Studies in Political Economy

Norman Schofield
Gonzalo Caballero
Editors

The Political Economy of Governance

Institutions, Political Performance and Elections

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Introduction

Norman Schofield and Gonzalo Caballero

In recent years, political economy has advanced in the understanding and modeling of institutions, democracy, governments, the behavior of policymakers and the nature of voting in society, among other issues. Politics and economics have interacted to make new contributions to political and economic theory.

The current volume includes contributions from authors of papers that were presented at the conference on the *Political Economy of Governance, Institutions and Elections*, held in Baiona, Spain, April 2014, under the auspices of the University of Vigo. The editors thank the University of Vigo, and the Weidenbaum Center at Washington University in Saint Louis for the support they provided. Moreover, other chapters have been invited to be included in this volume too.

Each chapter in this book went through a review process before publication. These chapters deal with theoretical and empirical issues over the behavior of institutions and the operation of democratic elections. Below we briefly sketch the topics discussed in these chapters.

Part I: Institutions

1. Demand for Wealth Reducing Institutional Change. The Role of Ideas and Interests Thráinn Eggertsson (University of Iceland)

Dani Rodrik (2014), in a recent paper, calls on economists to recognize the role of ideas in institutional change. This chapter takes up the challenge by considering ideas about how the world works and ideas about the legitimacy of social arrangements, distinguishing between instrumental models (the relations between instruments and outcomes) and moral models (issues of legitimacy). I then explore an empirical case, the efforts by the government of Iceland 2009–2013 to dismantle the country's regulatory system of ocean fisheries, which is based on individual transferable quotas and widely seen as the most efficient system of its

kind in Europe. The exports of fish products have for more than a century been Iceland's engine of growth. The attempts at introducing inefficient institutions came in the wake of, and even as a response to the country's dramatic 2008 financial collapse. I identify seven instrumental and moral theories that were crucial for the reform process. The decision makers' varying understanding and acceptance of these ideas gave substance to the traditional variables of power and interests and influenced how the agents responded to individual transferable quotas.

2. Cultural Legacies: Persistence and Transmission Leonid Peisakhin (New York University Abu Dhabi)

It is well established that institutions evolve in a path-dependent manner, yet this essay shows that certain types of formal institutions leave a cultural legacy by creating political attitudes and behaviors that can persist for a surprisingly long time even in the face of hostile material and institutional environments. Making use of a natural experiment of history, a partition of a homogenous population of ethnic Ukrainians between Austrian and Russian empires, the chapter demonstrates how differences in political preferences that came about as a result of a historical accident have persisted over the course of several centuries. The essay records contemporary differences in political attitudes and behaviors in a survey of over 1,600 individuals residing in settlements that are located within 15 miles of a long-defunct Austrian-Russian imperial border. The chapter also proposes and tests a theory of political identity transmission. It finds that families, as long as they remain embedded within likeminded communities, play a vital role in transmitting historical political identities. By contrast, state institutions, and especially schools, are dominant in identity building and transmission in families where historical political identities have not taken root.

3. Judicial Independence: Evidence from the Philippine Supreme Court 1970–2003 Desiree Desierto (University of Wisconsin-Madison)

Is the Philippine Supreme Court independent from the Executive branch? Using data from Haynie et al.'s (2007) High Courts Judicial Database, I compare how each of the ten Chief Justices from 1970 to 2003 decides cases involving the national government 2 years prior and 2 years after their appointment as Chief Justice, in a difference-in-differences framework. To verify whether differences could be due to selection bias from the possible non-random assignment of cases and strategic timing of decisions, I also verify whether panels that did not include the Chief Justice exhibit differences in behavior during the same 4-year time periods. I find that they do not. In contrast, it is only the panels that include the Chief Justice which show some significant differences in the probability of favoring the government in its decisions pre- and post-appointment of the Chief Justice.

4. Comparative Analysis of Institutional Incentives and Organizational Adjustment of Social Actors in Eight European Countries Rosa Nonell (University of Barcelona) and Ivan Medina (Autonomus University of Madrid)

This chapter compares the institutional differences between some European social actors and their implications in the policy-making process. We observe

the difference between reinforcement of social pacts or reinforcement of social actors and their results in economic performance. We emphasize the pernicious effects of bargaining systems excessively based on institutional rewards and political rationales as opposed to centralized and coordinated bargaining system. If the roles of social actors in economic policy-making are restricted in exchange for monopoly of representation, that reduces the necessity to recruit new members and ensures access to public resources. In the case study between different countries firstly, we argue that social pacts are often short-sighted compromises with no compulsory clauses concerning policy outcomes. Secondly, we point out that political social pacts draw upon numerous trades off logics between the government and social actors. In this case, thirdly, such a scenario urges social actors to be focused primarily on institutional representation. However, they face serious constraints as far as most of the advisory forums and monitoring institutions remain outside the core of decision-making. The cases of Spain and Italy give the best examples to understand the incapacity to resolve political and economic problems with these instruments.

5. The Historical Origins of Regional Economic Inequality in Spain: The Cultural Legacy of Political Institutions David Soto (University of Vigo)

This chapter delves into the role of historical institutions and culture in current regional economic inequality in Spain. It starts from the theoretical basis that there exist certain cultural traits that are associated with a better economic performance within a liberal institutional framework—these include generalized trust, orientation toward political issues, associative participation, attitudes toward individual independence. These are highly persistent and were partly shaped by political experiences in the distant past. With regard to the relevant historical facts that could have led to the promotion of these cultural traits, this study relies on two different but related works: Tabellini (2010) and Guiso, Sapienza and Zingales (2008). Specifically, two historical political aspects that vary regionally are considered: the type of political institutions in the Early Modern Age and the level of local autonomy in the High Middle Ages. The former is measured by the political constraints on the executive within the period 1600–1850 and the latter by the level of autonomy in the formation process of the local legal order between the eleventh and fifteenth centuries. This work empirically tests this causal argumentation that relates past political institutions to current regional economic distribution through this cultural legacy. The results support this hypothesis and are robust even against other so-called fundamental causes of development such as geography and human capital.

6. Institutional Change in Spain from Francoism to Democracy: The Effects of the Great Recession Gonzalo Caballero and Marcos Álvarez-Díaz (University of Vigo)

Institutional Change in Spain in the second half of the twentieth century has been a story of success. After the Spanish Civil War, a dictatorship was established in the country in 1939 and the political regime implied an institutional design that evolved over time. In 1959, there was an important reform that propelled

economic markets and development, and the death of General Franco in 1975 opened up a period of institutional change that conduced to democracy. The new self-enforcing institutional framework that emerged in the political reform of democratization has implied a modern democratic system, the adhesion to the EU and an Europeanization of civil society, a decentralization political process, social and cultural modernization, the making of a Welfare State and the expansion of the economy. These institutional foundations adequately worked until the Great Recession that has intensely affected the Spanish economy since 2008. The huge economic crisis has implied electoral changes, new social movements and distrust on political institutions, and understanding these trends is relevant to study how the economic crisis can influence the process of institutional change in Spain. Therefore, this study attempts to provide new and original empirical evidence on the existence of a long-run relationship between economic crisis and political trust in Spain using monthly data. Specifically, the Autoregressive Distributed Lag (ARDL) approach to cointegration is employed to discover such relationship, and to quantify the impact of the economic crisis on the Spanish political trust. The empirical findings indicate that the economic crisis has a negative impact on political trust and provide an estimation of this effect.

7. Institutional Determinants: A Case Study of IMF Programme and Non-programme Countries Omer Javed (University of Barcelona)

The study attempts to explore significant determinants of institutional quality—economic and political—in the case of non-programme- and programme countries. The period of analysis is 1980–2009, as the activity of IMF increased during this time. Results primarily indicate that military in power significantly reduces institutional quality, while improvement in property rights, openness, aggregate governance, and real GDP growth all remain highly important in improving institutional quality, while enhancement in monetary- and investment freedom also help; and hence need to be the focus of IMF programmes.

Part II: Democracy

8. An Experimental Study of Jury Voting Behavior Lisa R. Anderson (College of William and Mary), Charles A. Holt (University of Virginia), Katri K. Sieberg (Tampere University) and Allison Oldham (University of Virginia)

This chapter uses experimental analysis to test the Feddersen and Pesendorfer (1998) theoretical results regarding the Condorcet Jury Theorem. Under the assumption that jurors will vote strategically (rather than sincerely based on private information), Feddersen and Pesendorfer derive the surprising conclusion that a unanimity rule makes the conviction of innocent defendants more likely, as compared with majority rule voting. Previous experimental work largely supported these theoretical predictions regarding strategic individual behavior, but failed to find support for the conclusions about the relative merits of unanimity and majority

rule procedures in terms of group decisions. We extend this literature with an experiment in which the cost of convicting an innocent defendant is specified to be more severe than the cost of acquitting a guilty defendant. This payoff asymmetry results in a higher threshold of reasonable doubt than the 0.5 level used in earlier studies. We find very little evidence of the strategic voting predicted by theory (even for our asymmetric payoff structure) and no difference between the use of unanimity and majority rules. Overall, it was very difficult for the juries in our experiment to achieve a conviction, and no incorrect convictions occurred. Our experimental results suggest that the standard risk neutrality assumption can lead to misleading conclusions. We argue that a high cost associated with convicting the innocent can interact with risk aversion to produce an even higher threshold of reasonable doubt than would result from risk neutrality, which tends to neutralize the negative effects of strategic voting under a unanimity rule.

9. Trading Portfolios: The Stability of Coalition Governments Betul Demirkaya and Norman Schofield (Washington University in St. Louis)

In this chapter, we explore the question of how the inclusion of a niche party influences the allocation of ministries in coalition governments. In particular, we ask whether niche parties have an advantage because of higher values that they place on certain ministries that the other parties are less interested in. We provide a model where two parties are dividing a portfolio of three ministries, and compare the stable coalitions formed by two mainstream parties with those formed by a mainstream party and a niche party. The results show that in some cases the niche party is able to form stable coalitions with higher payoffs than the mainstream party. This advantage, however, makes the niche party a less desirable coalition partner because the latter cannot commit not to ask for better payoffs.

10. A Median-Activist Theorem for Two-Stage Spatial Models Daniel Kselman (IE Business School, Madrid)

The spatial model of electoral competition has for decades been a staple of formal political theory. As part of this field, a number of authors have developed two-stage spatial models in which electoral candidates must first win intra-party primary elections, and then compete in a general inter-party election. A universal result in these two-stage models is that party selectorates, and in particular the "median party activist," exert a centrifugal pull on party platforms. The current paper brings this basic finding into question, suggesting that party voters only exert this centrifugal force under fairly strict conditions; and in particular only if candidates attach fairly high value to the outcome {Win Nomination, Lose Election}. The paper's primary result, a "Median-Activist Theorem," suggests that if candidates place little value on winning the nomination in and of itself, primaries are necessary, but not sufficient, for generating more extreme electoral platforms.

11. No Polarization in Spite of Primaries: A Median Voter Theorem with Competitive Nominations Gilles Serra (CIDE, Mexico City)

It is commonly assumed that primaries induce candidates to adopt extremist positions. However, the empirical evidence is mixed, so a theoretical investigation

is warranted. This chapter develops a general model introducing the fundamental elements of primary elections in the well-known spatial voting model by Downs (1957). In spite of significant incentives for candidates to diverge, I find the surprising result that they will all converge to the median voter's ideal point. The result in this paper suggests that primaries are not sufficient to create polarization by themselves. Rather, for candidates to diverge from the center, other complementary features must be present. An implication is that previous formal results in the literature predicting that primaries lead to polarization probably contain other factors that must be interacting with primaries. Future research should endeavor to disentangle these factors.

12. Downsian Competition with Assembly Democracy María del Pino Ramos and M. Socorro Puy (University of Málaga)

This chapter studies a scenario of political competition between two parties, a traditional downsian party and a party implementing assembly democracy. The latter party celebrates a pre-electoral assembly and a post-electoral assembly open to all who wish to take part in which citizens are invited to launch proposals and vote over them. The multiple proposals at the assembly generates a lottery over some policies which is evaluated by voters against the single policy proposed by the traditional party. We show that extremist assembly parties induce the traditional party to locate at the median policy position, whereas centrist assembly parties move the traditional party away from the median just in the opposite direction of the assembly's median. Besides, we find that centrist assemblies, with respect to extremist assemblies, have more chances of winning the elections.

13. Rent Seeking and the Size of Parliamentary Majorities Jan Klingelhöfer (RWTH Aachen University)

This chapter presents a model in which the party that loses the general elections can still try to capture the majority in Parliament by convincing members of the majority faction to switch sides. These attempts are not successful in equilibrium. Nonetheless, the results of the general elections are partly determined by this additional stage of political conflict. Larger majorities are shown to lead to lower rent payments and some voters therefore face a trade-off between lowering rent payments by supporting the party that wins the elections or supporting their preferred party. Multiple equilibria in the general elections with either party winning are possible. Moreover, the size of the equilibrium majority is larger than when no bribes after the elections are possible.

14. A Comment on Choice Rules and Median Outcomes Jon Eguia (Michigan State University) and Francesco Giovannoni (University of Bristol)

This chapter studies one particular property of voting rules in applications in which the choice set is one-dimensional: whether the median alternative is chosen. Our results suggest that with three or more alternatives, it is difficult to rule out non-median outcomes, even if all voters have linear Euclidean preferences.

15. How Should Votes Be Weighted to Reflect the Existing and "Calculated" Distribution of Voting Power of Weighted Voting Organizations Integrating Different Majority Requirements? Michèle Khouri-Hagot (IESEG School of Management, Paris) and Bertrand Lemennicier (Sorbonne University, Paris)

Voting weight and voting power are not necessarily equal. The former represents the number of votes allocated to each member while the latter represents the ability of a member to influence voting outcomes. In this paper, we observe that, in general, "calculated" voting powers, measured by the normalized Banzhaf index, tend to be linearly linked to voting weight. However, there are key exceptions; larger countries or "outliers" have powers far less or more than proportional to their weight and their powers vary with majority requirements. First, based on a sample of weighted voting organizations [African Development Bank (AfDB), International Bank for Reconstruction and Development (IBRD), International Fund for Agricultural Development (IFAD), and International Monetary Fund (IMF)], in 2008, we confirm the main results of Fisher and Schotter (1978) and Dreyer and Schotter (1980): despite the change in the distribution of voting weight since the 1978 or 1999, in 2008 our findings show that under simple majority requirements, especially for larger contributors, voting powers are greater than voting weight while under qualified majority requirements voting powers are far less than voting weight. Second, inspired by Leech (2002), we ask, ourselves, how the votes should be weighted to reflect the existing and "calculated" distribution of voting power, or the potential "calculated" voting powers a larger country could expect with its "existing" voting weight if proportionately between weight and voting power is the one observed for all other smaller countries and is the desired one. In this last case, we offer an estimation of the opportunity cost of cooperation in the international organization in terms of loss of power but at the same time an estimation of the minimum implicit gains which cover these costs.

Part III: Elections

16. Party Activists in the 2009 German Federal Election Norman Schofield (Washington University in St. Louis) and Anna-Sophie Kurella (University of Mannheim)

Formal modelers of party competition often have to face the fact that their models predict far too centrist equilibrium positions when compared to empirically observed party positions. Various components have been suggested as extensions for the standard Downsian spatial model, in order to receive more plausible, diverging equilibrium configurations. One important improvement was the inclusion of a valence term that accounts for non-policy related factors that influence vote decisions. The underlying assumption is that valence describes an overall perceived external popularity or competence, that is ascribed to a party and/or its leader and cannot be attributed to the parties' policy position. This valence term is thus assumed to be exogenous and constant among the voters. The model can further be extended

by the inclusion of an additional individual specific non-policy element, such as partisan bias or ideological distances to party positions. This stabilizes the formal game of party competition by diminishing the probability of parties leapfrogging each other in equilibrium configurations. Still, the predictions of those models show significant discrepancy to empirical party configurations.

17. Application of the Variable Choice Logit Model to the British General Election of 2010 Elena Labzina and Norman Schofield (Washington University in St. Louis)

The chapter aims to estimate the modification of the classic spatial electoral model and to evaluate the convergence of the electoral system at the origin for the case when the assumption of irrelevant alternatives (IIA) is violated, and, hence, the standard multinomial logistic model is inapplicable. The work looks at the General British election of 2010, in which the voters from Scotland and Wales could vote for Scottish National Party and Plaid Cymru, respectively, in addition to the parties common with the voters of England. To account properly for the presence of these additional parties, the theoretical model of Yamomoto (2011) for the varying choice logit is implemented by applying Gibbs sampling. For the convenience of the analysis, the set of common parties is restricted to the three major parties, the Conservatives, Labour and Liberal Democrats, that are of our main interest. In the end, we find that the electoral system diverges, because of the saddle location of Plaid Cymru. Meanwhile, conditional on the insignificance of this party, the system converges. A separate study of Scotland is particularly relevant because of the referendum on Scottish independence in September, 2014. The method deployed here is also relevant in many countries in Europe where there are regional parties, including Spain, Belgium and Italy.

18. Turnout and Polarization Under Alternative Electoral Systems Konstantinos Matakos (London School of Economics), Orestis Troumpounis (Lancaster University) and Dimitrios Xefteris (University of Cyprus)

This chapter presents a formal model of electoral competition where parties' platforms are endogenously chosen and depend on the degree of the electoral rule disproportionality. We first show that proportional electoral systems generate centrifugal forces that increase candidate differentiation. This in turn implies that more proportional systems are associated with lower levels of abstention from indifference. This two-step theoretical prediction of the effect of electoral systems on turnout is then empirically validated even when we jointly control for the prevailing pivotality and party-system size hypotheses. Thus, our work highlights an additional link in the proportionality-turnout nexus.

19. Fiscal Deficits and Type of Government: A Study of Spanish Local Elections Joaquin Artes (Universidad Complutense) and Ignacio Jurado (University of York)

The literature on public choice has largely argued that when several actors are part of a decision-making process, the results will be biased towards overspending. However, the empirical studies of the effect of minorities and coalition governments on spending have yielded mixed support for this theoretical claim. This chapter

argues that the inconclusiveness of the empirical evidence is related to problems of standard regression models to accurately capture unobserved heterogeneity. We use data from Spanish municipalities for the period 2004–2011 to compare the results of four typically used estimation methods: mean comparison, OLS, fixed-effects regression, and matching. We argue that out of these models, matching deals better with unobserved heterogeneity and selection bias of the type of government, allowing us to reduce estimating error. The results show that, when we account for these problems in a matching model, minorities run lower surpluses than single party majorities. This result did not arise in simple mean comparisons or OLS models, or even in the fixed-effects specification. These results give support to the law of 1/n (Weingast et al. 1981) and also underscore that in order to identify correctly the impact of government characteristics on policy-making, we need to understand that these are not randomly assigned across our units of observation. This advises the use of more quasi-experimental methods in our empirical research.

20. Federalism, Proportionality and Popular Will in US Presidential Elections: Did Colorado Have the Right Idea? Jose Manuel Pavia and Fernando Toboso (University of Valencia)

As is well known, the USA is a federal country composed of 50 states plus the District of Columbia, where the individual states and the country as a whole are each sovereign jurisdictions. This is reflected everywhere in its political-administrative structure, including the election of the US President, who is elected by the Electoral College and not directly by the people; an issue that provokes a confrontation between abolishers of the Electoral College and supporters of the current system each time a candidate not winning the most popular votes is elected President (last time in 2000 elections). Between both extremes, there are intermediate solutions that, while continuing to respect the spirit of a federal nation like the USA, enable proportionality to be incorporated into the process. This was, for example, the idea behind Amendment 36 to the Colorado Constitution (LCCGA, 2004). After studying the merits and drawbacks of the current system, this paper investigates what would have happened if Colorado proposal had been used nationwide in Presidential elections from 1828 to 2012. The chapter concludes that the Colorado idea might have made electoral colleges' results closer to popular will, would have diminished the risk of electing a non-popular winning President and would have served to require a more balanced regional support to be elected. As counterpart, it would have encouraged the emerging of third minor candidates.

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About the Editors and Authors

Norman Schofield was the Director of the Center in Political Economy at Washington University in Saint Louis from 1992 until 2012. He is currently the William R. Taussig Professor of Political Economy, and Professor in the Departments of Economics and Political Science. He has Ph.Ds in both government and economics from Essex University, a LittD from Liverpool University, and a doctorate from the University of Caen. His research includes the theory of social choice, political economy, and democracy. He has written several books, including Multiparty Government (with Michael Laver, in 1990), Social Choice and Democracy (Springer, 1985), and edited or co-edited ten volumes, including The Political Economy of Institutions, Democracy and Voting (co-edited with Gonzalo Caballero, Springer, 2011). His book, Mathematical Methods in Economics and Social Choice, was published by Springer in 2003, and the second edition in 2013. In 2006, he published Architects of Political Change as well as Multiparty Democracy (with Itai Sened) both with Cambridge University Press. His book, The Spatial Model of Politics, was published by Routledge in 2008, followed by The Political Economy of Democracy and Tyranny in 2009 with Oldenbourg (Munich). His book, Leadership or Chaos (co-authored with Maria Gallego) was published by Springer in 2011. He has been the recipient of a number of NSF awards, most recently one on electoral politics and regime change. In 2003, he was the Fulbright distinguished professor at Humboldt University and, in 2007 and 2008, visiting fellow at ICER in Turin. In Spring 2008, he was the visiting Leitner Professor at Yale University and was a National Fellow at the Hoover Institution in summers 2009 and 2010. He was recipient of the Riker prize for contributions to political theory in 2002, and was elected to the American Academy of Arts and Sciences in 2005.

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Part I
Institutions

Demand for Wealth-Reducing Institutional Change: The Role of Ideas and Interests

Thráinn Eggertsson

1 Introduction

Rodrik (2014), observing that a raison d'être of political economy is to explain why rational actors often support wealth-reducing institutional change, asks why ideas have little or no role in modern economic analysis. Political economy does not assign an independent role to ideas but links inefficient outcomes to pressures from organized interests and to the cost of collective action. Usually the models assume instrumental rationality, which implies full knowledge of all potential policy tools and associated outcomes, either in absolute terms or as probabilities. Rodrik (2014, 190) challenges the practice of assuming that "there is a well-defined mapping from 'interests' to outcomes. This mapping depends on many unstated assumptions about the *ideas* that political agents have about: (1) what they are maximizing, (2) how the world works, and (3) the sets of tools they have at their disposal to further their interests." A few economists have studied how ideas influence political agents but their approaches have not initiated major research programs (Leighton and López 2013). For instance, North (1990, 2005) in his work on economics of institutions gives a central role to ideas and ideology but Acemoglu and Robinson (2008, 2012, 2013), who (among others) have continued North's work, do not rely on ideas as key explanatory variables.

Analyzing and measuring the role of ideas in institutional change challenges the usual methods of economics. The scholar must often deal with potentially untestable hypotheses, preference falsification, and the complex issue of explaining the birth

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and death of ideas.[1] Yet in daily life we observe decisions by neo-Keynesian or perhaps supply-side macro central bank directors and ideological suicide bombers that apparently are motivated by particular rather than universal ideas. Some of our standard economic concepts are not entirely irrelevant when we examine the influence of ideas on behavior. The notion of substitution applies to idea-motivated behavior; except perhaps for suicide bombers, corner solutions are not the rule. People consume low-cost ideas to enjoy an internal glow; strategically invest in ideas to get ahead in politics and obtain material benefits; and sometimes they make moral commitments to ideas and are willing to pay a high price for their beliefs. In principle we are able to test instrumental ideas or models, which correspond to positive social science, but the validity of moral models is by definition untestable.

The purpose of this paper is to examine the role of ideas in the emergence of pressures for wealth-reducing institutional change. In the following two sections, I outline my framework. In Sects. 4 and 5 I examine an empirical case, attempts by the government of Iceland in 2009–2013 to implement wealth-reducing institutional change in the country's ocean fisheries. The Iceland fishing industry, which unlike the country's other industries is the most efficient industry of its kind in Europe, became a local symbol for the drastic collapse of Iceland's banking sector. Facing potential insolvency from the 2008 crisis, the government gave priority to two major structural changes, applying for membership in the European Union and dismantling the institutions governing the country's fisheries. A final section concludes.

2 The Ideas: Instrumental and Moral Models of the Social System

One way to classify modern social models (ideas, theories) is to distinguish between the top-down paradigm and the bottom-up paradigm.[2] Economic history of the last 250 years or thereabouts reveals an ideological pendulum swinging slowly back and forth between the two paradigms with each journey lasting several decades (Eggertsson 2005, Chapter 3). As the pendulum swings, the various ideologies of political parties and other social groups (including social scientists) are revised in the direction of the paradigm shift. There are those who ignore current trends, as we shall see, but they are relatively few.

[1] See Kuran (1995) on preference falsification. We may theorize about types of environments that are most likely to stimulate creativity but obviously we do not foresee new ideas.

[2] The distinction between the top-down and bottom-up paradigms bears a superficial but misleading resemblance to the macroeconomics and microeconomics distinction in economic theory. The content of mainstream economics changes as the ideological pendulum swings between the two paradigms. In the bottom-up phase, macroeconomics takes on the appearance of microeconomics.

In economics, central planning belongs squarely with the top-down paradigm and laissez-faire to the bottom-up paradigm. Each paradigm emphasizes specific issues at the expense of other concerns. The top-down approach exaggerates the knowledge and information of central managers and ignores or plays down the importance of individual incentives. The favored idea is that central managers can scientifically direct social organizations toward desired goals. The bottom-up approach emphasizes the dispersion of information and knowledge and the belief that market competition is an effective mechanism for coordinating economic activities. The former approach overestimates the capacity and willingness of central managers to internalize social externalities, and the latter overestimates the capacity of decentralized individuals to negotiate around externalities.

The swings of the ideological pendulum are driven by widespread dissatisfaction with outcomes associated with the dominant paradigm of the day. The dissatisfaction may be linked to catastrophic events, such as the Great Depression and the Financial Crisis of 2008, or the gradual deterioration of social systems, such as the decades-long decline of the Soviet Union or slow productivity growth and increasing income inequalities in market economies.

The two paradigms provide a general background for specific ideas about how the social world works. These specific ideas (models, theories) can be divided into instrumental models and moral models. Instrumental models are theories about the relationship between policy instruments and social outcomes. The term social technology refers to applied knowledge derived from instrumental models, involving practical methods for building and maintaining social systems. Long-run economic growth depends on new ideas and the creation of both new social technologies and new physical technologies. The two technologies are complements. Major social technologies include the creation of money, the corporation, limited liability, patents and copyright, and China's dual-track system.

The assumption that political agents, no less than economic ones, make rational decisions and optimize leads us directly to the idea of social equilibrium.[3] In social equilibrium, only unexpected and uncontrollable events upset the balance of power, and reformers have no obvious role. New ideas sometimes provide a way out of such traps because they are usually unexpected events that may upset the balance of power. Moreover, new social innovations can create win-win situations for both proponents and potential opponents of wealth-enhancing reforms (Rodrik 2014, 198–201). The famous dual-track system that China used in its transformation process is an example of how ideas can overcome a pernicious social equilibrium.[4]

[3]Bhagwati (1978), in an early recognition of the limits to reform, refers to the implications of endogenous policy as the "determinacy paradox." Eggertsson (2005, 142–145) discusses the determinacy paradox.

[4]The authorities in China maintained existing planning quotas but allowed economic agents to produce for the market once they had met the assigned planning targets, thus creating opportunities for the agents to profit. The dual-track system, at least in theory, came close to meeting the marginal efficiency conditions of neoclassical economics (Qian 2003).

Moral models of the social world contain ideas about the legitimacy of institutions and paradigms. An institution is valued in itself and/or for its consequences (its instrumental usefulness). For many people, the death penalty is an illegitimate institution, irrespective of its power to deter murderers.[5] Moral models are not required for explaining social change if they are merely a convenient cover for material interests, whereas independent moral ideas, even weakly held ones, can have significant impact on social change. Social entrepreneurs, for instance, political ones, often focus opposition to (or support for) a particular social institution by linking it with fundamental values. Court decisions also are often grounded in moral values.

Institutional change involves four types of players. The ultimate power to set formal rules is with the rule maker—the state. The rule maker category includes the executive and legislative arm of government and also the judiciary. New rules confer formal property rights on actors when they perform in specific social roles. They are the right holders. Right holders demand new rules when they believe that the status quo hurts their (material) interests and alternative arrangements will improve their lot. New institutions (property rights) are unlikely to function effectively unless they meet basic requirements of the right holders and are suited to their circumstances. Also, new rights for a subset of the citizens require at least tacit support of other actors, the duty bearers. Duty bearers can render rules ineffective by disobeying them and by acting through the political process. I distinguish two types of duty bearers. Material duty bearers are asked to obey rules that hurt their material interest, for instance, by excluding them from access to specific resources. Moral duty bearers are required to obey rules that they see as illegitimate and morally wrong although the rules do not affect their material interests.[6]

3 The Case: A New Social Technology and Relevant Social Ideas

3.1 The Logic of ITQs in Marine Fisheries

High costs of exclusion and enforcement have rendered impractical the use of traditional exclusive property rights to regulate the harvesting of migrant marine species in the oceans, thus inviting some form of open access. In the second half of the twentieth century, perverse interactions between steady increase in demand, improvements in fishing technology, and flawed ownership arrangements created

[5] Instruments of policy are visible and unambiguous but the related outcomes are not, for instance, in the case of the death penalty. Uncertainty about outcomes creates an opportunity for competing social entrepreneurs to make their cases for and against particular institutions.

[6] The same agent can be simultaneously both material and moral duty bearer, although empirically it may be impossible to measure the impact of each component on behavior.

worldwide excess fishing capacity, excessive costs, and threats to fish stocks. Both direct open access and indirect open access, which is associated with aggregate limits on total allowable catch, a TAC regime, make fishers race to the grounds to catch the fish while it lasts.[7] The competition to be first creates output patterns for the industry that ignore the time structure of consumer demand and various other consumer preferences. The invention of individual transferable quotas, ITQs, is a prime example of how a new idea—new social technology—can revolutionize an industry. In marine fisheries, ITQs overcome transaction cost barriers to exclusive rights and drastically reduce the costs associated with open access.

ITQs for marine resources is a hybrid form of exclusive property rights where the rule maker and the right holders divide various tasks between them that in other market-based industries are usually the responsibility of private owners. In the Iceland fisheries, the rule maker sets total allowable annual catch for each species (TAC), allocates shares in TAC to individual operators, monitors the biological conditions of each species, protects breeding grounds, and enforces the system by measuring the output of each operator. Those who possess ITQ shares hold user rights (measured as percentages of TAC for each species) in the fisheries for an unspecified number of years. In Iceland, beginning in 1984, individual quotas were allocated to vessel owners based on their prior fishing history (the grandfathering rule). Individual quotas can be inherited and used as collateral but paradoxically the possession of fishing quotas does not confer full exclusive property rights on the holders. The basic law governing the ITQ system makes the people of Iceland owners of the country's marine resources and permits the state to repossess fishing quotas without compensation. This discrepancy between formal and economic property rights soon created bitter political controversy.

Iceland and New Zealand were the first countries in the world to use ITQs for regulating their entire marine fisheries. Our case study only looks at the experience of Iceland, a high-income European country in the North Atlantic with a small population (approximately 330,000) and surrounded by rich fishing grounds. Economic growth in Iceland since the late nineteenth century has been export driven and fish products have been the critical export.[8] Until the country's severe financial crash of 2008, economic setbacks have always been due to adverse developments in the fisheries. Given current pressures of demand and technology, Iceland cannot afford inefficient regulations in the fisheries, unlike the countries of the European Union, which can easily live with their wasteful common fisheries policy.[9]

[7] In theory, a fisheries ministry could complement a TAC with a long list of constraints intended to prevent indirect open access. The industry would then be micromanaged by the ministry. Such attempts have not been successful.

[8] In 2011 the fishing industry employed some 5 % of the Icelandic labor force. The industry contributed 11 % to GDP and 38 % to the country's goods exports. The export share underestimates the importance of the fisheries because the other major export item is primary aluminum and ferrosilicon made from imported metallic minerals. The producers use the country's abundant geothermal and hydroelectric energy to power their smelters.

[9] On the EU fisheries policy, see Khalilian et al. (2010).

The reception of the ITQ system in Iceland reflects a complex mix of ideas and interests. Instrumental models have influenced people's beliefs about the operational qualities of the system and whether for reasons of efficiency the state should shift its taxation toward the fisheries, making it carry much higher taxes proportionally than other industries. Beliefs that the recent wealth of fishers is illegitimate are grounded in moral models. I now briefly summarize key ideas that have influenced how the Icelanders have responded to the ITQ system.[10]

3.2 Instrumental Models: Economics of Property Rights

3.2.1 Direct and Indirect Open Access

The economic consequences of direct open access in fisheries (and in other spheres) are well established among experts. Under direct open access, independent fishers enter a fishery ignoring the negative external effects they create for other fishers by reducing their catches. New entry continues until total cost in the fishery equals total revenue—and then the acquisition of potentially valuable new fishing grounds would make no contribution to GDP. The net effect is only to reallocate labor and capital from other industries to fishing. In the process, fish stocks may collapse due to overfishing. If the rule maker sets sustainable TAC (but not individual quotas) and enforces the limit, fish stocks will not be destroyed but races to be first to the grounds create excessive costs and inefficient marketing strategies, which is also true of direct open access. Under a TAC regime, in the limit new fishing grounds also make no contribution to GDP.

3.2.2 Characteristics of Efficient Exclusive Property Rights

The economics of property rights identifies various characteristics that are required for exclusive rights to function efficiently (Barzel 1989). The most general attributes of efficient exclusive property rights are four: The rights must be unambiguous and clearly defined, secure from appropriation, granted for a very long (if not infinite) period of time, and transferable. These characteristics are required for providing ex ante incentives for investment as well as efficient management and use. The fourth condition, transferability, brings us to the Coase theorem.

3.2.3 The Coase Theorem

The Coase theorem states that ownership rights will end up in uses of highest value, when transfer is permitted, ownership rights are clear, and high transaction costs

[10]Eggertsson (1990) discusses these models in greater detail and provides basic references.

do not prevent the exchange (Coase 1960). Evidence in Iceland shows that fishing quotes can easily be traded.

3.3 Instrumental Models: Optimal Taxation

3.3.1 The Windfall-Gains Principle

When a rule maker gives away valuable exclusive property rights, the recipients receive windfall gains. If the recipients sell their originally free exclusive rights at full price in the market, the buyers do not share in the original windfall; the gains stay with the original recipients. If the state changes its mind and decides to tax outstanding fishing quotas at a rate comparable to their market price, the windfall-gains principle implies that the tax authorities are compelling second and later generations of owners to pay twice for their fishing licenses.

3.3.2 Taxing Pure Rent

Economics of taxation tells us that taxes usually distort the allocation of resources, except taxes on pure rent. Pure rent is linked to the abstract idea of a virgin natural resource that has only one use and has never been maintained or improved through investments. The supply of the resource units is perfectly inelastic—high taxes do not reduce the amount supplied. Many observers in Iceland, including economists, believe that marine resources are a pure natural resource or that it is possible for the state to measure and tax the pure component with no effect on resource allocation. The idea of pure rent goes at least back to David Ricardo (1772–1823) who identified as pure rent the increasing return on high-quality agricultural land when inferior quality land is put into use to meet demand (population) pressures. Other economists argue that the idea of pure rent is inoperative as a tax base once we recognize how risk, uncertainty, and costly information influence business strategies and the creation of value. The contribution of a fishing industry is more complex than simply providing transport services between the fishing grounds and the market. The American economist Frank Knight (1885–1972), claiming that the pure rent concept is a useless abstraction, argued that one should model natural resources as a flow variable rather than a stock variable. Knight reasoned that entrepreneurs produce natural resources over time through search, experimentation, and trial and error. In fisheries, the experiments involve new methods of locating and harvesting resource units, the study of consumer preferences, and the development of new products and market networks. The tax authorities lack information and the capacity to measure which part of these processes, if any, constitutes pure rent (Knight 1933, 1953).

3.4 Moral Models: Knowing Right and Wrong

3.4.1 Opposition Ideology

Chai (1998) shows empirically that in the post-World War II period, countries that had newly broken away from Western colonial rule initially ignored the long swings of the ideological pendulum. The first generations of leaders, according to Chai (1998), had internalized opposition ideology or social policy models that were different from (opposite to) the perceived laissez-faire models of the colonial masters. Opposition ideology usually favors strong state control of the economy. Chai found that developing countries that had not been colonialized usually were not attracted to this ideology.

Iceland fits well with Chai's findings. For several centuries, Iceland was part of the Kingdom of Denmark but became a fully independent republic in 1944. Iceland identifies with the other Nordic countries. It has developed a welfare system of the Scandinavian variety and is a founding member (in 1952) of the Nordic Council that organizes economic and social cooperation in the region. Yet in the postwar period involvement by the state in the economy was far greater in Iceland than in the Scandinavian countries. Until toward the end of the twentieth century, nearly all large-scale economic units were controlled by the state. The government managed the financial system, each organization having three directors representing the three largest political parties. For most of the postwar period, real interest rates were negative and bank loans amounted to a subsidy. In the fishing industry, internal prices were determined administratively by government-controlled committees.

In the late twentieth century, Iceland did not deliberately seek to liberalize the economy, but the government was twice compelled to introduce bottom-up approaches in order to keep open its European export markets (for fish). Exports and imports were liberalized in 1970 when Iceland reluctantly joined the European Free Trade Association, EFTA. Another huge wave of reforms came in 1992 when again export concerns forced Iceland to join the European Economic Area, EEA, and introduce free international capital movements, privatize the financial system, and adopt the economic institutions of the European Union, except in fisheries and agriculture.

Like many small places, Iceland has tight social networks and a culture of equality. Unconventional behavior and conspicuous consumption are carefully observed and a sudden rise from rags to riches often meets with social disapproval. External impulses introducing the institutions of capitalism have not eroded the nation's deeply ingrained opposition ideology.

3.4.2 People's Property

The idea of people's property (which fits well with opposition ideology) has a strong hold in Iceland but only as a moral category. There is virtually no interest among the

economists, intellectuals, or members of the public who favor the idea to develop instrumental models and social technologies for making this form of ownership operational, for instance, through equal universal shares, and thus distinct from state property and conventional nationalization.

Although the law states that all marine resources in the country's economic zone are people's property, operationally the resources are state property, except that the law does not permit the government to permanently alienate the resources. As the constraint is not embodied in the country's constitution, the government could in theory sell the marine resources provided it would first change the law. There is, however, strong cross-party support for adding a people's property clause to the constitution. Many citizens feel that it is morally wrong if private operators become millionaires by exploiting a resource that belongs to the people. The fact that fishers pay taxes like other citizens does not exculpate them.

4 Political Economy of ITQs in Iceland: The Initial Phase

4.1 Why Major Institutional Change?

In the post-World War II era, Iceland has generally preferred top-down social technologies and never pioneered major market-based solutions, except for the ITQ system. The shift, which involved a drastic paradigm change at the industrial rather than national level, fits well with shock theories of major institutional change. The rule maker (and many other players) gradually realized the destructiveness of TAC regimes and saw the futility of central management and direct control in ocean fisheries. The degeneration of the system appeared on several fronts: alarming reports of declining stocks, excess capacity, mounting costs, and recurrent economic crises that simultaneously hit the fishing industry and the national economy.

In the late 1970s and in the 1980s, government scientists discovered that various fish stocks in Icelandic waters, initially the herring stock, were close to collapse. Beginning in 1984, the government in cooperation with the industry sequentially introduced individual quotas for each of the threatened species. Finally in 1990 the country's parliament passed a law making individual quotas transferable and extended the ITQ system to all major marine species in the country's economic zone. In 1990 Iceland had a left-center government. In parliament the country's largest center-right party did not support the market-oriented paradigm shift. Later during the 1990s, however, the political parties reversed their roles. Now the right defends the ITQs and the left opposes the system.

Initially, the quotas were allocated for free based on the recent fishing history of each vessel.

At the time, the choice of grandfathering was a practical solution because the industry operated at a loss and was in urgent need of financial support. In more normal times, the need to get cooperation from the powerful fishing industry would

have been a key consideration when deciding on free quotas. To sweeten the deal for small-time fishers excluded from the ITQ system (material duty bearers), the government opened loopholes for small vessels, creating for them a system parallel to the ITQs, which involved TAC and races to be first. The small-boats division spiraled out of control and was terminated in the late 1990s when the government set up a special ITQ division for small boats.

It is fair to say that the politicians who introduced the quota system did not fully appreciate the practical implications of the Coase theorem—the rapid and extensive reorganization of the industry and the new wealth that transfers and market pressures generated. In Iceland a new class of millionaires was born. In fact, even the market underestimated the eventual magnitude of these changes. Initially fishing quotas exchanged at a low price, and in some instances, they were given away to relatives and friends.

4.2 The Impact of the ITQs: The Right Holders

In theory an ITQ system puts pressure on fishers to reorganize their industry. Even free quotas have an opportunity cost; they can be sold. The owners must decide whether to continue fishing or sell their quotas to more efficient operators. In Iceland the fisheries were reorganized along several dimensions, although some of the changes are jointly due to the quota system and advances in technologies of fishing, processing, and communication. Many of these outcomes are transparent and available in official statistics. The industry solved at its own expense a serious problem of over capacity and in the process changed geographic location, scale of operations, types of fishing vessels, and reduced the number of enterprises. Government statistics record an upward trend in productivity and value added. Frequent economic crises no longer plague the fisheries. The reorganization has favored some regional fishing communities but others have suffered. The pay of workers on fishing vessel, which is based on shares in output, is very high relative to other workers with similar skills.

The ITQ system is also associated with improvements in product development and marketing, outcomes that are relatively opaque, even to outside experts. In essence, the new user rights and the opportunity cost of the quotas have replaced the previous races to the grounds and created strong pressure to maximize the value of the resource units, which requires a market-drive strategy. Because Icelandic fishers possess individual (annual) quotas, they are free to fish when international prices are high, unlike their competitors, for instance, in Norway, who lack this flexibility.

Domestic fish markets have emerged in the wake of the ITQ system, enabling operators to hone their skills by specializing in processing and marketing of specific fish products. Exchanges among fishing vessels of quotas for different species also aid specialization. International marketing has been quietly revolutionized. The industry is now sensitive to preferences of foreign consumers and new products

and various forms of governance have evolved, involving both integration in the value chain and the rise of specialized marketing firms. Competition is moving the industry toward 100 % utilization of the raw material, and for that purpose, clusters of innovative firms have sprung up around the fisheries. The cod is a source of meat, liver oil, tinned liver, and eggs but it also provides stomach enzymes used in cosmetics, gelatin capsules for holding drugs, hand and foot cream for diabetics wounds, and fish leather for the fashion industry (Knútsson and Kristófersson 2014).

Although the 1990 reform very substantially raised the industry's net earnings before taxes, interest, depreciation, and amortization (EBITDA), the increase is not primarily associated with a corresponding increase in total catch. The decline in fish stocks has been arrested and many important species are recovering but overall the recovery has been modest.[11] The gain is primarily due to falling costs, product development, and successful marketing strategies. For more than two decades, these gains have been crucial for the welfare of the nation.

4.3 Material Duty Bearers and Their Costs

Major restructuring of an important industry often involves collateral damage. In Iceland these costs involve small fishing communities that have lost their quotas, vessels, and processing facilities as operators have consolidated their activities in regional centers. Communities left behind have suffered serious economic shocks. The resentment is especially bitter in small communities where local operators have sold their fishing quotas to other fishing centers and left town. However, recent technological change and very long-term population trends away from remote areas exaggerate the effects of ITQs on small communities. Material duty bearers are also found in successful communities and include agents who are tempted by recent success in the fisheries but do not enter the industry because they are unable or unwilling to pay high sums for the right to fish.

Material duty bearers are only a small fraction of Iceland's voting population. In spite of its macroeconomic importance, the fishing industry (fishing and processing) employs currently about 5 % of the country's labor force. Some 20 % of those employed in fishing and processing work in the capital (Reykjavik) area and 80 % in the countryside. The percentage division of the fisheries labor force between Reykjavik and the regions has not changed since 1990 but the absolute number of workers has fallen by about 1/3. The loss of employment since 1991 to the

[11]The industry's average EBITDA was 7 % in 1980–1984, 15 % in 1984–1992, and 21 % in 1992–2010. The rise and fall of the exchange value of the króna have also influenced EBITDA (Íslandsbanki 2012, Figure 11). Note that Iceland caught 430,000 tons of cod in 1980 and only 157,000 in 2012. Currently the cod stocks appear to be recovering fast. The allowed catch for the 2013–2014 season is 215,000 tons.

present has been about four times greater in processing than in fishing (Íslandsbanki 2012, 16).

4.4 Moral Duty Bearers and Their Opposition

Moral duty bearers are people who oppose the quota system although the system has not hurt them directly or indirectly through lost jobs, incomes, and economic opportunities. Moral (and material) duty bearers express their dissent in political forums, media outlets, and opinion polls. Opinion polls can be misleading for several reasons. Usually they do not (attempt to) measure commitment or the costs that dissenters are willing to carry in support of their convictions. Yet we cannot ignore that all polls consistently point in the same direction, a very large fraction of the nation, usually 66–90 % of those asked, opposes the ITQ system.

In 2007 a Gallup Poll estimates that only 15 % of the Icelanders are satisfied with the ITQ system. Indirect evidence suggests that a very large majority of the opponents are moral duty bearers. First, material duty bearers are a small fraction of the population. Second, the opposition in the Reykjavik area is about the same as in the outlying regions. About two-thirds of the population lives in the Reykjavik area where employment in fisheries is of trivial importance. Outside Reykjavik, the fisheries employ about 11.9 % of the labor force, but in Reykjavik area, the figure is 1.7 % (Íslandsbanki 2012, 16). Third, opinions of the quota system bear little relation to the respondent's party affiliation; a majority of supporters of all major political parties, left and right, oppose the system. Even a majority of those who favor the center-right, business-oriented Independence Party do not support the quota system, and the party's strong support of the system probably has turned some voters away.[12]

The 2007 Gallup Poll reveals, perhaps not surprisingly, that the average person is primarily concerned with moral issues and has little interest in instrumental models of fisheries regulations. When the 2007 poll asks opponents about their favored alternative to the ITQ system, the answers are inconclusive with no strong alternatives emerging. Some 25 % of those asked want altogether to abolish ITQs, and for them the most popular alternative is TAC regimes (implying races to be first) and the second most popular alternative is open access (by implication, tragedy of the commons). Sixty percent of the sample want to reform the system but about 70 % of those preferring reforms have no favored alternative, 15 % call for regional quotas, and another 15 % want to make the quotas nontransferable.

When the cost to an individual of expressing normative views about a social mechanism is approximately zero (because the views of one person will not change the system), Caplan (2001) refers to such expressions as *rational irrationality*. Even weakly favored normative views can have consequences for institutional change;

[12]The fishing industry, of course, contributes toward the war chests of the Independence Party.

political parties often use widespread moral objections, weak and strong, as a focal point for their supporters. In Iceland the leaders of the left eventually made opposition to the current ITQ system a key issue in their program. The various reform proposals usually share the idea or moral model that justice requires the government make the fishers, in some manner, give up the pure resource rent. Radical politicians also call for a return to top-down systems. The public debate is acrimonious and the media routinely depicts fishing industry leaders as thieves who have stolen the nation's crown jewels.

5 The System in Turmoil

The ITQ system originated during a slow-moving crisis, and it was thrown into turmoil by the feedback from a double shock: a ruling in 2007 by the United Nations Human Rights Commission and the 2008 financial collapse in Iceland.

5.1 The UN Human Rights Commission

In 2001 two Icelanders, with some earlier experience in the fisheries, decided to challenge the authorities by openly fishing without the required quotas. When the government enforced the rules and fined the fishers, they sued the government but lost the case both in a lower court and in Iceland's Supreme Court. The fishers then appealed to the United Nations Human Rights Commission, which, in a split decision, ruled in October 2007 that Iceland's ITQ system violated the International Covenant on Civil and Political Rights. In its verdict the Commission's majority agreed that the two fishers had the right to go fishing without first having to buy licenses from other fishers. The Icelandic government was told to make the victims whole and, in some manner, make the system fair. The Commission's minority wrote several dissenting reports, strongly disagreeing with the majority.

Rulings by the UN Human Rights Commission are not binding for member states but the verdict had strong impact on public opinion in Iceland. Grandfathering is a common institution for allocating natural resources in countries throughout the world. The Commission's verdict might have initiated institutional change on all continents, which it did not.

5.2 The 2008 Financial Collapse

The financial crash in Iceland came swiftly and decisively in the fall of 2008, propelled by reckless foreign creditors and irresponsible and inexperienced domestic financial institutions. The public mood immediately swung from exhilaration over

the country's financial miracles to deep shame and self-doubt. The miracles included purchases of well-known chain stores in the United Kingdom and major buildings and businesses in the center of Copenhagen, Iceland's historical capital. The doubts concerned the viability of the small republic and the shame over low moral standards in business and politics and presumed loss of international respect. The media and politicians voiced beliefs that the origins of recent greed and recklessness in part originated with the ITQs and generally with recent institutional change away from the opposition paradigm toward a market-oriented design, a reckless version of the economic institutions of the European Union.

5.3 Attempts at Reform

A left-center government was formed in February 2009, following elections to the country's parliament. The obvious immediate goal of the government was to rebuild the country's financial system, with assistance from the International Monetary Fund, and limit effects of the financial shock on the real economy and the welfare system. Its two major long-term goals were to (a) join the European Union and introduce the euro and (b) reform the country's illegitimate system of fisheries regulations. The two-party coalition government, which included mainstream social democrats and a more radical and nationalistic left-wing party (the Left-Green), soon found itself with a narrow and unstable majority in parliament. The two parties in the government actually did not agree whether to join the EU and, de facto, eventually put discussions with the EU on ice. Their approach to ITQ reforms is a more complex story.

As the 2007 Gallup Poll shows, a clear alternative to the unpopular ITQs has not emerged. Moreover, in 2009 Iceland possibly faced national insolvency and recovery would in large measure depend on the performance of the fishing industry, which had responded vigorously to a massive devaluation of the króna. In the government, social democrats favored a plan to annually withdraw 1/20 of the individual quotas, thus completing the withdrawal in 20 years. Quotas withdrawn would be auctioned off or rented back to the industry for relatively short periods of time, and in less than 20 years pure fisheries rent would become a major source of government revenue. The more radical members of the government favored top-down government management of the fisheries. Both sides agreed to raise substantially the maintenance license fees that the quota owners already had been paying for some years and were used to defray government expenses in operating the regulatory system, including costs of marine research and monitoring of the catch. Moreover, in the summer of 2009, the Left-Green minister of fisheries initiated and operated a new system parallel to the ITQs, the so-called coastal fisheries, which is still in operation.

The relatively small coastal system is a typical top-down, hands-on governance structure. The minister determines TAC of demersal species for each of the country's four regions and makes it available to all coastal fishers operating small vessels. The

minister then ends the races when the fishers reach the aggregate regional limits. Fishing in the coastal system can take place only during specific months (the four summer months) and only on specific days (not on weekends). There is a time limit for the length of each fishing trip, and the maximum catch per trip is specified. In the coastal fisheries, the costly inefficiencies linked to indirect open access appeared immediately, including an increase in the number of small boats competing.

Both opponents and supporters of ITQs recognize the undesirability of more than two decades of bitter recriminations over the country's key industry. Also, it is obviously unadvisable in the wake of a national economic disaster to assault the country's engine of growth. Moreover, to function properly a major institutional change requires not only support of the duty bearers but also the right holders must agree that the new institutional framework is operationally consistent with their basic requirements. In 2009 the government therefore appointed a committee with representatives of stakeholders and all the political parties, the so-called "reconciliation committee." In September 2010 the committee defied expectations by reaching (a vaguely worded) consensus. Its recommendations left the system essentially intact but suggested an increase in the license fee (in addition to the previous maintenance charges) that would become the Treasury's share of the resource rent. The committee also recommended adding a clause to the constitution confirming that the nation is the owner of the country's marine resources. A contractual arrangement would express the ownership idea. Vessel owners would sign individual contracts with the government for a period of 15–20 years. The standardized contracts would specify general operational conditions for those holding individual fishing quotas. The contracts would be renewable, except in cases of malpractice.

By midyear 2011 the fisheries minister presented a major reform bill in parliament, mostly ignoring the recommendations of the reconciliation committee. The overall goal of the bill was to gradually reintroduce top-down institutions and central management. According to the bill:

- Individual quotas will be terminated after 15 years, with a possible (and presumably final) extension of 8 years.
- The market aspects of the individual quotas will be eliminated: transfer will be forbidden after 15 years, and use of individual quotas as collateral are immediately forbidden, except that existing financial arrangements will be tolerated for their duration.
- The ministry will set up a new system parallel to the ITQ arrangement, consisting of five centrally managed "pots" in the spirit of the recent coastal fisheries experiment. The total quotas for the five pots will be subtracted from what is available in the ITQ system, and, as valuable fish stocks recover, a large share of the increase will go to the pot system.

These proposals would immediately shrink the ITQ system, pull its teeth, and gradually return the fisheries to a TAC regime and indirect open access. The minister would dominate the system. The minister's plans for allocating the resource rent evoke images of pork barrel politics rather than people's property. The rent would

go only to fishing communities in direct proportion to their catch in recent years. Communities without a fishing industry would have no claim on the people's property. The capital area with 2/3 of the population would not share the rent in direct proportion to recent catches but receive a much smaller fraction. The ministry would also allocate a small part of the rent to research benefiting the fisheries.

The bill appeared when the government was on its last legs with an uncertain majority. It was not passed into law. Just before leaving office in May 2013, the government introduced a huge increase in the annual license fee for fishing quotas for the upcoming 2013–2014 fishing season but did not develop workable methods for calculating the rent. The new center-right government immediately abolished the new measures but retained the fishing fees of the previous year, which already were high and distortive. The tax burden, for instance, can be very different for firms that are only in fishing and those that combine fishing and processing. The new government continues to operate the inefficient coastal fisheries.

6 Conclusions

The evolution of institutions regulating the Iceland ocean fisheries since the 1980s reveals a complex relationship between power, material interests, and ideas. Ideas have three roles in the process: as social innovations that overcome previous constraints; as instrumental models, often contested, for guiding material interests; and as moral models for evaluating the legitimacy of new institutions.

The rule maker in Iceland used ITQs, a social innovation, to overcome transaction costs barriers in ocean fisheries and introduce elements of exclusive rights in a sphere previously dominated by direct and indirect open access.

To understand the practical effects of ITQs in ocean fisheries, the rule maker, the right holders, and the duty bearers must familiarize themselves with several ideas (instrumental models), some of which are contested. These ideas include the main dimensions of efficient property rights, the Coase theorem, and the effects of direct and indirect open access. Ideally, the decision makers would want to predict the magnitude and time path of the various effects, including the impact of transferable fishing quotas on industrial organization, productivity growth, and the distribution of wealth. Evidence from Iceland suggests that many of these developments surprised the actors. Comprehensive knowledge of complex regulatory systems does not exist. In the fisheries complexity arises partly because the effects of new systems of governance are contaminated by little understood biological developments of the ocean, new production technologies, and trends in foreign markets. Yet only when decision makers understand the full implications of new rules are they able to make correct long-term decisions in terms of their material interests.

ITQs were introduced in Iceland for free at a time when the fishing industry was operating at a loss and required support. The rapid reorganization of the fisheries in the 1990s brought unexpected wealth to operators in the fisheries and created a new class of millionaires. The question soon emerged whether the fisheries should carry

higher and different taxes than other industries. The answer depends on whether one understands the principle of windfall gains, whether the new wealth is Ricardian pure rent, and whether pure rent can be measured and taxed (or priced) away with no impact on resource allocation. I agree with Frank Knight that the concept of pure rent is useless and misleading because it fails to recognize the nature of business and value creation in an uncertain world. The rent is created through trial and error with competition selecting the winners. Many economists refuse to accept this idea. They also doubt that the effective functioning of a highly capital intensive industry requires stable rights for a time period of up to 30 years. The behavior of decision makers is influenced by their responses to these ideas.

The Iceland fisheries are the most efficient ones in Europe. No other industry in Iceland can make such a claim. Yet a very large majority of the country's voters do not support the current ITQ system, without having a clearly favored alternative. The opposition by moral duty bearers, whose material conditions are not affected by the system (except that they benefit from its contribution to economic growth), is based on two moral models: opposition (antimarket) ideology and the vague idea of people's property. There is, however, no interest in the country to give all individuals shares in the fisheries.

Following the 2008 financial collapse in Iceland and fears of national insolvency, a new government in 2009 made reforms of the ITQ system one of its two major long-term goals and presented bills in parliament proposing to replace the system with new arrangements that did not rely on classic market incentives. The attempts to create new wealth-reducing institutions failed, partly because of divisions within the government. The system suffered various marginal damages, and 4 years of uncertainty about the future of its institutional framework made the industry hold back on investments in new vessels. Since 2013, with a new and more sympathetic government in place, investments in new fishing ships are planned. Yet the new government, weary of public opposition, is moving slowly to restore the system.

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Cultural Legacies: Persistence and Transmission

Leonid Peisakhin

1 Introduction

The armed conflict in Ukraine, both a civil and interstate war, was threatening to reignite at the time of this volume going to press. This conflict marked the lowest point in relations between Russia and the West since the Soviet collapse in 1991 and, for a time, was poised to transform into a major ground war in Europe. At the heart of the conflict, and of violent regime change that preceded military hostilities and ousted Ukraine's president Viktor Yanukovych from office, lay a fundamental disagreement among the residents of Ukraine over their country's political, economic, and cultural trajectory. In mid-2013, before violent anti-government protests engulfed Ukraine, 42 % of Ukrainians favored closer relations with Europe, while 31 % believed that their country would be better off in Russia-led Customs Union.[1] This division over Ukraine's civilizational choice was starkly regional: western regions favored the European Union, while the east and south preferred a future with Russia. Likewise, Western Ukrainians were the ones who fueled and sustained the Maidan protest movement of 2013–2014 in its early days. Today, Ukraine finds itself split geographically along what until 1917/1918 used to be the border between the Austrian Empire and Russian Empire. Similar divisions that map onto substantial contemporary differences in voting behavior are found elsewhere in Eastern and Central Europe, notably in Poland, Romania, and the Balkans where the historical

[1]Public opinion data reported by Razumkov Center in April 2013: http://www.uceps.org/eng/socpolls.php.

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identity-forming institutions of Prussia, Austria, Russia, and the Ottoman Empire have all left their mark. In this chapter, I demonstrate that legacies of imperial rule persist into the present in the form of political attitudes and behavior. I also explore the mechanisms behind such persistence.

That historical institutions leave a lasting institutional legacy is largely uncontroversial. This insight is at the core of historical institutionalism. Thus, we know that societies that had historically high levels of economic inequality are highly unequal today (Engerman and Sokoloff 1997), that those colonies that had been denied most advanced democratic institutions because they were inhospitable to European settlers are especially undemocratic and underdeveloped (Acemoglu et al. 2001; Easterly and Levine 2003), and that colonial patterns of labor coercion and landholding have shaped contemporary levels of inequality and development (Banerjee and Iyer 2005). In all of these instances, colonial-era institutions have persisted into the present via path dependence. What happens then when historical institutions are swept away as a result of a revolution, economic crisis, or some other major rapture of the kind that appear to characterize the development of the modern state?

There is an emerging consensus in political science and economics that historical institutions leave lasting cultural legacies and therefore influence attitudes and behavior in ways other than path-dependent persistence of formal institutions. Darden and Grzymala-Busse (2006) have demonstrated that imperial-era schooling explains much of the variation in resistance to Soviet rule in Eastern Europe, and Darden (in press) developed this argument further in a study of the microfoundations of resistance in different Austrian provinces within Western Ukraine. Wittenberg (2006) has shown that pre-Communist political preferences can survive the institutional upheaval brought about by Communist rule, whereas Alesina and Fuchs-Schuendeln (2007) and Pop-Eleches and Tucker (in press) have argued that Communist-era attitudes have survived into the post-Communist period. In an argument that takes in a longer sweep of history, Nunn and Wantchekon (2011) have sought to demonstrate that the long-defunct institution of slavery has left a lasting mark on trust levels in areas where slavers had been active historically. This fledgling literature suggests that material interests and path-dependent institutions are not the only causes of variation in contemporary political and economic attitudes and behaviors. Cultural legacy explanations ought to be considered seriously alongside more conventional explanations for variation in political and economic outcomes.

My work contributes to the literature on cultural legacies of historical institutions. Two biggest impediments to rigorous scholarship in this area are the difficulty of credibly connecting distant historical causes to contemporary outcomes and the complexity of tracing transmission mechanisms behind persistent attitudes and behaviors. In this chapter I try to tackle both of these problems by drawing on a natural experiment of history. In a rather haphazard process that resulted in partition of the Polish–Lithuanian Commonwealth in the late eighteenth century, a homogenous population of Ukrainians became as-if-randomly divided between the Austrian Empire and Russian Empire; this population then came together under

Soviet rule in 1939. In a representative survey of individuals residing within 15 miles (25 km) either side of the defunct Austrian–Russian imperial border, I find that those who live in former Russian settlements are by 21–28 percentage points more likely to favor closer relations with Russia and support an interpretation of recent Ukrainian history that is more favorable toward Russia. This cleavage also translates into sizeable differences in voting behavior. I then draw on a survey of elderly respondents to demonstrate how families embedded in tightly knit like-minded communities on the formerly Austrian side of the border transmitted anti-Russian attitudes and how schools on the formerly Russian side were pivotal to transmission of pro-Russian attitudes. I find that families fail at transmission if attitudes and political behaviors that they attempt to instill in offspring are contrary to dominant community views. In addition, I demonstrate how state institutions like schools can be coopted by local elites and, as a result, rendered ineffectual at publicizing state-sponsored ideology.

This chapter is a brief summary of a much larger project, originally a doctoral dissertation and now a book manuscript. It is impossible to fit all the important information into what is a very limited space. This chapter opens with a discussion of hypotheses that I propose to test and a brief description of the natural experiment of history that gave rise to my research design. I then present results from two different surveys: a 2007 representative survey that explores variation in political attitudes and behaviors in settlements situated to either side of the defunct imperial border and a 2012 survey of elderly respondents designed to explore transmission mechanisms. I conclude with a brief discussion of the significance of these findings. There is much more to this project than what I could fit in this chapter; the reader is invited to consult my other work for more substantive detail and context.

2 Theory

At the root of my argument is the idea that certain types of political attitudes and behaviors—those that define one's group or community—are highly durable and are capable of persistence even in adverse institutional environments. This idea is far from uncontroversial. The dominant view in political science (e.g., Zaller 1992) is that political attitudes are easily malleable, and even the most independent-minded and stubborn individuals alter their views regularly under the barrage of conflicting information, countervailing moral messages, and changing material incentives. Contrary to that established view is the argument that some sets of attitudes—partisan and religious identities, self-placement on a liberal-conservative ideological continuum—are highly stable and often persist across generations within the same family (Hyman 1959; Jennings and Niemi 1974; Zuckerman et al. 2007; Bengtson et al. 2009). Existing observational work on persistence of political attitudes is subject to one obvious and deadly criticism: namely, that authors in this tradition are unable to fully control for similarities in environmental factors between parents and offspring. Thus, it is argued that what transpires on the surface as transmission

of dominant political attitudes across generations is in fact independent response of family members to highly similar material and moral circumstances. The quasi-experimental nature of this project, which approximates random assignment of individuals to different treatments, allows me to get around this difficulty by keeping variation in background material conditions to a minimum. I am therefore able to advance the following hypothesis:

> H1: If residents of settlements situated on different sides of the long-defunct Austrian-Russian imperial border exhibit different attitudes and behaviors today, then that must be evidence that such attitudes and behaviors can persist across multiple generations.

In much observational research on persistence of political attitudes and behavior, while offspring are shown to be somewhat similar to their parents, younger and older generations are almost never identical (Niemi and Hepburn 1995). This disparity between younger and older respondents gives further credence to the idea that what creates similarities in attitudes across generations is not persistence of norms of behavior or attitudes rooted in group identity but similarities in material conditions across generations. Therefore, a strong test of the persistence hypothesis would seek to establish that attitudes and behaviors are identical across different generations. This gives rise to the following hypothesis:

> H2: If younger and older respondents are identical in their attitudes and behavior, then there is strong support for the persistence hypothesis.

Our knowledge about the processes by which transmission of political attitudes and behavior takes place is far from complete. For one, there are no existing empirical studies on this issue in the scholarship on the legacy of imperial and colonial rule. The literature that does exist on transmission of political and religious identities (Westholm and Niemi 1992; Jennings et al. 2009) suggests that families are crucial to these processes. This proposition makes especially good sense in a postcolonial context where most preceding formal institutions had been swept away and a sense of continuity with the previous period can, presumably, be maintained only informally within families and local communities. Therefore, drawing on the literature on political socialization, I am able to formulate the following hypothesis:

> H3: If there is evidence of persistence of historically rooted political identities, then families likely play an important role in the transmission process.

Just as families struggle to maintain and transmit locally dominant and historically rooted political attitudes, state-sponsored schools in the postcolonial period will seek to destroy historical political identities and replace them with more contemporary state-sponsored political identities. Thus, in settings where historical political identities conflict with contemporary state-sponsored ones, the family and the school will struggle against one another for control over the hearts and minds of the young. This theoretical proposition gives rise to the fourth and final hypothesis, which is focused on the role of schools in the transmission process:

> H4: If there is evidence of persistence and transmission of contemporary state-sponsored political identities, then state schools likely play an important role in that process.

3 Natural Experiment of History

An ideal test of a cultural legacies theory must control for variation on all variables other than conditions that originally gave rise to differences in culture. This is important because arguments seeking to demonstrate cultural differences are frequently subject to omitted variable bias (Almond and Verba 1963; Putnam 1993). My work draws on a natural experiment of history that keeps constant variation on most factors that are not directly relevant to formation and persistence of political attitudes and behavior. Experiments are premised on the idea of random assignment of individuals to treatment and control or to different treatments. Natural experiments are historical occurrences, where the scholar observes aftereffects of a supposed random assignment without ever exercising direct control over the assignment process itself. Thus, natural experiments are by necessity quasi-experimental; whether the scientific definition of an experiment is met is a product of how closely exposure to historical treatments approximates true random assignment (Dunning 2012).

My work explores how the division of a homogenous Ukrainian population between the Austrian Empire and Russian Empire for almost 150 years has affected political attitudes and behavior in the regions that were subject to divergent imperial treatments. The area that is today Western Ukraine came to be divided between Austria and Russia in 1772–1793. The partition occurred as part of a broader dismemberment of the Polish–Lithuanian Commonwealth, medieval Europe's largest state by landmass, between Europe's dominant powers of the late eighteenth century—the Kingdom of Prussia, Austrian Empire, and Russian Empire. Prior to the partitions, the swathe of territory under study had been part of Poland and Lithuania since the mid-1300s. This area was predominantly agricultural and populated largely by ethnic Ukrainians, with substantial Polish and Jewish minorities in towns. From the perspective of a Ukrainian peasant, the Polish–Lithuanian Commonwealth was a premodern state; local government was firmly in the hands of landowners, and institutions of the central government were distant and irrelevant. Modernity erupted on this pastoral scene with the arrival of empires. For one-and-a-half centuries that followed, imperial authorities tried to fashion a conscious political subject out of a backward Ukrainian peasant. Collapse of the Russian Empire in 1917 and of Austria in 1918 ushered in the chaos of the interwar period and the horror of the Second World War. Then, in 1944, the population that had been one prior to 1772 was reunited once again, this time under the auspices of the Soviet Union. Soviet authorities zealously destroyed all vestiges of imperial institutions and introduced new systems of property rights and class relations. What I seek to show, though, is that some political attitudes and behaviors—specifically, those central to pre-Soviet group identities—survived and flourished through the Soviet period and into the present.

The process by which the area under study (Fig. 1) came to be divided between the Austrian Empire and Russian Empire was as close as conceivable to random in the domain of interstate politics. Historians concur that post-partition borders did not

Fig. 1 Russian–Austrian imperial borderlands, late eighteenth–early twentieth century

correspond to any preexisting historical, ethnic, religious, or economic boundaries (Wandycz 1974; Lukowski 1999). In fact, the Austrian–Russian border was drawn up with such little regard for conditions on the ground that a segment of the frontier was drawn along a river (Podgorze) that existed only in the mind of the mapmaker. When Austrian troops arrived on the scene in search of the phantasm river, they kept moving eastward until they found an actual river (Zbruch), which then became the de facto Austrian–Russian border. As a result, a stretch of Russian territory 150 miles long and 50 miles wide found itself under Austrian control.

Assignment of individuals to Austrian and Russian zones appears to satisfy the randomness criterion. The treatment that produced persistent cultural effects took the form of state-sponsored identity construction projects aimed at instilling loyalty in the Ukrainian population. The two empires faced identical security threats in their borderlands: internal risk of secessionism from local Polish elites and external threat emanating from an aggressive and expansionist regional hegemon on the other side of the border. Loyalty of ethnic Ukrainians, the majority population in this area, became a crucial security issue. It was a matter of utmost importance, therefore, to ensure that this population was positively predisposed toward its imperial overlord. The Austrian Empire and Russian Empire went about that task in diametrically different ways, in large degree due to differences in state capacity. Where Vienna strove to create an active independentist national Ukrainian movement as a counterweight to Polish and Russian encroachment, St. Petersburg chose instead to isolate ethnic Ukrainians from all institutional influences (for fear that these institutions would be captured locally by secessionist Poles) in the hope that bonds of common religion would bind Ukrainians (Little Russians, as they

were known in the Russian Empire) to their Greater Russian brethren. Ukrainians of the Austrian Empire were therefore subject to the full onslaught of modernity—state-sponsored churches and schools, periodicals, and political parties—already in the mid-nineteenth century. By contrast, those same institutions did not arrive into Russian Ukraine until the interwar period (Wandycz 1974; Magosci 1996).

As a result, by the turn of the twentieth century, Ukrainians of the Austrian Empire were demanding autonomous status for their region. When the Austrian Empire collapsed in 1918, its Ukrainian subjects were quick to seize on the opportunity to proclaim an independent Western Ukrainian Republic. The Ukrainian nationalist movement lived on in the former Austrian borderlands even as the Western Ukrainian Republic fell to advancing Polish troops. Ukrainian nationalists organized an effective boycott of the 1922 Polish general election followed by a campaign of violence against Polish officials. When the Soviet threat arrived at the partition of Poland in 1939, Ukrainian nationalists for a time sided with Nazis in the hope that Nazi Germany would tolerate independent Ukraine (Magosci 1996). When Soviets finally prevailed over Nazi Germany in 1944, Ukrainian nationalists continued to fight a covert war against Soviet authorities in former Austrian borderlands for another 7 years. In short, by 1900 self-recognition as an independent national and political group and desire for statehood became an integral part of group identity for Ukrainian residents of Austrian borderlands.

In 1900, Ukrainians of Russian borderlands were just beginning to discover modern institutions. Elected local assemblies and schooling came to Ukrainian territories in the Russian Empire only starting in 1911 (Weeks 2008). And even then, the use of Ukrainian vernacular in schools and in print had been explicitly outlawed in 1875. No surprise then that in the first-ever elections in the Russian Empire, in 1905, no political party in Ukraine even proposed special status for Ukraine (Magosci 1996). When Soviet authorities became established in the former Russian imperial territories in Ukraine in the 1920s, they simply took over the Russian imperial policy of what effectively amounted to forced Russification. This time, though, the state came equipped with the full institutional machinery necessary for identity construction: literacy schools for adults alongside a comprehensive education system for youth, printing presses and railroads, collective farms, and Communist party cells. Under the guise of nominal advancement of the Ukrainian language and folkore, the Bolshevist state promoted pro-Russian and pro-Communist attitudes (Martin 2001). As a result, the independentist streak never took root among Ukrainians residing in former Russian borderlands. This population had been socialized into pro-Russian and pro-Soviet attitudes.

The nature and substance of historical identity-building processes in Ukrainian borderlands gives rise to the expectation that Ukrainians residing to either side of the defunct imperial border today must differ in their attitudes toward Ukrainian statehood and, most importantly, toward Russia, an obvious external aggressor. That is precisely what I will seek to establish in the section that follows. As an aside, it bears highlighting that whatever treatment effects I find, these will likely be underestimated. In the interest of space and simplicity, I skipped over the fact that imperial borderlands are made up of several different regions: Galicia and

Bukovina on the Austrian side and Podolia and Volhynia on the Russian. In the interwar period the formerly Russian region of Volhynia fell under Polish control. During that time in a policy known as the Volhynia Experiment, the Polish state made efforts to instill an anti-Russian independentist identity among the Ukrainian residents of Volhynia (Snyder 2005). The presence of that interwar anti-Russian policy in interwar Volhynia drives down the overall pro-Russian effect of identity-building policies in former Russian territories.

4 Results

4.1 Measurement Strategy

In order to measure contemporary differences between populations residing to either side of the defunct Austrian–Russian imperial border, I surveyed individuals who live in settlements that are situated within 15 miles/25 km of the historical border. I focus on such a narrow band of settlements in order to be able to precisely estimate the effect of imperial legacies while controlling for variation on other factors that might cause differences in political attitudes and behavior (structure of the economy, design of local institutions, etc.). Given that the survey zone is rural and agricultural along the whole of its breadth and width and that local institutions do not vary because Ukraine is a unitary state with a standardized system of local government across all provinces, I am confident that background conditions are held constant. The further one moves away from the historical border, the greater the regional differences between populations. At Ukraine's extremes, westernmost provinces bordering on Poland are completely different from easternmost regions that abut on Russia. But that is hardly surprising given that ethnic Russians reside mostly in Eastern Ukraine and that that is where the country's heavy industry is concentrated. In other words, a regional comparison is not a useful analytical strategy for disentangling the effect of historical institutions, because too many alternative variables compete with the historical explanation. By contrast, controlled micro comparison is a much more promising analytical strategy, even if it inevitably raises concerns related to external validity of the findings.

All in all, 1,675 respondents were surveyed in 232 villages and 15 small towns in the spring and summer of 2009: using the population-proportionate-to-size (PPS) method, I randomly picked 121 and 126 settlements on the Austrian and Russian sides, respectively, to be included in the sample. The sample that I analyze is therefore representative of the population that resides in the immediate vicinity of the defunct imperial border. The second set of analyses that explores transmission dynamics draws on a follow-up survey conducted in 2012 among 813 respondents over 70 years of age in 81 settlements. The follow-up survey therefore is based on a representative sample of older people who reside in the former imperial borderlands. The reason that I limited the sample to older people in that instance

is because for identity transmission analyses it was especially important to explore how individuals resisted early and particularly intense Soviet efforts at dismantling preceding historical identities and replacing them with the new Communist political identity.

4.2 Balance Tests

My research design is premised on the assumption that individuals who reside to either side of the defunct imperial border are indistinguishable from one another but for the fact that their ancestors had lived under different empires. Balance tests reported in Table 1 bear out this assumption. On basic demographic covariates like education, income, and ethnicity—all of these are standard explanatory variables in research on attitudes and behavior—the populations of former Austrian and Russian borderlands are statistically identical. This lends credence to my research strategy and suggests that any existing differences in political attitudes and behavior must be due to factors other than standard explanations for variance in attitudes. Older respondents residing to either side of the defunct imperial frontier are also statistically indistinguishable from one another on standard demographic covariates. I do not present balance tests for older respondents in this instance to save space.

One obvious concern with this research design, given that it covers such a broad span of time, has to do with population mobility. If people who reside in these settlements today are different from the population that had been settled in the imperial borderlands historically, then it would be difficult to trace persistence of local historical identities. Potential concerns about population transfers across the former imperial border are further exacerbated in this instance because the two world wars wreaked havoc on Ukraine and, more simply, because I study settlements that are located within such easy proximity of one another that, presumably,

Table 1 Balance test

	Austrian area	Russian area	Magnitude of differences
Self-identify as Ukrainian (%)	0.94 (0.01)	0.94 (0.01)	0.00
Income[a] (five-point scale)	2.80 (0.03)	2.79 (0.03)	0.01
Education (years)	6.44 (0.09)	6.27 (0.09)	0.17
Age (years)	50 (0.64)	49 (0.64)	0.50
Reside in villages (%)	0.76 (0.01)	0.70 (0.02)	0.06**
Depth of local roots			
Reside in settlement of birth (%)	0.60 (0.02)	0.60 (0.02)	0.00
Family roots in province for over 100 years (%)	0.65 (0.02)	0.76 (0.02)	0.11**
N	830	845	1,675

** $p < 0.01$

[a]Income is measured on a five-point scale where 1 is the lowest level and 5 the highest

population exchanges between them should be common. To address these concerns I examine two measures of population stability toward the bottom of Table 1. Data indicate that the two populations are highly stable and, more importantly, have deep historical roots in their respective regions. Sixty percent of respondents in both areas were born in the settlement where they currently reside. Over 65 % can trace their family's roots at least 100 years back in a province on the "correct" side of the defunct imperial border. Former Austrian settlements experienced more population movement than the Russian simply because that is where Ukrainians being transferred from Poland were settled at the conclusion of World War II. More anecdotally, the defunct imperial border is still very much alive in the mental geography of local residents. For instance, over the course of fieldwork, I learnt that first intermarriages across the former imperial frontier did not take place until the 1980s. Today, even teenagers can pinpoint the exact location of the former imperial boundary, even though no material markers have delineated that line for almost 100 years.

4.3 Results

I have hypothesized that those Ukrainians who reside in former Austrian settlements are likely to be more hostile toward Russia than their immediate neighbors who live in former Russian territory. This hypothesized difference is due to the fact that Ukrainians in the Austrian Empire developed a distinctive political identity already in the late nineteenth century and would therefore be more resistant to perceived colonial encroachment by any power, including Russia. To test for this difference I turn to a survey question that asked respondents to state whether they perceive Ukraine's future to lie with Russia and the Russia-dominated Commonwealth of Independent States, a regional bloc that brings together former Soviet countries.

The key difference between Austrian and Russian historical strata is reported in Table 2. Although the dependent variable is binary, here I use a linear probability model (LPM), equivalent to ordinary least squares, for simplicity of interpretation; direction and magnitude of effects are consistent across binary specification and LPM estimations. Because the samples were unbalanced on proportion of village residents and strength of local roots, I include these two variables as controls

Table 2 Explaining attitudes toward Russia

Former Austrian territory	-0.29^{**} (0.04)
Village resident	−0.05 (0.06)
Family roots in province over 100 years	-0.11^{**} (0.03)
Constant	0.64^{**} (0.06)
N	1,444
R^2	0.09

$^{**}p < 0.01$

alongside the key independent variable, which is a binary variable that takes on the value of "1" for residents of formerly Austrian settlements. Support for pro-Russian orientation among town dwellers with no historical connection to the region is the constant. Those respondents who reside in former Austrian territory are 29 percentage points less likely to support pro-Russian orientation than their immediate neighbors in former Russian settlements. This is a very substantial effect given that this is the magnitude of differences between two populations that reside only within 30 miles of one another and that have been living under the same set of political and educational institutions for 70 years. Notably, on the Russian side of the defunct border, the majority favors closer relations with Russia. On the Austrian side, barely a quarter of the population takes this view. In addition, it would seem that those with deeper local roots are more opposed to Russia, as is evidence by the fact that the variable measuring local rootedness is sizeable and statistically significant. Those who are more rooted are consistently more anti-Russian for the reason that many relative newcomers to the region are from Eastern Ukraine where pro-Russian attitudes are generally stronger than in the west.

While I only report evidence from a single survey question here—the primary question that concerns attitudes toward Russia—across a whole array of related measures, the population of former Austrian settlements is consistently more anti-Russian. The anti-Russian effect persists in the assessment of recent Soviet past and also translates into differences in voting behavior. In the 2007 parliamentary election, respondents in former Austrian areas were more likely to vote for Our Ukraine. That political party was then led by the winner of the Orange Revolution Viktor Yushchenko. In the 2012 parliamentary election, formerly Austrian settlements were more likely to support the nationalist Svoboda party. Svoboda came to play a key organizational role in the Euromaidan protests of 2013/2014.

It is clear that Ukrainians residing to either side of the defunct Austrian–Russian imperial border hold different political identities and that these identities are consistent with historical treatments that the two populations were subject to. Yet, for this variation to serve as evidence of divergent historical legacies, I would need to demonstrate that differences in attitudes and behavior are consistent across age cohorts. Absence of such consistency might mean that differences are being driven by the elderly who had direct exposure to original treatments. If only the elderly are responsible for all the variation on the dependent variable, then that would mean that historical treatments had no lasting influence on populations under study and therefore did not produce something amounting to a historical legacy.

To explore the variation in attitudes toward Russia across age cohorts, I divided the survey population into six age cohorts. Cohorts aggregate individuals at 10-year intervals; the first cohort begins at 18, and the last ends at 77. On average, there are 130 individuals in every cohort. I then ran a probit regression to predict the likelihood of thinking of Russia in positive light (same dependent variable as in Table 2); that analysis includes the key historical independent variable (Austrian

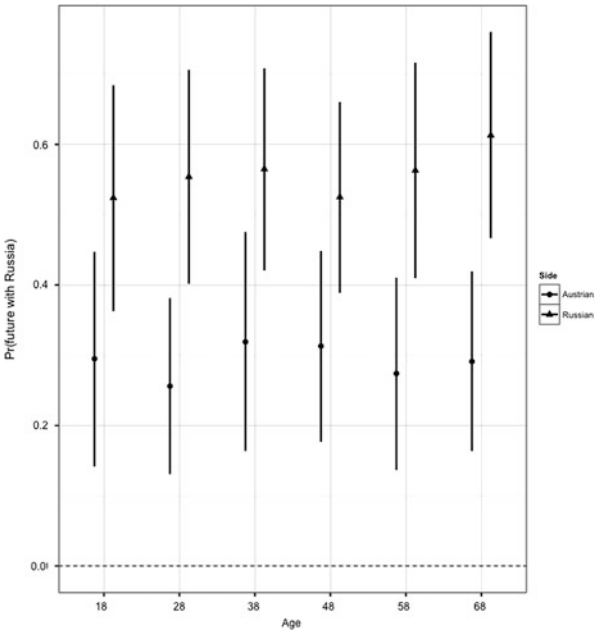

Fig. 2 Marginal effect of age on the likelihood of support for Russia

or Russian borderland) alongside all six age cohorts and standard controls.[2] To explore how attitudes toward Russia vary by age and location I plotted marginal effects of age within each borderland with controls set to their means. Results are presented in Fig. 2. Attitudes toward Russia are completely stable across all age groups and are consistently different on either side of the defunct border. Those who live in former Austrian settlements are consistently anti-Russian irrespective of age, whereas respondents in former Russian settlements are consistently more pro-Russian. None of the differences across cohorts are statistically significant within each borderland, and all differences between cohorts are statistically significant when former Austrian territory is compared to former Russian territory. In other words, the strength of anti-Russian attitudes does not diminish overtime in former Austrian settlements; the legacy of an independentist political identity lives on. Likewise, former Russian territories remain consistently pro-Russian.

An obvious question to ask then is how political attitudes and behavior are transmitted across generations. This is an especially important question in the context of Ukraine given that the Soviet state made a concerted effort to erase all previous political identities in an attempt to forge the Soviet man. Mechanisms of attitude transmissions are a notoriously difficult subject (e.g., Jennings et al. 2009), and here my findings are perforce tentative. An additional difficulty arises from the fact that my evidence on transmission of attitudes and behavior comes from a

[2]Results not reported in the interest of space and available on request from the author.

survey of a single generation of respondents, who were asked to recall information about their parents and think back to formative childhood events. Faced with logistic limitations I chose to focus on respondents over 70, who had directly experienced early Sovietization. While this strategy yields interesting information about pivotal historical events, it also introduces a great deal of measurement error into my analyses, simply because respondents were not always able to recall information correctly.

In terms of its institutional landscape, the Ukrainian village is quite a straightforward place. Families are the basic building blocks of village social life; in the domain of formal institutions, there are schools, churches, and occasionally community economic institutions or cells of political parties. One or several of these structures must perforce be responsible for transmission of political identities. Given that the Soviet Union was a single-party state with collective property ownership and that both the party and the collective farm were obviously hostile to pre-Soviet political identities, it is safe to conclude that political parties and economic institutions could not have ensured transmission of pre-Soviet political attitudes. In this chapter, I focus on families and schools and leave the complicated role that churches played in attitude transmission to a book-length treatment of this project. The first thing to note is that families were different on opposite sides of the defunct imperial frontier. As can be seen in Table 3, respondents' parents were considerably more pro-Soviet in former Russian settlements. Parents are vital to children's political socialization (Jennings and Niemi 1968), and it is clear that parents transmitted predominantly anti-Russian political values in former Austrian settlements and predominantly pro-Russian values in former Russian settlements. In addition, the structure of authority was also different on opposite sides of the border. Children raised in the former Austrian area were 21 percentage points more likely to look up to their relatives as role models. On the formerly Russian side, children were 20 percentage points more likely to follow the example of their teachers. In other words, the school was a much more important institution of political socialization in former Russian areas.

How well do the competing transmission mechanisms perform in a regression framework? To answer this question I ran a probit regression to predict the likelihood that a respondent will think of Russia as Ukraine's ally—a related dependent variable to one presented in preceding paragraphs. The regression

Table 3 Differences in transmission mechanisms

	Austrian area	Russian area	Magnitude of differences
Parents liked the Soviet regime	0.22	0.53	0.31**
Relative was a role model in childhood	0.67	0.46	0.21**
Teacher was a role model in childhood	0.10	0.30	0.20**
N	410	402	

** $p < 0.01$

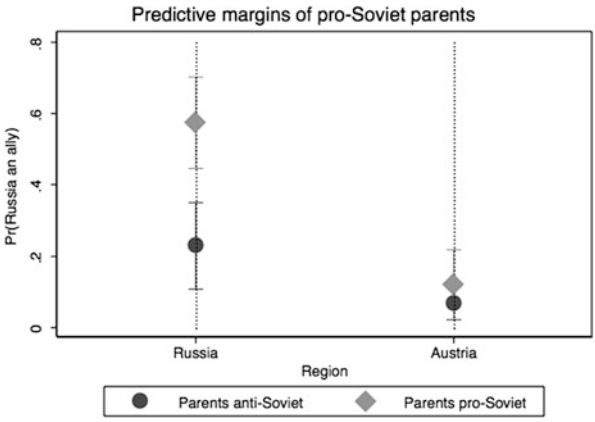

Fig. 3 Predictive margins of pro-Soviet parents

includes a binary variable for imperial borderland and three mechanism variables described in Table 3 alongside standard controls. For ease of interpretation I report the results in the form of marginal effects graphs, where I examine how a respondent's attitude toward Russia changes depending on whether the relevant transmission mechanism was active or not. Whiskers denote 95 % confidence intervals that tell us whether the coefficient is statistically different from zero. Figure 3 demonstrates that parents were important to attitude transmission: those respondents whose parents were pro-Soviet (gray rhomboid) are more likely to think positively of Russia today when compared to respondents whose parents were anti-Soviet (black circle). Differences between these two groups are statistically significant at $p < 0.01$ in both historical border regions; however, the magnitude of the difference is much greater in former Russian settlements (34 percentage points) than in former Austrian villages (5 percentage points). It seems that in former Austrian borderlands something is dampening the influence of pro-Soviet parents. In the next section, I will hypothesize that that something is the effect of dominant anti-Russian community norms. All in all though, this set of results provides proof for the proposition that families play a crucial role in the transmission of historical political identities.

The next two sets of findings—on the role of relatives and teachers in identity transmission (Figs. 4 and 5 respectively)—ought to be considered side by side. In the Austrian region, respondents are likely to adopt equally anti-Russian attitudes irrespective of whether they held up relatives or teachers as role models in childhood. That those who did not look up to relatives are not more pro-Russian today is consistent with the idea that dominant communal norms in former Austrian settlements are so anti-Russian that individuals conform to the norm irrespective of their relatives' views. As to the role of teachers in the Austrian area, it seems that Soviet schooling did not succeed in instilling pro-Russian attitudes in students there. In contrast, Soviet schooling was obviously successful in disseminating and preserving pro-Russian attitudes in former Russian settlements. On the Russian side, there was no baseline resistance to the Soviet message and there local residents

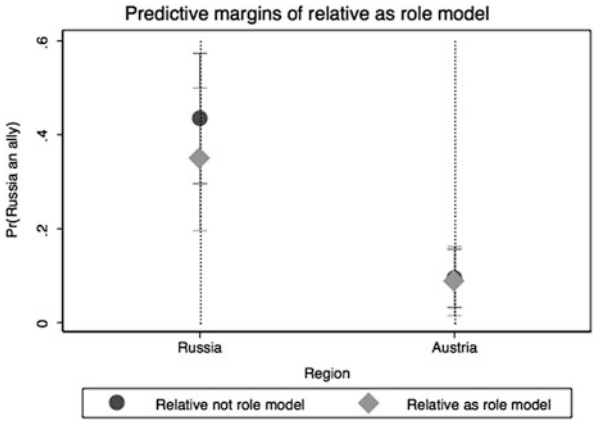

Fig. 4 Predictive margins of relative as role model

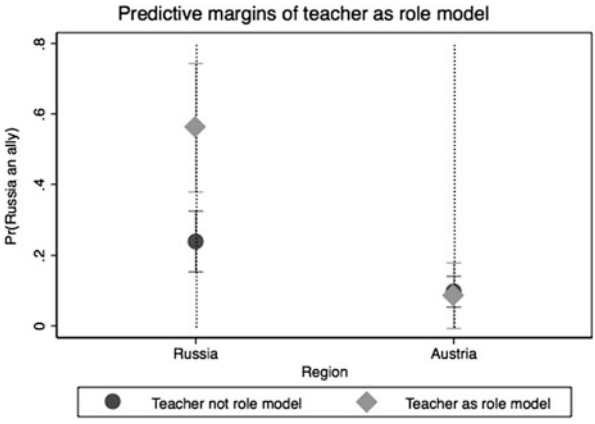

Fig. 5 Predictive margins of teacher as role model

were already predisposed toward it. Those respondents on the Russian side who report looking up to teachers are 33 percentage points more likely to think of Russia as an ally than their peers who did not consider a teacher to be their role model. The family could not keep up with the school in the perpetuation of pro-Russian attitudes in former Russian settlements. That is why those respondents who held up relatives and not teachers as role models are 8 percentage points less likely to think of Russia as an ally (this difference is statistically significant at $p < 0.01$). In short, while families were important to the preservation of dominant political attitudes on both sides of the defunct border—anti-Russian on the Austrian side and pro-Russian on the Russian—local communities and schools appear to have operated differently on the opposite sides of the border. Specifically, in former Austrian settlements, historical community-level independentist, and therefore by necessity anti-Soviet and anti-Russian, political identities appear to have rendered null the effect of Soviet schooling and even pro-Soviet parenting.

5 Discussion

5.1 Summary of Findings

There is persuasive evidence that historical institutions that had originally created divergent political identities on different sides of the Austrian–Russian imperial border succeeded in leaving lasting cultural legacies that have survived into the present. Historical identity-forming institutions are long gone, but political attitudes and behaviors that they created persist. Hypothesis 1 has been proven correct. Settlements situated to either side of the historical Austrian–Russian imperial border—a dividing line that lost its meaning almost a century ago—are very different when it comes to attitudes toward Russia, even though they are identical on basic demographic and economic characteristics. The cultural legacy of historical political identities remains strong. Political attitudes among the young and the old are identical within each former imperial area. This provides supporting evidence for hypothesis 2, which set out to test the strength and continuing relevance of cultural legacies. In short, Ukrainians living on either side of a long-defunct imperial border continue to interpret some crucial aspects of their political world as if though that border was still active. And all this despite the fact that one of the most ruthless and efficient totalitarian regimes the world has known made a concerted effort to eradicate and replace all preceding political identities.

How did historically rooted political attitudes and behavior survive into the present in the face of state-sponsored efforts to eradicate them? For one, the family played a vital role in transmission of independentist political attitudes on the Austrian side. By contrast, in former Russian settlements, the Soviet schooling system nurtured and disseminated pro-Russian attitudes. However, it bears noting that parents who held pro-Soviet attitudes in formerly Austrian villages were not able to instill pro-Soviet attitudes in their offspring. Likewise, Soviet schools appear to have had no effect on children in the historical Austrian area, even though schools were highly effective in former Russian settlements. These two findings indicate that families and schools are not the only structures that matter in the transmission process. Communities within which families are embedded are likely also important. If communities are homogenous and tightly knit, then presumably they can override the influence of deviant families or external institutions, like Soviet schools. This is an issue that I cannot explore empirically here given the constraints of my survey data and is something that deserves considerable further attention. However, community-level effects do provide major correctives to my hypotheses 3 and 4 on the exclusive importance of families and schools to the transmission process.

5.2 Implications and External Validity

These findings suggest a major corrective to the way we study political attitudes and behavior. Evidence from Western Ukraine indicates that material incentives and institutional rules are not the only factors that shape the way in which citizens interact with the political world. Political identities that are rooted deeply in the past can be another powerful force that affects political behavior. In the context of Ukraine, it was the residents of Western Ukraine—carriers of a particular brand of independentist anti-Russian identity—who played a pivotal role in the early days of the anti-Yanukovych Euromaidan protests. These protests eventually resulted in regime change in Ukraine and sparked a conflict with Russia. Ghosts of empires long gone are continuing to influence contemporary political outcomes via cultural legacies.

It might be tempting to dismiss these findings as a historical curiosity and something unique to the Ukrainian context. That would be a mistake. In the fledgling literature on historical legacies, evidence is slowly building that the phenomenon that I describe here is rather common in both colonial and other contexts. To mention but a few studies in context far removed from Ukraine, Nunn and Wantchekon (2011) show that areas that had been particularly badly affected by slave trade exhibit lower levels of generalized trust and higher levels of underdevelopment in the present. Acharya et al. (2014) demonstrate how segments of the US South where plantation agriculture was especially dominant still today harbor persistent anti-Black attitudes. Alesina and Fuchs-Schuendeln (2007) show how variation in attitudes toward the welfare state in Germany are accounted for by the legacy of Communism in eastern Germany, whereas Grosfeld et al. (2013) argue that persistent anti-market attitudes in parts of Eastern Europe are best explained as a legacy of the Holocaust. In other words, there is already substantial evidence from various parts of the world in support of the cultural legacies hypothesis, and it is continuing to mount. Much more work is needed to explore the conditions under which cultural legacies arise and the processes by which they are transmitted and eventually fade away.

6 Conclusion

Leveraging a natural experiment of history that for a time divided a homogenous population of ethnic Ukrainians between two empires, I have demonstrated how historically rooted political attitudes and behavior can persist into the present when transmitted by families that are embedded within homogenous communities. Such persistence amounts to what I term cultural legacy of historical institutions. Cultural legacies are not alternative explanations designed to account for all variation in political and economic behavior. Rather, cultural legacies are complimentary to standard models focusing on material incentives and institutional rules.

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Judicial Independence: Evidence from the Philippine Supreme Court (1970–2003)

Desiree A. Desierto

1 Introduction

Is the Philippine Judiciary independent of the Executive branch? Specifically, does it tend to decide cases in favor of the national government in exchange for some benefit that the latter provides?

The idea that judges decide cases based solely on their merits has increasingly been called into question in the politics and law and economics literature. Three hypotheses governing judicial behavior have been put forth.[1] One approach, evident in, e.g., Gillman (2001), Baum (1997), Knight and Epstein (1996), Epstein and Knight (1998), and Lindquist and Klein (2006), assumes that judges are primarily "law-seeking", and are thus constrained by legal precedent and doctrine, rules, and institutional design.[2] Another, typically referred to as the "attitudinal" hypothesis,

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[1] See, for instance, Kim (2011) and Zajc and Kovac (2011) for a summary.

[2] In certain cases, the relevant constraints may be the lack of resources. Galanter (1974,1995) and Atkins (1991), for instance, put forth a "party capability" hypothesis, whereby judges may appear to rule in favor of powerful parties like the government, but this could be because the latter, having more resources to spend on legitimate activities, e.g. hiring better lawyers, could actually build more meritorious cases.

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assumes that judges are policy-seeking and thus choose actions that maximize their policy preferences. Black and Owens (2009), Caldeira, Wright and Zorn (1999), and Benesh, Brenner and Spaith (2002), for instance, model the decision of the US Supreme Court to grant petitions to review decisions made by the lower courts as agenda-setting opportunity for justices to change or retain status quo policies.

The third set of studies assume that judges are motivated by considerations other than legal and policy preferences, and respond to incentives provided by a "principal" actor on behalf of which judges act as agents. This principal–agent hypothesis has been widely adopted in the literature, following Posner's (1993, 1985, 2008) seminal work. However, it is still unclear who the relevant principal is. The implicit assumption in studies that advocate for judicial reform is that various incentives can be devised so that judges can perform their work more efficiently, with efficiency defined as the extent to which judges' performance measure up to the duties and responsibilities laid down by law, e.g. the Constitution. In this case, the principal are the citizens or the framers of the Constitution. There are various empirical studies that appear to support this hypothesis, specifically showing that, with the prospect of being promoted, judges improve their performance by reducing case loads, writing more opinions, and generally increasing their productivity.[3] Note, however, that while promotion is conferred by other branches of government (i.e., Executive and Legislature), the principal is still assumed to be the citizenry, since the outcomes of judicial performance that are typically measured are those which the citizenry would want. In other words, the utility function of the promoting institution/s is the utility function of the citizenry.

Yet there are also many papers that suggest that other public institutions may be the relevant principal. Studies on the US judiciary, for instance, posit that lower courts act as agents of the US Supreme Court—see, e.g., Songer et al. (1994), Benesh and Reddick (2002), and Clark (2008), in which judges in the lower court behave according to the (policy) preferences of the Supreme Court. On the other hand, Black and Owens (2013) show that lawyers of the US Office of the Solicitor General (OSG) are more likely to win cases in the US Supreme Court, compared with non-OSG lawyers, which suggests that the principal is the US government. In the case of the European Union, Carruba and Gabel (2005) demonstrate that the European Court of Justice (ECJ) act as agents of member-states by showing that ECJ decisions in the years 1989, 1993, and 1997 tended to rule more favorably towards national governments when there are threats of legislative override and non-compliance by the latter.

In this paper, I test the hypothesis that the Philippine Supreme Court (SC) is an agent of the Executive; specifically, that Associate Justices of the SC tend to favor the national government in its decisions in consideration of being promoted to Chief Justice (CJ). Anecdotal evidence suggests that this is plausible. Survey data

[3] See, e.g., Cohen (1992) and Taha (2004) for the USA, Ramseyer and Rasmusen (1997) for Japan, Smyth (2004) for the UK and New Zealand, and Schneider (2005) and Choi and Gulati (2004a,b) for Germany.

obtained by the Alternative Law Groups, Inc. (2008) indicate that 48 % of Filipinos believe that the SC responds to pressures from the Office of the President. The 2003 national survey of the Social Weather Station (SWS) reveals that only 40 % believe that people get equal treatment in court, while the 2004 survey shows that 62 % of respondents believe that there are significant levels of corruption in the judiciary.

The institutional design of the Philippine SC also renders itself susceptible to such kind of principal–agent relationship. First of all, the Chief Justice (and all Associate Justices) is selected by the President (without need for legislative approval) from a list of nominees drawn by the Judicial Bar Council (JBC). Five out of the eight members of the JBC has connections with the President and the national government—the current Chief Justice, the Clerk of the SC, the Secretary of Justice, a member of Congress, and a retired justice of the SC.[4] Secondly, the supposed "tradition" of choosing the CJ nominees from the current Associate Justices of the SC, and eventually appointing the most senior Associate Justice as the CJ, have actually been broken several times. Lastly, the amended 1987 Constitution has vastly expanded the jurisdiction of the SC to such an extent that virtually any case can be raised to the SC on appeal.[5] All these elements combine to give the Executive more power to dangle the "carrot" of CJ appointment, and the SC justices greater discretion in affecting the outcomes of cases.

Selecting a sample of politically salient cases decided by the Philippine SC from 1986 to 2010, Escresa and Garoupa (2012, 2013) show that an SC justice tends to decide in favor of the administration that appointed her (while no such pattern exists for administrations that did not appoint her). However, this is likely to provide support for the "attitudinal" hypothesis, rather than taken as evidence of the existence of a principal–agent between the administration and SC justices. In considering only politically salient cases, one cannot infer whether the observed pattern is due to the alignment of political ideologies or preferences of the justice and the appointing administration, since there is no comparison with non-politically salient cases. Also, the paper is not able to test the alternative "law-seeking" or institutional-constraint hypothesis since institutions, specifically the Constitution, have experienced no significant changes in the period 1986–2010.

In contrast, using randomly selected cases from 1970 to 2003 (provided by Haynie et al. 2007) allows me to disentangle the various hypotheses and more consistently test the existence of the principal–agent relationship. This is because this sample includes cases of all types, and in the period 1970–1986, i.e. the years of the Marcos dictatorship, a different Constitution was in force, which was subsequently replaced by the 1987 Constitution. More importantly, during 1970–2003, there were ten turnovers (i.e., appointments) of the CJ and, thus, ten instances to test whether CJ appointment causes the CJ to behave more favorably towards the appointing authority.

[4]The other members are a representative of the Integrated Bar, a law professor, and a representative of the private sector.

[5]See, e.g., Bernas (2007) and Desierto (2009) for an analysis.

I thus adopt a difference-in-differences (DD) framework to compare the outcome of cases that involve the national government vs. those that do not, before and after appointment of a new CJ, for each of the ten appointment periods. If the behavior of justices is driven solely by their policy preferences which happen to coincide with the government's, then there could be differences in how the justice decides on government cases compared with other cases, but this difference should not be any different just prior to and just after appointment of a new CJ. Similarly, if justices only respond to opportunities and constraints set by institutions, then there could be differences in the extent of favoritism towards government vs. non-government cases pre- and post-1986, but there should still be no difference just before and just after a CJ is appointed. If any such difference remains, it could thus be attributed to agency behavior, that is, as response to being appointed CJ.

I find that such difference is significant, and the principal–agent relationship is thus apparent, during the appointments of CJs Fernan, Narvasa and Davide—that is, in three out of the four appointments that occurred after the new 1987 Constitution took effect. In contrast, none of the CJ appointments during the Marcos dictatorship mattered in terms of further increasing the probability that government cases are decided favorably. This result suggests that while a dictatorship might potentially increase the prerogative of the principal to use rewards (and threats), the power of such tools are blunted if agents are constrained by other institutions and thereby prevented from exercising personal discretion and affecting outcomes. It is only when the Constitution expanded the jurisdiction of the SC and its powers of judicial review that the opportunity to act as agents arose.

The next section discusses in more detail the empirical strategy I use to verify the existence of a principal–agent relationship between the Executive and the Philippine SC. Section 3 presents results from DD regressions and Sect. 4 concludes.

2 Methods and Data

If the preferences of the government and the judiciary can be modeled within a principal–agent framework, the hypothesis is that appointment to the judiciary causes an individual to decide cases in favor of the appointing authority, i.e. the government. To try to falsify this, I approximate the counterfactual scenario by looking at how Philippine Supreme Court (SC) Chief Justices (CJs) behave before their appointment as CJ, that is, while they are still Associate Justices of the SC, and verify whether there is a significant change in their behavior after they become the new CJ.[6]

[6]I use CJ appointment, rather than appointment to the SC, since the pool of SC Associate Justices from which the CJ is typically selected is likely to be more homogeneous than the larger set of Philippine lawyers who can be appointed Associate Justices of the SC.

Agency behavior is all the more plausible in the case of the Philippine SC essentially because the Executive wields considerable power in the selection of CJs which can significantly affect the latter's incentives, while CJs, at least after the 1987 constitutional change which expanded the scope of case jurisdiction of the SC, have much opportunity to generate favorable outcomes for the government. However, while one could then hypothesize a change in the treatment of government cases between appointment periods, one cannot easily put restrictions on the timing of such change. Specifically, it is possible for an increase in favoritism to occur prior to appointment, or after appointment. On the one hand, the former may be more likely since CJs, once appointed, can only be removed by impeachment or mandatory retirement at age 70, which casts doubt on the credibility of any promise a candidate CJ might make to favor the government after she is appointed. On the other hand, any apparent favoritism before appointment might blemish the reputation of the candidate, which in turn can taint the image of the appointing Executive. In this case, it may then be mutually optimal for the CJ to delay favoritism, and for the Executive to agree to this delay.

Moreover, this approach does not rule out the possibility that there may be systematic differences between government cases and cases not involving the government which may enable the former to win more often. For instance, the government may have more resources to build meritorious cases, or even that judges' own ideologies may make them more sympathetic to the government's position. However, there should be no further difference in the way government cases are decided (relative to other cases) just before, compared to just after, CJ appointment. That is, in adopting a difference-in-differences (DD) approach, one could attribute any further increase in the probability that government cases win to the fact that the Justice was appointed CJ and, thus, to agent-like behavior of the CJ.

The crucial assumption is that the assignment of government cases into pre- and post-appointment periods is random, but this may be untenable. The process of deciding a case in the Philippine SC is as follows. When an appeal is filed with the SC, the Clerk of Court decides whether it falls under the jurisdiction of the SC. If it is accepted, the case is assigned to a panel of five justices, who then deliberate on the case and vote whether or not to grant the appeal. The final outcome is that which is voted by the majority of the panel.[7] (Non-random) selection of cases into pre- and post-appointment periods could thus be possible if: (a) the Clerk of Court determines jurisdiction in such a way that the case dockets before appointment periods are more (or less) meritorious than post-appointment periods; or (b) cases are assigned to panels who are more likely to decide in favor of the government before, or after, CJ appointment; and/or (c) panels may strategically time their decisions such that, e.g. favorable decisions towards the government are resolved before or after CJ appointments.

[7]Certain cases are decided en banc, that is, by all fifteen justices of the SC, in which case one *ponente* is randomly assigned whose responsibility is to argue the case before the other members.

To separate out the effect of possible selection bias from (a), (b), and/or (c), I distinguish the outcomes of government cases (relative to other cases) pre- and post-appointment of a new CJ when the CJ is included in the panel, from the outcomes when the CJ is not included. The idea is that non-random selection of cases to pre- and post-appointment periods should already be evident from the decision behavior of the entire panel, since cases are assigned to, and decisions made by, panels. If it is only selection bias that is driving any apparent agent-like behavior of the CJ, then there should be no further difference in the extent of favoritism towards government cases (relative to other cases) pre- and post-appointment periods between cases handled by panels that do not include the CJ and those by panels that include the CJ. If there would still be a difference, then this would mean that having the CJ in the panel increases the probability that the government wins its cases more upon the CJ's appointment.

Finally, the foregoing assumes that preferences are stable pre- and post-appointment periods. This could be violated if, for instance, such periods coincide with elections that change the identity of the appointing authority, or if Justices change preferences once they become CJ (e.g., they may become more or less conservative, or care more or less about their image and would not want to be seen as favoring the government). One way to control for stability of preferences would be to shorten the time included in each pre- and post-appointment period. (One could also ensure that such periods do not involve regime changes or elections.) Another is to control for types of government cases, to allow for the possibility that justices may have different preferences toward certain types of cases.

I obtain encoded data on Philippine Supreme Court decisions between 1970 and 2003 from Haynie et al.'s (2007) High Courts Judicial Database (HCJD).[8] From this, I select decisions from 4-year periods corresponding to pre- and post-appointment periods of each CJ, exactly 2 years prior and 2 years after each appointment. There were ten CJs between 1970 and 2003, all of whom were already at the SC as Associate Justices prior to their appointment. Makalintal was appointed CJ on October 31, 1973, Castro on Jan. 2, 1976, Fernando on July 2, 1979, Makasiar on July 25, 1985, Aquino on Nov. 11, 1985, Teehankee on April 2, 1986, Yap on April 19, 1988, Fernan on July 1, 1988, Narvasa on Dec. 8, 1991, and Davide on Nov. 11, 1998. Thus, I construct ten *post "CJ "* binary variables (i.e., *postMakalintal*, *postCastro*, *postFernando*, etc.) which take on the value 1 for decisions that were handed out within exactly 2 years from the particular CJ's date of appointment, and 0 for decisions exactly 2 years prior.

I also construct binary variables *govtresp* and *govtappel* for decisions involving the national government as primary respondent and as appellant, respec-

[8]The HCJD contains encoded data describing the content of decisions produced by Supreme or High Courts of several countries over multiple years, and the data for the Philippines come from 3,409 decisions reported in that country's Supreme Court Reports Annotated (SCRA)—approximately 100 cases per year in the period 1970–2003—that were randomly chosen by Haynie et al.

tively, and 0 otherwise. (I make this distinction since there could be inherent biases against favoring an appellant, since this entails reversing, while favoring a respondent entails upholding, a lower court's prior decision.) The outcome variables are also binary variables, i.e. *Makalintalfavorresp*, *Castrofavorresp*, *Fernandofavorresp*, ... *Davidefavorresp*, that take on 1 if the decision reveals that the CJ was in favor of the respondent—particularly, either the respondent won and the CJ voted with the majority, or the respondent lost but the CJ dissented. (Note that favoring the respondent means not favoring the appellant.) To distinguish how the CJ decides a case compared to other (Associate) Justices, I construct another outcome binary variable *favorrresp* which takes the value 1 for decisions in which the respondent won, and 0 if the appellant won instead. (I also construct binary variables that select decisions based on whether they were decided by panels that included vs. those that excluded the CJ while the CJ was in court.)

Lastly, to distinguish between types of government cases, I construct binary variables $specialcourt = 1$ if the case came from a special court, rather than the Court of Appeals, $corruption = 1$ if the decision involved corruption charges, $publiclaw = 1$ for those involving public law, $privateeconrel = 1$ for those involving private economic relations, $torts = 1$ for tort cases, $familyestates = 1$ for those involving family estates, and $constiss = 1$ if the case pertained to a constitutional issue.

The Appendix reports summary statistics for these variables.

3 Estimation

The previous section suggests that if there were no biases from selection of decisions into pre- and post- CJ appointment periods, one could verify whether CJs tend to favor government cases by estimating the following difference-in-differences equation ten times, one for each CJ:

$$\text{“}CJ\text{”}favorresp = \alpha_0 + \alpha_1 govtresp + \alpha_2 govtappel + \alpha_3 post\text{“}CJ\text{”} + \alpha_4 govtresp * post\text{“}CJ\text{”} + \alpha_5 govtappel * post\text{“}CJ\text{”} + \epsilon, \quad (1)$$

where the notation “CJ” is replaced by the name of the relevant CJ of the period, and ϵ is an error term.

However, there may be selection bias. Since cases are assigned to panels and decisions are also made by panels, selection bias emanating from non-random assignment and strategic timing of decisions should be evident from the behavior of the entire panel. That is, if the difference in the outcome of government cases pre- and post-appointment is due solely to selection of government cases into pre- and post-appointment periods, then when the pre- and post-appointment behavior of the panel is already accounted for, the pre- and post-appointment behavior of the individual CJ should no longer explain differences in outcome. Thus, we estimate

Eq. (2) twice for each CJ appointment period, the first time only including cases decided by panels that excluded the CJ, and the second time including only cases decided by panels that included the CJ. If the effect is driven solely by selection bias, then favoritism towards the government should already be incorporated in the overall outcome, regardless of the CJ's participation. (Note that the dependent variable here is now the overall outcome of the decision, rather than how the CJ votes.) That is, in estimating Eq. (2) below, one would expect β_4 and β_5 to be no different if the CJ is in the panel, than if the CJ is not in the panel.

$$favorresp = \beta_0 + \beta_1 govtresp + \beta_2 govtappel + \beta_3 post\text{“}CJ\text{”} + \beta_4 govtresp * post\text{“}CJ\text{”} + \beta_5 govtappel * post\text{“}CJ\text{”} + \mu, \quad (2)$$

where, as before, the notation "CJ" is replaced by the name of the relevant CJ of the period, while μ is an error term.

Equations (1) and (2) are estimated by OLS and are thus interpreted as linear probability models, where the predicted value of the dependent variable is the predicted probability that the variable takes on the value 1. Thus, for instance, Eq. (1) implies that the predicted probability that the CJ favors the government more than other types of respondents prior to appointment is obtained by setting $govtresp = 1$, $govtappel = 0$ and $post\text{“}CJ\text{”} = 0$ to get:

$$\widehat{Pr}(\text{“}CJ\text{”} favorresp = 1) = \hat{\alpha}_0 + \hat{\alpha}_1, \quad (3)$$

while such predicted probability after appointment (i.e., $post1\text{“}CJ\text{”} = 1$) is:

$$\widehat{Pr}(\text{“}CJ\text{”} favorresp = 1) = \hat{\alpha}_0 + \hat{\alpha}_1 + \hat{\alpha}_3 + \hat{\alpha}_4. \quad (4)$$

Analogously, the predicted probability that the "CJ" *dis*favors[9] the government more than other types of appellants prior to appointment is obtained by setting $govtresp = 0$, $govtappel = 1$ and $post\text{“}CJ\text{”} = 0$:

$$\widehat{Pr}(\text{“}CJ\text{”} favorresp = 1) = \hat{\alpha}_0 + \hat{\alpha}_2, \quad (5)$$

while such predicted probability after appointment is:

$$\widehat{Pr}(\text{“}CJ\text{”} favorresp = 1) = \hat{\alpha}_0 + \hat{\alpha}_2 + \hat{\alpha}_3 + \hat{\alpha}_5. \quad (6)$$

Equation (2) can be similarly interpreted, with the predicted value of the dependent variable now interpreted as the predicted probability that the respondent

[9]Note that deciding in favor of the respondent in a case means ruling against the corresponding appellant. Since the dependent variable takes on 1 if the "CJ" votes in favor of the respondent, we can then interpret the predicted probability to be the predicted probability of disfavoring the appellant. Equations (5) and (6) consider cases in which the government is the appellant.

Table 1 Estimated coefficients from OLS estimation of Eq. (1) (dependent variable is "*CJ*"*favorresp*)

	Makalintal as CJ	Castro as CJ	Fernando as CJ	Narvasa as CJ
govtresp	0.658	0.220***	0.007	−.056
	(0.101)	(0.067)	(0.074)	(0.153)
govtappel	−0.654***	0.070	0.244*	0.722***
	(0.208)	(0.101)	(0.131)	(0.217)
postMakalintal	−0.416***			
	(0.060)			
govtresp × *postMakalintal*	0.129			
	(0.132)			
govtappel × *postMakalintal*	0.598**			
	(0.252)			
postCastro		−0.211***		
		(0.046)		
govtresp × *postCastro*		−0.158*		
		(0.096)		
govtappel × *postCastro*		−0.097		
		(0.141)		
postFernando			−0.272***	
			(0.062)	
govtresp × *postFernando*			0.317***	
			(0.106)	
govtappel × *postFernando*			−0.112	
			(0.194)	
postNarvasa				0.132
				(0.164)
govtresp × *postNarvasa*				0.000
				(0.223)
govtappel × *postNarvasa*				−0.750**
				(0.292)
Constant	0.654***	0.237***	0.340***	0.278***
	(0.044)	(0.032)	(0.042)	(0.108)
Observations	311	326	313	79
R-squared	0.179	0.146	0.101	0.161

Standard errors in parentheses
$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

actually wins the case, that is, that the majority of the panel votes in favor of the respondent.

Recall that Eq. (1) is estimated (by OLS) ten times, i.e. for each CJ in the sample, while Eq. (2) is estimated twice for each CJ in the sample. Tables 1, 2, and 3 report only those regressions in which either of the interaction terms *govtresp* ∗ *post*"*CJ*"

Table 2 Estimated coefficients from OLS estimation of Eq. (2) (dependent variable is *favorresp*)

	Makalintal in panel	Fernan in panel	Narvasa in panel	Davide in panel
govtresp	−0.150*	−0.043	0.071	−0.285**
	(0.086)	(0.092)	(0.106)	(0.110)
govtappel	−0.605***	−0.059	0.485***	−0.209
	(0.154)	(0.139)	(0.171)	(0.195)
postMakalintal	−0.097			
	(0.077)			
govtresp × *postMakalintal*	0.235*			
	(0.142)			
govtappel × *postMakalintal*	0.597**			
	(0.296)			
postFernan		0.063		
		(0.117)		
govtresp × *postFernan*		0.088		
		(0.171)		
govtappel × *postFernan*		0.559*		
		(0.334)		
postNarvasa			0.048	
			(0.101)	
govtresp × *postNarvasa*			−0.077	
			(0.151)	
govtappel × *postNarvasa*			−0.613***	
			(0.231)	
postDavide				−0.209
				(0.141)
govtresp × *postDavide*				0.335*
				(0.175)
govtappel × *postDavide*				0.065
				(0.280)
Constant	0.605***	0.437***	0.415***	0.617***
	(0.045)	(0.065)	(0.068)	(0.084)
Observations	266	180	188	140
R-squared	0.063	0.032	0.048	0.059

Standard errors in parentheses
*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table 3 Estimated coefficients from OLS estimation of Eq. (2), controlling for case type (dependent variable is *favorresp*)

	Fernan in panel	Narvasa in panel	Davide in panel
govtresp	0.020	−0.029	−0.225∗
	(0.124)	(0.133)	(0.128)
govtappel	0.018	−0.387***	0.084
	(0.152)	(0.188)	(0.189)
postFernan	0.018		
	(0.120)		
govtresp × *postFernan*	0.135		
	(0.176)		
govtappel × *postFernan*	0.564*		
	(0.333)		
postNarvasa		0.0386	
		(0.100)	
govtresp × *postNarvasa*		0.026	
		(0.151)	
govtappel × *postNarvasa*		−0.471*	
		(0.232)	
postDavide			−0.218
			(0.133)
govtresp × *postDavide*			0.303*
			(0.163)
govtappel × *postDavide*			0.086
			(0.259)
specialcourt	−0.066	−0.165**	0.000
	(0.010)	(0.080)	(0.111)
corruption	0.173	0.082	0.561**
	(0.182)	(0.169)	(0.232)
publiclaw	−0.393**	−0.633***	−0.494***
	(0.178)	(0.151)	(0.115)
privateeconrel	0.518***	0.478***	0.552***
	(0.190)	(0.174)	(0.141)
torts	0.340	0.598**	0.177
	(0.339)	(0.272)	(0.255)
familyestates	0.674**	0.398	0.046
	(0.333)	(0.272)	(0.336)
constiss	0.016	−0.0837	−0.184
	(0.183)	(0.134)	(0.136)
Constant	0.380***	0.627**	0.670***
	(0.115)	(0.124)	(0.122)
Observations	180	188	140
R-squared	0.084	0.153	0.258

Standard errors in parentheses
*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

or *govtappel* ∗ *post*"*CJ*" is significant, since the idea is to show whether there are significant differences in the way government cases are treated (relative to other respondents and appellants) before and after appointment. Table 1 reveals that there was a significant difference between pre- and post-appointment periods in the difference between how government and non-government cases were decided by CJs Makalintal, Castro, Fernando, and Narvasa. However, this could only be due to (non-random) selection of cases into pre- and post appointment periods. Thus, Table 2 reports results from estimating Eq. (2), but only those regressions in which either *govtresp* ∗ *post*"*CJ*" or *govtappel* ∗ *post*"*CJ*" is significant. These results are from regressions that included CJs Makalintal, Fernan, Narvasa, and Davide in the panel. In other words, none of the regressions of Eq. (2) that involve panels that excluded the CJ generated significant results. At the very least, this suggests that if any selection bias was present, it appears to have been targeted towards, or coincides with, the presence of a CJ in the panel. If anything, then, non-random assignment of cases or strategic timing of decisions has effectively contributed to the agency behavior of the CJ. Finally, when I add control variables (on the types of government cases) to Eq. (2), only the panels that included CJs Fernan, Narvasa, and Davide generate significant coefficients of either *govtresp* ∗ *post*"*CJ*" or *govtappel* ∗ *post*"*CJ*". Again, none of the panels excluding a CJ exhibited any apparent agency behavior.[10]

What is also interesting is that all the significant results in Table 3 coincide with three of the four appointment periods which occurred after the 1987 Constitution took effect. The magnitude of the estimated effects are also non-trivial. Figures 1, 2, and 3 use the estimated coefficients in Table 3 to compute for the predicted probability that *favorresp* = 1 for public law cases, where the left bars are the difference in the probability of winning for government cases and the probability of winning for non-government cases prior to appointment of the CJ, while the right bars show the difference after appointment.[11]

[10]As further robustness check, Eq. (2) is also estimated for CJs Fernan, Narvasa, and Davide using "placebo" periods more than 2 years after the latter were appointed CJ and before the next CJ is appointed. Specifically, for CJ Fernan, I consider the period July 1, 1990 to Dec. 7, 1991 and where *postFernan* = 1 if the case was decided after Dec. 31, 1990. For CJ Narvasa, I consider the period Dec. 8, 1993 to Dec. 8, 1997, and let *postNarvasa* = 1 for cases decided after Dec. 8, 1995. Lastly, for CJ Davide, I consider the period Nov. 30, 2000 to Nov. 28, 2003 (the last period in the sample), and let *postDavide* = 1 for cases decided after May 30, 2001. I find no significant differences in the way CJs Fernan and Davide decide cases involving the government relative to other cases between the pre- and post-CJ periods. However, for CJ Narvasa, the estimated coefficient for *govtresp* ∗ *postNarvasa* of −0.320 is statistically significant at 5 %.

[11]The difference in the probability for government cases and the probability for non-government cases is computed by taking the difference in the predicted probability when either *govtresp* or *govtappel* = 1 and the predicted probability when either *govtresp* or *govtappel* = 0, respectively. The left bars are such difference when *post*"*CJ*" = 0, while the right bars are when *post*"*CJ*" = 1. I treat as zero all estimated coefficients that are statistically insignificant. Lastly, for all these bars in the figures, I set *publiclaw* = 1 and, hence, *privateeconrel*, *torts*, *familyestates*, *constiss* = 0.

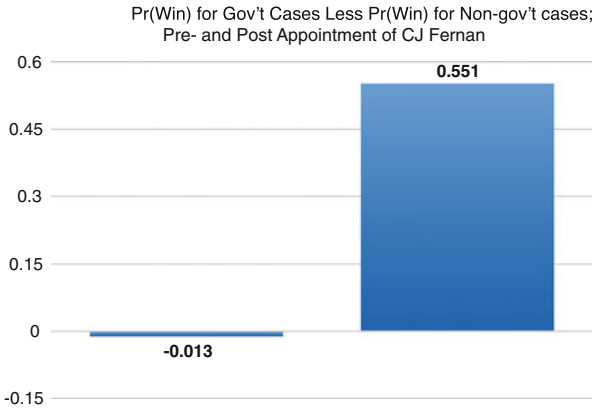

Fig. 1 Pr(Win) for Gov't Cases Less Pr(Win) for Non-gov't cases; pre- and post- appointment of CJ Fernan

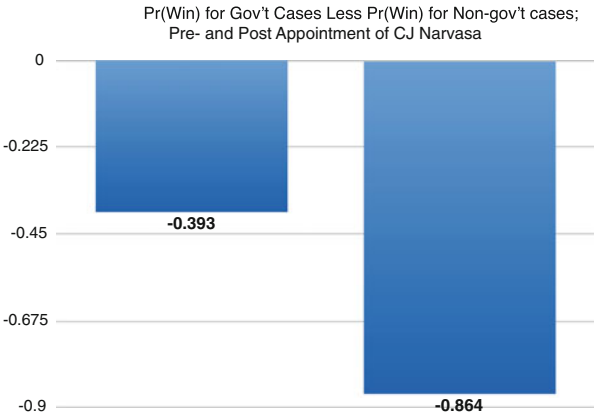

Fig. 2 Pr(Win) for Govt't Cases Less Pr(Win) for Non-gov't cases; pre- and post- appointment of CJ Narvasa

Specifically, Fig. 1 shows that the probability of preferential treatment towards cases involving the government as appellant (compared with other cases not involving the government) increased to 0.551 when Fernan became Chief Justice. While the agency behavior in Fernan's case appear to have been activated after Fernan became CJ, note that Eq. (2) allows for the possibility that agency may occur prior to appointment, that is, in anticipation of, appointment. Thus, Fig. 2 shows that while the panels involving CJ Narvasa tended to decide more favorably towards non-government cases compared with cases in which the government was the appellant,

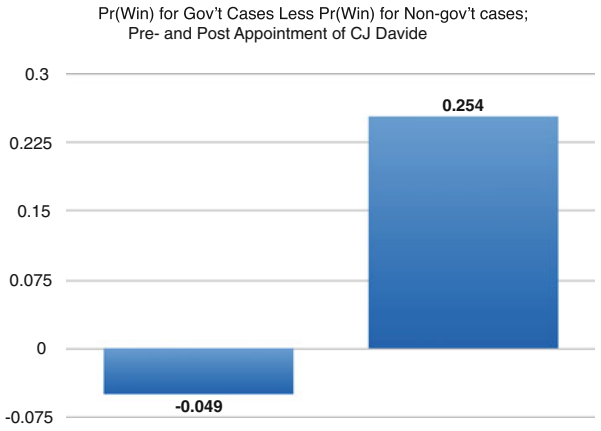

Fig. 3 Pr(Win) for Gov't Cases Less Pr(Win) for Non-gov't cases; pre- and post- appointment of CJ Davide

this disadvantage is smaller just before Narvasa became CJ.[12] Finally, Fig. 3 shows that panels that included Davide appear to have favored other cases more than cases in which the government was the respondent, but this trend reversed after Davide was appointed CJ—the probability that government respondent cases would win was now higher than the probability that other cases would win, by 0.254.

4 Concluding Remarks

In this paper I used randomly selected cases decided by the Philippine Supreme Court between 1970 and 2003 to test the hypothesis that the latter acts as agent of the Executive by favoring the latter in its decisions in consideration of being promoted/appointed Chief Justice. The results from estimating a difference-in-differences model for each CJ appointment period in the sample suggest that agency behavior began after changes in the Constitution were made that expanded the jurisdiction of the Supreme Court. The new, post-Marcos, Constitution was primarily supposed to have been designed in order to limit Presidential powers (and prevent future dictatorships), but in transferring more power to other branches of government (i.e., the Supreme Court), the unintended consequence is that the President remains powerful, but in a less transparent way.

[12]This trend seems plausible since overall, Narvasa tended to decide against government cases more than he did against non-government cases and, hence, favoritism before appointment is less conspicuous.

Appendix

Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
favorresp	3409	.4916398	.5000034	0	1
Makalin1in~r	1895	.1208443	.3260323	0	1
Castro1inf~r	1895	.1218997	.3272563	0	1
Fernand1in~r	1895	.2216359	.415457	0	1
Makasia1in~r	1895	.223219	.4165139	0	1
Aquino1inf~r	1895	.1905013	.3928002	0	1
Teehank1in~r	1895	.2168865	.4122335	0	1
Yap1infavor	1895	.0005277	.0229718	0	1
Fernan1inf~r	1895	.0131926	.1141291	0	1
Narvasa1in~r	1895	.0422164	.2011355	0	1
Davide1inf~r	1895	.0490765	.2160848	0	1

Variable	Obs	Mean	Std. Dev.	Min	Max
govtresp	3171	.397351	.4894269	0	1
govtappel	3377	.0775837	.2675549	0	1
postMak~ntal	408	.5196078	.5002288	0	1
postCastro	408	.5	.5006139	0	1
postFernando	416	.4759615	.5000232	0	1
postMakasiar	392	.4872449	.5004761	0	1
postAquino	395	.4708861	.4997847	0	1
postTeehan~e	375	.536	.4993686	0	1
postYap	415	.4915663	.5005323	0	1
postFernan	422	.4668246	.4994903	0	1
postNarvasa	397	.488665	.5005023	0	1
postDavide	405	.5135802	.5004337	0	1
postCJ	2417	.6156392	.4865445	0	1

Variable	Obs	Mean	Std. Dev.	Min	Max
specialcourt	3409	.2100323	.407391	0	1
corruption	3409	.0155471	.123733	0	1
publiclaw	3409	.5092402	.4999879	0	1
privateeco~l	3409	.3376357	.472973	0	1
torts	3409	.0293341	.1687661	0	1
familyesta~s	3409	.0316808	.1751747	0	1
constiss	3408	.038439	.1938022	0	2

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Comparative Analysis of Institutional Incentives and Organisational Adjustment of Social Actors in Eight European Countries

Rosa Nonell and Iván Medina

1 Introduction

European governments are currently dealing with profound structural reforms in such fields as the banking sector, the labour market, pensions and welfare. The motivation behind reforms often recalls neoliberal standpoints criticising untamed, unsustainable public spending. There is, in fact, an intense debate over the role the state should play in overcoming the crisis, leading to a polarisation between people who defend austere, tax-free mechanisms of economic stabilisation and those who call for a neo-Keynesian path to economic recovery. While social protests spring up across Europe, international and European organisations (for instance, IMF, World Bank, European Union) urge national governments to speed up reforms to stabilise public budgets. Governments must act quickly, avoiding lengthy, far-reaching negotiations with trade unions that could (undesirably) water down the reforms. However, the majority of the European governments deem necessary, as far as possible and in order to ensure governability, to listen to social demands, at least in an attempt to legitimise unpopular decisions, as well as to share responsibilities with organised groups. This paves the way for the signing of social pacts. However, for the time being, social partners in some countries, like Spain and Italy, seem not to be leading the dance, thus causing a situation in which the governments in both countries are apparently the ones setting the agenda for reforms. Have

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social partners refused to get involved in the debate for economic recovery? Other countries utilised the bargaining process as an instrument involved in the solution of the economic crises, is it the case of Austria, Norway and the Netherlands. The widespread rationale interpreting Spain and Italy points out that these countries have no chance of dealing with economic reforms through social pacts because of the lack of efficient institutional preconditions.

When the economic performance is analysed, there are some countries (Austria, the Netherlands, Germany, the UK, Norway) with healthier macroeconomic stability before the economic crisis and with more capacity to obtain positive results during the crisis compared to other countries (France, Italy, Spain) with lower economic results and strong difficulties to resolve the economic crisis in terms of debt (public and private), public deficit and unemployment. What we see, in short, is a certain relationship between the organisational elements of social actors, especially the use made of the institutional incentives, and characteristics of the negotiating process. It is argued that institutions in these countries neither ensure proper negotiations nor plan methodical policy implementation. From the very beginning, social pacts become worthless. These countries would fail in institutionalising social concertation, that is, formalising political commitments to economic policies. However, social pacts have continued to occur, to the surprise of many experts, who appreciated neither clear economic effects nor institutional preconditions for corporatism (Regini 1997). The inconsistency between these two elements (high provision of social pacts *plus* nonexistent economic output) conceals, in our opinion, other explanatory factors related to the negotiation process. Our argument focuses on the political component of social concertation as a particular characteristic of policymaking. We call for much more attention to be paid to the organisational contexts of social actors because this, in a way, shows the limits of interest representation (Schmitter 1974).

At this level of analysis, we find a number of institutional changes that have fed the logic of influence to the detriment of the logic of membership of social actors in Spain and Italy. There is a general interest in improving the institutional status of social actors ahead of an interest in improving the decision-making power of the institutions responsible for social dialogue, causing a situation in which social pacts are traded in a fairly informal context whenever the parties involved see fit. In the course of this, two trends may be occurring at the same time, although in different countries: either the reinforcement of social pacts or the reinforcement of social actors. In fairness, our argument draws on previous studies that claimed that the consolidation of the main trade unions and employers' associations was articulated through the organisational support of the state, and this greatly conditions the dependence of social actors from the government and, in turn, the actual functioning of social concertation.

In this respect, we stress the structural interdependence between the input process (the logic of membership) and the output process (logic of influence) for the provision of social pacts, in the case study selected countries. The article is structured as follows. Firstly, we outline the main theoretical discussions on social pacts in Europe. A call is made to analyse social pacts beyond their mere

economic nature. Secondly, we examine the organisational characteristics (logic of membership) of the most representative peak business associations and trade unions in various European countries, namely, Germany, Austria, Norway, the Netherlands, France, Italy, Spain and the UK. The selection of cases has taken into account the existence of various economic coordination models: Germany, Austria, Norway and the Netherlands are coordinated market economies (CMEs) that reinforce the institutionalisation of social pacts; France, Spain and Italy fall within the so-called mid-spectrum economies, emphasis in the institutionalisation of actors; and the UK represents the model of 'liberal market economies' (LMEs). Finally, we examine the institutional framework that allows social concertation, the frequency with which social pacts are signed and the economic motivation behind social pacts.

From the methodological point of view, this work is to build and develop fuzzy score index and proxy variables to identify the actors and their behaviour. It notes the difficulty of finding homogeneous and comparable micro data across the selected countries that identify the social partners and their involvement in the formation of public policies through negotiations and social pacts.

2 Social Pacts, Social Actors and the Debate on Institutionalisation

The decision over which (sort of) political economy mechanism governments should rely on rekindles the debate on social pacts in the studies of the politics of economic reforms (Hamann and Kelly 2011). In fairness, scholars have never abandoned the concept of social pacts, or the broader concept of social concertation, but constantly highlighting its mutation into lean forms (Traxler 2004). Contrary to the UK experience pioneered by Margaret Thatcher (deregulation of industrial relations, marginalisation of trade unions, abolition of social concertation), the majority of European countries continued to resort to (some sort of) tripartite or bipartite social pacts since the 1990s onwards (Fajertag and Pochet 1997). EMU proved to be a catalyst for social pacts in as far as governments could negotiate the schedule and scope of reforms—although social pacts happened less intensely than in previous decades. This trend helped disprove the idea that neoliberal economics would generate the complete destruction of trade unions and the dismantling of formal negotiation mechanisms. Of course, national social actors steadily began to face a problem of representation and a gradual loss of power in national policymaking (Traxler 2010). However, such flaws could be solved by the adaptation of structures and logics to upper and lower levels of interest representation.

Amid this wave of social concertation in which macroeconomic issues were gradually being replaced by microeconomic ones, scholars place emphasis on the prerequisites needed to achieve social pacts at national level (Traxler and Brandl 2010). The idea of the prerequisites for the achievement of social pacts is not new, as it goes back to early studies of corporatism in Europe (Schmitter and

Lehmbruch 1979). Under the aegis of Keynesianism, *corporatism* pointed out that a high degree of centralisation was needed to provide a disciplined framework for social concertation at national level. Many governments obliged both workers and employers to be hierarchically organised under the threat of exclusion from the decision-making group. Such a corporatist structure proved capable of adapting policies to specific demands in companies, fostering adjustments of variations in demand and encouraging a microeconomic orientation (Traxler and Mermet 2003). Regarding the relevance of social partners' organisational features, the *organisational approach* admits that organisational designs have a strong impact on both economic development and institutional performance. Arguably, social pacts depend on social partners' willingness to ensure political governability, and this, in turn, depends on their ability to achieve internal coordination (Flannagan 1999). Issues related to membership of organised groups, centralisation, representation and governance capacity become key independent variables for achieving effective social pacts under this approach.

Moreover, Avdagic et al. (2005) pioneered the latest stream of research indicating the tendency towards the institutionalisation of social pacts. The *institutionalisation of social pacts* approach praised various preconditions for the achievement of social pacts: firstly, highly centralised negotiations on wages helping to achieve convergence and, secondly, a moderate centralisation that should provide a better response to market pressures (Hassel 2007). This approach has mainly focused on the structural conditions allowing the emergence, adaptation and resurgence of social pacts, resorting to a methodology focusing mainly on the organisational power of trade unions, for instance, unions' density rate and degree of centralisation, as well as on the empowerment of certain institutions dealing with social bargaining. According to Avdagic (2010), there are a number of situations in which social pacts are more likely to occur:

(a) The existence of serious economic problems, for instance, the formation of the single market, strong structural imbalances, a high rate of inflation, high budget deficit or a high rate of unemployment.
(b) The existence of an institutional framework of labour relations that promotes collective bargaining, preferably in a centralised manner, thanks to the existence of unions with significant rates of unionisation, high coverage of collective bargaining, centralised government structures and government involvement in the wage formation process.
(c) The existence of political factors favouring the achievement of social pacts, for example, left-wing governments with strong electoral pressures.

In short, countries were classified in two general groups: on one hand, countries with proper institutional arrangements that are likely to obtain competent social pacts (i.e. Germany, the Netherlands, Austria) and, on the other hand, countries that show a much more problematic history of national social dialogue (i.e. Spain, Italy, Ireland, Portugal). The former group of countries was expected to be able to produce highly integrated social pacts and restrain the interest of social partners, whereas the latter set of countries seemed unlikely to establish stable institutional

settings leading to a 'blame-sharing strategy' between actors at national level (Pochet and Fajertag 2000). Such a classification of countries on the grounds of institutional arrangements is congruent with the notion of Varieties of Capitalism (Hancké 2010). In short, in CMEs, of which Germany stands as a cornerstone, the state plays a limited role in the economy, allowing (highly) organised business and unions, to shape economic regulation, through voluntary agreements. As the state in CMEs endeavours itself to provide functional institutional frameworks, what makes social pacts succeed is the institutionalisation (or reinforcement) of institutions. By contrast, countries labelled as 'Compensating States' (or mid-spectrum economies) host weakly organised interest groups facing severe weaknesses for playing a decisive role in economic growth. The state becomes a sort of 'compensating' force when it comes to distributing resources, initiating economic policies and triggering institutional participation. As organised groups are poorly articulated and decision-making is quite obtuse, these countries are therefore ill-equipped for achieving effective social pacts.

However, some authors provide alternative explanations for the limits affecting the latter group of countries by highlighting the fact that institutional factors alone cannot explain the proliferation of social pacts (Negrelli and Pulignano 2008). The role of actors, the power-sharing strategies between them and the territorial dynamics of social concertation need to be taken into account. In other words, it seems that the analysis of social pacts is not restricted merely to the observation of the oft-cited 'institutionalisation of negotiations at national level'. For instance, Caruso (2002) pointed out that the reduction of state-wide social concertation in Italy did not block the emergence of social dialogue at regional and local levels. Accordingly, Natali and Pochet (2010, 19) have recently encouraged the analysis of the formation of social pacts following three main variables, namely, (a) the *problem load* resulting from socio-economic and political challenges, (b) the *role of actors* (and their interests and preferences) and (c) the *institutional dynamics* related to the whole process of social concertation. In their view, such a multidimensional approach captures complexity in a better way.

We intend to understand the way social actors become adapted to their economic and institutional environment. In our view, social actors do face constraints and opportunities that are strongly related to the policy process, whether the government grants incentives for formal social concertation or the country dismantles collective bargaining institutions. In addition to analysing the organisational model of social actors, we must understand the organisational capacity and financial autonomy they can achieve. In a recent contribution on the forms of business associations, Lanzalaco pointed out that the historical framework of the structuring of business associations does matter in that:

> [An] important historical factor in the development of associative systems is the role played by exogenous actors in "sponsoring" the formation of the peak associations, leading us to distinguish between *internally* and *externally* legitimized associations. The first type owes its formation to the autonomous and spontaneous action of capitalists, so the association is endogenously legitimized by its representative action. In other cases, less infrequent than

> one might suppose, the source of legitimization is exogenous to the organization itself. (Lanzalaco 2008, 301)

And he adds:

> In general terms we may infer that the way in which a peak association is formed determines its structural properties, in particular its degree of institutionalization. BIAs generated and developed by diffusion, regardless of the source of their legitimization, tend to be weakly institutionalized. In fact, when the national peak association emerges, the territorial and sectoral associations adhering to it are already consolidated and reluctant to devolve their power and authority to a new central organization, as in the cases of the French CNPF or the British CBI. In the case of BIAs born as a result of penetration, their degree of institutionalization will be dependent on their form of legitimization. If the source of legitimization is internal they will be strongly institutionalized (e.g. the Swedish SAF), whereas if the legitimizing source is external, they will be weakly institutionalized (e.g. the Italian Confindustria whose consolidation was fostered by the Fascist regime), since the control over organizational resources and the linkages of loyalty depend on the external "sponsoring" organization. (Lanzalaco 2008, 301–302)

Obviously, the success of social concertation cannot be inferred solely from the morphological study of social actors (see, for instance, Baccaro and Simoni 2008). The economic performance of a country is defined by a multitude of factors that facilitate the implementation of economic policies and free market expansion.

However, we aim to show that the organisational structure of social actors and especially the existence of means to protect their bargaining power, the majority of them having a long history and a solid anchorage, seem likely to have significant impact on social concertation. Interestingly, this explanation applies to selected comparative case studies of countries and encourages us to emphasise the organisational aspects of social actors as critical explanatory factors in the politics of social pacts. To analyse all of these institutional aspects and incentives that affect the actors and their bargaining process, we elaborated a research methodology based on the definition of characteristics and incentives that determined the input process and the output process of the social actors. The dates are based on the construction of index (fuzzy score) that identify the different aspects and institutional incentives, all of them are summarised in Table 1.

3 The Input Process: Organisation, Incomes and Membership

3.1 Business Associations

Business associations are determined by the very characteristics of the companies they are intended to represent. They therefore vary depending on firm size (large companies/small companies), economic sector and (the political power of a given) territory (Windmuller 1984). In comparative terms, Europe is marked by a profound heterogenisation in business associability. The majority of European countries are

Table 1 Summary of values elaborated between 1985 and 2013

Figure	Variable (proxy/adapted from)	Country							
		Austria	France	Germany	Italy	Netherlands	Norway	Spain	UK
1	*Membership incentives* Exclusion clauses for firms + risk compensations for members regarding industrial relations	0.35	0.33	0.33	0.17	0.5	0.33	0	0
	Institutional incentives Institutional representation + extension schemes + collective bargaining recognition	0.67	1	0.67	0.5	0.63	0.33	1	0
2	*Autonomy of resources* Weight of members' fees on overall budget	0.85	0.29	1	0.84	0.92	0.66	0.18	0.7
	Degree of corporatism Hamann and Kelly (2007)	0.92	0.46	0.82	0.58	0.8	0.92	0.38	0.38
3	*Membership incentives* Unions' density	0.28	0.1	0.19	0.33	0.18	0.53	0.14	0.27
	Institutional incentives Collective bargaining rules + unions' elections	0.75	0.65	0.5	1	0.25	0	1	0
4	*Degree of centralisation* Avdagic (2010)	1	0	0.8	0.8	0.4	0.8	0.4	0
	Regularity of social pacts Avdagic (2010)	0	0	0	1	0.2	0.1	0.8	0

home to 'dual' business associations attempting to represent both industrial relations interests and other economic interests (Traxler 1997). As business associations at national level end up being large confederations of territorial and sectorial associations, they face a serious problem of *articulation* between demands and structures. They have to find a way to define strategic actions that link all members of the organisation while competing with other peak business associations (recall Germany, for instance). An overview of the various forms of associations is described in Table 2.

Crouch (2003) noted that traditional peak business associations were clearly declining in significance for four reasons: increasing economic globalisation, the rise of individual enterprise, the dominance of neoliberal ideology and the challenge of various non-functional interests. He was reaffirming the notion of 'organised decentralisation' (Crouch 1995), pointing out that 'at least for neo-corporatist forms of co-ordination, the idea of centralization needs to be replaced by that of articulation, implying an elaborate relationship among different levels of organizational structure, with a central leadership being in a position to take into account and respond to the views and positions of the periphery and intermediate levels' (Crouch 1995, 321). In a recent study, Traxler (2010) analysed the long-term development (1980–2003) of organised business based on membership, activities and governing capacities. He comes up with three main conclusions: (1) business

Table 2 Overview of various peak national business associations across Europe

Country	General cross-industry	Specific employer type			Specific sector
		SMEs	Crafts	Others	
Austria	WKÖ				IV
France	MEDEF	CGPME	UPA		
Germany	BDA		ZDH		
Italy	Confindustria	RETE Imprese Confapi Confesercenti	CLAAI CNA Confartigianato	AGCI Confcooperative Legacoop and UNCI	CIA Coldiretti and Confagricoltura Confcommercio Confesercenti and Confapi
Netherlands	VNO-NCW	MKB-Nederland			LTO Nederland
Norway	NHO				HSH
Spain	CEOE	CEPYME			
UK	CBI	FSB			

Source: Carley (2010)

associations have undergone a slightly decline in associability, probably affecting the 'periphery' of small firm members; (2) business associations have reduced their participation in public policy, but the changes are fairly insignificant; and (3) there has been a strong decrease in staff hired by business associations, which can be explained by a generalised reduction of membership fees, by half in some cases. Organisational adaptation and the renewal of incentives for recruiting members have put national business associations under stress, confirming the need of any interest to have an organisation capable of solving 'collective-action' problems by integrating as many members as possible.

Nevertheless, this new array of economic transformations was a great challenge for business associations, as it offered the possibility of readapting their role and strengthening their capacity to meet the needs of members more effectively. In order to reduce internal tensions, business associations supply their members with a number of services that ensures their organisational stability and capacity to represent interests. The association needs to avoid *exit options* through the implementation of compensating clauses and services to members showing disappointment. For example, Spain protects the negotiating capacity of the actors involved in the sector/national collective agreements by establishing the principle of ultra-activity, France applies the principle of favourability, Germany applies the 'peace clauses' to prevent conflict to get embedded in collective bargaining and Norway promotes regulations that favour the principles of solidarity in the whole negotiation. The configuration of such incentives varies between countries, but they can be classified as follows: (a) exclusion options and/or opening clauses, directly

designed to prevent companies leaving the organisation in countries with centralised bargaining, (b) the management of certain business-related public services and/or existence of obligatory levies and (c) the existence of special schemes, such as insurance services, to facilitate the welfare of business managers, and conflict funds to facilitate the negotiating capacity of the organisation and reduce the impact of some decisions on individual companies.

Regarding the logic of influence, business associations find a series of public incentives to help strengthen their position in social concertation and industrial relations, namely, (a) representative endorsements, which many countries have strongly consolidated in their regulatory corpus for protecting and enhancing the activity of business associations, (b) extension schemes applied to collective agreements and (c) public subsidies, rewarding the participation of actors in collective bargaining negotiations. These incentives are available to a very small number of business associations (Berger 1981), having a profound impact on the competition of business interests and on the potential access of business associations to decision-making. Figure 1 places every country depending on the services the business associations provide to their members and on the degree to which they resort to public incentives to enhance their logic of influence. The best-case scenario is where a business association is likely to balance the two logics in such a way entrepreneurs feel the need to join the association due to the benefits it gets, as well as the association ensuring sufficient autonomy from the political realm. That means business associations can adjust logics to determine their own fate. This situation applies to countries such as Austria, Germany and the Netherlands. By contrast, the array of factors determining business associations in Spain mainly relate to public incentives in the field of social concertation. Since no special membership service is provided, the CEOE (Spanish Employers' Associations Confederation) is unlikely to plan a particular recruitment strategy. The combination of these two trends indicates that business associations' organisational evolution is highly dependent of the institutional rewards. As their organisational capacity depends to a lesser extent on members, their behaviour is focused on institutional representation. Confindustria (Italian Federal Employers' Association) also has problems in dynamising membership, but its public character is somehow less manifest than in Spain. The organisational basis of Norwegian business associations is characterised by services to members, whereas the UK is marked by having no incentives at all—neither related to institutional participation nor available in industrial relations.

Data on business associations' financial autonomy complements the above comments. *Membership fees* are one of the key components of financial autonomy. Data on the amount of membership fees in relation to total budget shows very different results across countries due to the different configurations between the logic of membership and the logic of influence. We can complement budget issues with the *corporatism index* proposed by Hamann and Kelly (2007), which is useful for measuring actors' degree of involvement in social dialogue and labour relations

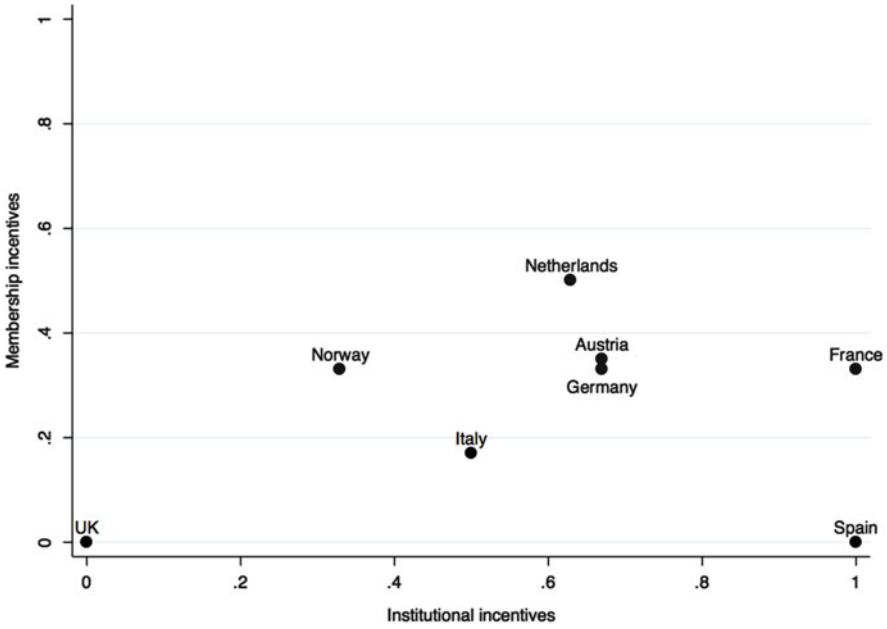

Fig. 1 Incentives determining business associability across Europe. *Source*: own research (see Table 2 for more details)

state-wide. Differences between countries are confirmed. There is certain coherence in Germany, Austria and the Netherlands, whereas Spain establishes a misaligned organisational model of business representation (Fig. 2).

3.2 Trade Unions

Trade unions are large associations comprising many territorial and sectorial subunits. Ideological variations often work in such a way that various trade unions are established separately. Italy is a paradigmatic example of ideological disputes in the workers' sphere. However, the current challenge of traditional unions is related to their ability to adapt to decentralisation trends of industrial relations that increasingly paves the way for non-union forms of employee representation, leading to a considerable reduction in unions' density in the majority of the OECD countries (Visser 2006). This trend establishes a strong causality between the organisational adaptation of trade unions and the exogenous pressures arising from the changing negotiating conditions in industrial relations. According to Molina (2008), two major challenges are at stake for unions:

> First, the redefinition of competences and roles within multi-level bargaining systems and the capacity of trade unions to link the instrument of social pacts and partnership to

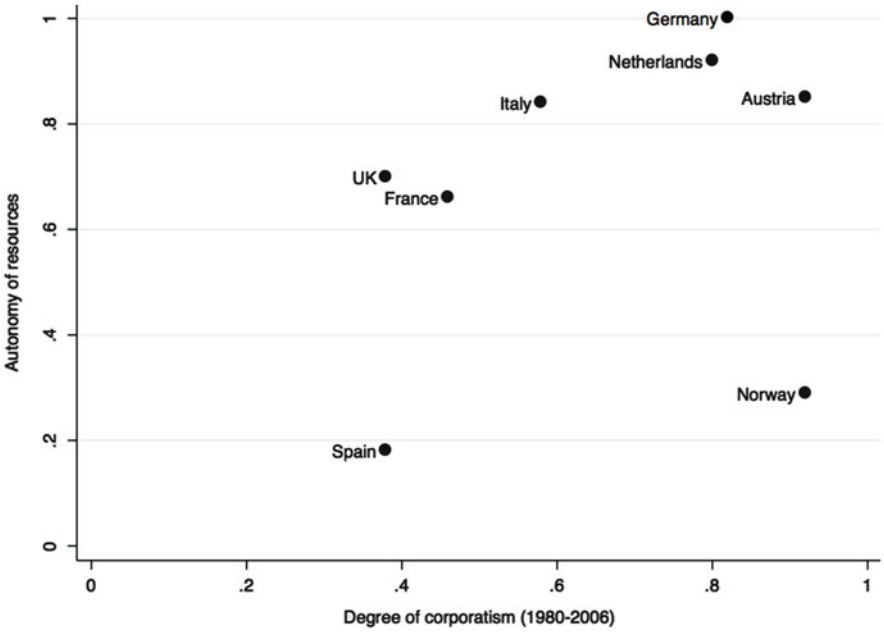

Fig. 2 Business associations, degree of corporatism and autonomy of resources. *Source*: own research (see Table 2 for more details)

> broader organisational objectives . . . The second challenge is governing and implementing organised decentralisation and managing the conflict underlying the marriage of centralised coordination and decentralised implementation . . . A critical question is the extent to which social pacts have set the conditions for effectively strengthening workplace structures and linking them to other organisational tiers in order to alleviate the tension between national intermediation and local implementation. (Molina 2008, 400–401)

Unions struggle with a flexible recruitment strategy taking into account that their public legitimacy is certainly in decline. Centrifugal and centripetal tensions lead to an organisational dilemma that threatens the viability of unions in two fronts: On one hand, organisational strategies geared towards political intermediation can lead to a weakening of the resources allocated to the lower levels. On the other, excessive centralisation of activities can result in the massive centralisation of organisational power in the hands of governing bodies to the detriment of workers. This can breed negative effects on the mobilisation capacity of trade unions. In generic terms, we are interested in examining the existence of monopolistic or competitive relationships between trade unions. Such relationships are frequently defined in a series of legal frameworks: for instance, collective bargaining rules, workers' statutes and trade unions' elections. The status of trade unions in their institutional engagement and involvement in policy implementation is also observed. These indicators are included in a variable labelled 'union representativeness'. In a nutshell, countries scoring high values in this variable tend to protect trade unions by

Table 3 Overview of trade unions across Europe

Country	Trade unions	Membership (as of 2008)
Austria	ÖGB	1,247,795
France	CFDT	808,720
	CFTC	132,000
	CGT	711,000
	FO	800,000
	UNSA	360,000
	CFE-CC	–
	Solidaires	90,000
Germany	DGB	6,371,475
	Dbb	1,280,802
	CGB	278,412
Italy	CGIL	5,604,741
	CISL	4,304,050
	UIL	1,810,904
Netherlands	FNV	1,192,000
	CNV	333,900
	MHP	169,200
Norway	LO	844,438
	UNIO	274,175
	YS	209,334
	Akademikerne	137,250
Spain	UGT	810,000
	CCOO	1,141,321
UK	TUC	6,471,030

Source: Carley (2009)

granting them a number of legal privileges. By contrast, countries with low scores do not ensure privileged status to trade unions. Particular concessions might, however, be endorsed. Table 3 summarised the union organisations in the selected countries.

The dynamics of *union associability* are also relevant. We focus on the interaction between union density, which measures the number of workers affiliated to unions, and unions' institutional dependency, which is similar to that of business associations. Since the culture of information transparency is weak in many Southern European countries, data on trade union membership fees is not available for all cases. We therefore measure unions' institutional incentives as a proxy of the existence of a series of legal incentives for collective bargaining, namely, extension schemes, opening clauses, exclusion options and special schemes. Protection for collective bargaining means protection for trade unions. Trade unions benefit from situations where collective agreements must be applied to all workers. There are fewer privileges when collective bargaining is less favourable to organised interests. Figure 3 shows the adjustment between trade unions' membership and institutional incentives.

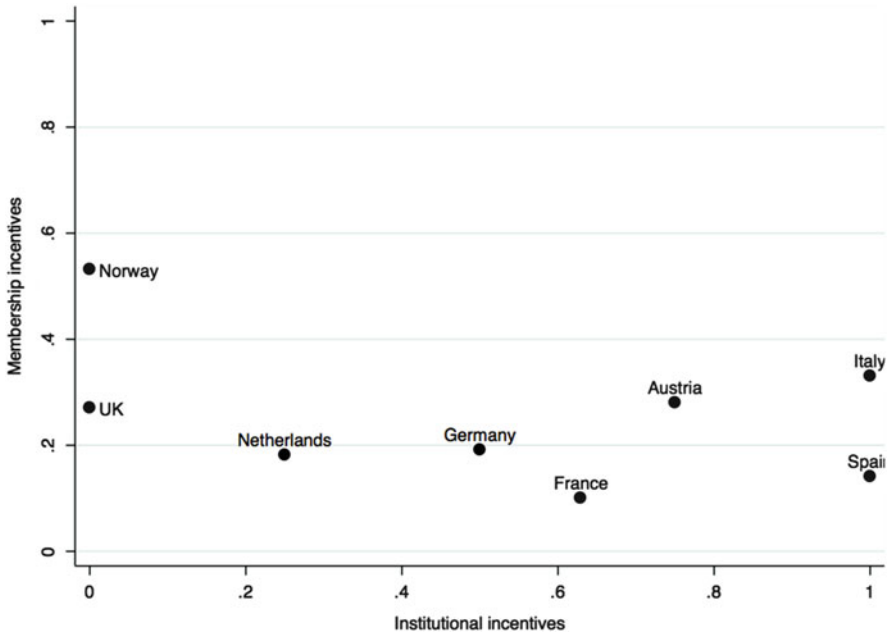

Fig. 3 Incentives determining unions' associability across Europe. *Source*: own research (see Table 2 for more details)

According to our analysis, Spanish unions benefit from a legal system that protects their representativeness and determines their membership base. French unions have a low-density ratio. Ideological disputes between Italian unions have maintained a high-density ratio and, therefore, reinforced rules that ensure the institutional representation of workers. Norway and the UK are opposite. In both these countries, there are no formal mechanisms to enhance the representativeness of trade unions. The Norwegian trade unions show a moderate density due to the weight of collective bargaining in industrial relations, while the absence of collective bargaining structures in the UK reduces potential inducements for workers to join unions.

4 The Output Process: Social Pacts, Economic Performance and Institutions

The institutional framework conditions the logic of influence. This logic is also moulded by the performance of social pacts and the economic policy. We have pointed out that the existence of institutional incentives helps achieve an understanding of the role of social actors in the policymaking process. The availability of incentives depends very much on the historical and institutional conditions that facilitate the participation of social partners in collective decisions. According to the country's decision-making model, social actors can play a role in three areas:

collective bargaining, social pacts (economic agreements on incomes policy and public goods aiming to contribute to macroeconomic stabilisation) and product-market regulations and specific industrial policies. The development of these areas depends on successful experiences and on the willingness of political parties to ponder over the participation of private actors in the policymaking. As mentioned in the theoretical discussion, the strengthening of institutions leads to the so-called institutionalisation of social pacts. This situation occurs in the Netherlands and Austria, where there are formal platforms supported by the state, allowing policy discussions between social actors and policymakers. Unlike these, the various economic and social councils in Italy, France and Spain are formal bodies that fulfil advisory functions but have no coercive capacity to enforce regulations or agreements on economic policies. They are instances of tripartite formal bodies with merely institutional representational functions. Table 4 summarised all forms of participation.

Now focusing on the outcome, let us examine whether centralisation affects the production of social pacts. We have taken into account the many types of social pacts: (a) social pacts covering incomes policies, labour markets and pensions, frequently applied to Spain and Italy in a non-compulsory manner; (b) bipartite or tripartite social pacts focused on labour market reforms, mostly seen in Spain and in Italy; (c) bipartite social pacts emerging from institutional councils in Norway and in the Netherlands; (d) occasional social pacts on social reforms negotiated in a centralised forum in Germany; and (e) regular social pacts following a corporatist, centralised pattern of negotiation in Austria. Figure 4 shows the results. Two opposite cases are worth mentioning: On one hand, countries with institutional designs that encourage the centralisation of collective bargaining do not resort to

Table 4 Institutional participation of social actors

	Austria	Norway	Netherlands	Italy	Germany	Spain	France	UK
Strong centralised collective bargaining	Yes	Yes	Yes	No	Yes	No	No	No
Social pacts		Rarely	Rarely	Regular	Fairly occasional	Regular	No	No
Social concertation institutions	Yes		Yes		Yes			No
Tripartite labour councils	Yes	Yes	Yes			Yes	Yes	No
Economic and social council (advisory functions)				Yes		Yes	Yes	No

Source: own research

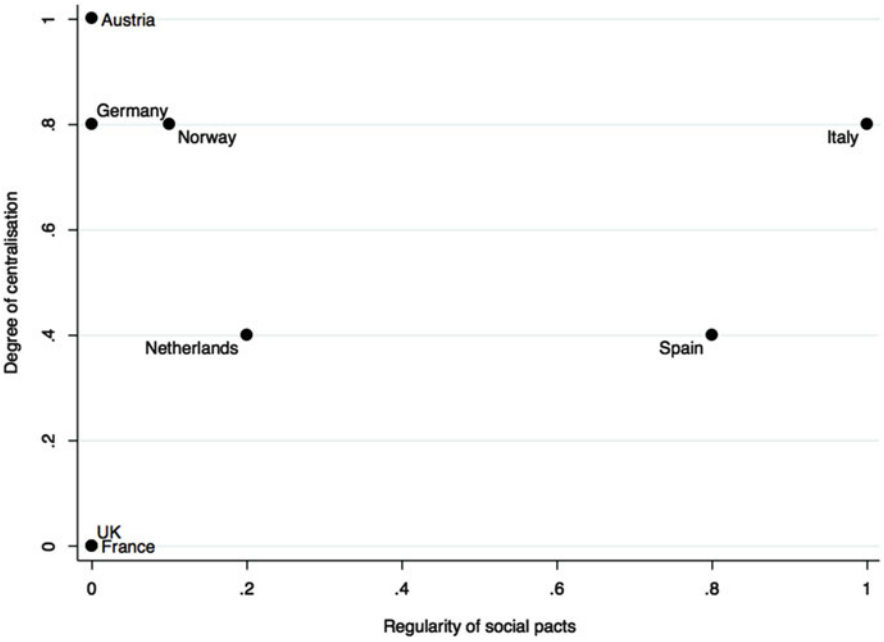

Fig. 4 Social pacts, centralisation and regularity of agreements. *Source*: own research (see Table 2 for more details)

social pacts very often (Austria, Germany, Norway). On the other hand, Spain, a country that has a very complex system of collective bargaining characterised by its lack of articulation and the predominance of intermediate levels of negotiation, has fulfilled a vast number of social pacts. This is to some extent inconsistent with the aforementioned discussions on the organisational capacity of the social actors, which, in relation to the Spanish social actors, should be likely to downplay social dialogue. The case of Italy is also surprising. Although centralised bargaining applies only in certain sectors, the country relies on national agreements in order to establish general basic conditions, as well as to encourage increased flexibility, especially during recent years.

The next step is to assess the effect of social pacts on the main economic figures. According to the classical definition, social pacts, whether they are formal or informal, regular or occasional, are intended to achieve specific results that collectively or individually benefit the social actors and the society as a whole. Some succeed, some fail. We focus on the evolution of a series of economic indicators, as collected by the OECD, which are summarised in Table 5. We are interested in the evolution of the following indicators:

- The degree of sensitivity (or tolerance) of social actors to the variation in prices, considering the control of inflation as the basic axis in any strategy

Table 5 Average of main economic figures

	Consumer prices (1985–2013)	Multifactor productivity (1985–2012)[a]	Unemployment rates (1985–2013)	Unit labour costs (1985–2013)
Austria	1.82	1.4	4.55	0.89
France	0.96	1	9.33	1.59
Germany	1.54	0.9	8.90	−0.22
Italy	0.74	0.4	7.91	0.54
Netherlands	2.24	1	3.32	1.94
Norway	0.61	N/A	3.44	4.55
Spain	1.22	0.4	12.63	0.35
UK	1.48	1.5	4.89	1.20

Source: OECD
[a]Austria (1996–2007), France (1985–2009), Germany (1992–2010), the Netherlands (1985–2007), and the UK (1985–2009)

of macroeconomic stabilisation. This is measured through the *consumer price index* for the period 1985–2013. This indicator shows that countries in Southern Europe, despite the large number of social pacts, have not achieved price stability. Spain and Italy are characterised by a high inflation over time. However, inflation has proven to be a big economic issue for all countries during the years covered.

- The degree of equilibrium in the labour market between new contracts and layoffs and flexibility to adapt to internal and external changes. This is measured through the *unemployment rate* for the period 1985–2013. Spain shows dull results, noting that social actors are not oriented towards improving the poor conditions in the labour market. Germany, France and Italy have achieved an unemployment rate below 10 %, which has assuaged in the last decade. Austria, Norway, the Netherlands and the UK have all managed to keep unemployment under control.
- The sensitivity of the social actors to the level of competitiveness of the economy is measured through the *unit labour costs* as a means of reducing business costs in favour of increased investment in competitiveness.

Overall, the analysis of economic performance shows there is certain tolerance to bad economic performance in the Southern European countries, in front of the results obtained in Norway, the Netherlands, Austria and Germany. Economic imbalances persist over time even after the implementation of several economic reforms. Given the many problems existing in these countries and taking into account the recurrent political nature of social pacts, the agenda for economic reforms must pay attention to specific goals, which, in the majority of cases, are tackled through government programmes. This weakens the potential of social pacts as genuine means of economic reform in Spain and in Italy. In fact, the state-wide social agreements in both countries deal with a handful of topics, with no compulsory clauses. The high degree of members' influence in the social

		Institutional Incentives					
		Low		High			
Members' influence	Low			Spain	Italy	Bad	Economic performance
			France			Good	
	High					Bad	
			Norway	The Netherlands	Austria Germany	Good	
		No	Yes	No	Yes		
		Centralised bargaining					

Fig. 5 Results of the comparative case study

actor organisations is also related to the good economic performance in the select countries as Fig. 5 shows.

5 Conclusions

This article aligns with the studies that assure the organisational design of social actors somehow impacts on macroeconomic performance. Yet our argument differs slightly from that of Avdagic et al. (2005). By way of conclusion to their book on *Social Pacts in Europe* (2011), they come up with the theory that, in general terms, social pacts have become the ultimate channel, mostly from a political viewpoint, for reaching agreement on a series of economic and welfare issues and taming actors' interests and power. Social pacts turn out to be a very rare policy vehicle because of their functional nature. Actors resort to social pacts once they have mitigated existing power tensions. Every new social pact is likely to reshape policy goals and policy conditions. However, what if social pacts get away from this solemnity and their function is not to establish new rules but to revitalise old ones? What if one of the main functions of social pacts is to redistribute incentives among the actors involved in the policy process? In this regard, social pacts become an institutional tool instead of an economic one. The evidence in Spain and in Italy coincides fairly well with these considerations. These two countries have a massive number of regulations; produce permanent social pacts at national, regional and local levels (Negrelli 2004); and possess the basic institutions for social concertation and/or labour relations. In our view, the crucial issue focuses on the influence of political logic over economic logic; in other words, the key element is found in the exchange relationships between social actors and the government generating certain roles and establishing restrictions to ensure political and economic stability. The choice of social actors has been to

institutionalise themselves instead of social pacts (perhaps because social pacts have never been seen as the ultimate goal). This has occurred with the consent of the government. We suggest that institutions in these countries have shaped social actors, perhaps in a very unproductive manner, through institutional incentives and credited a set of certain ludicrous behaviours. The more dependent social actors are on institutional incentives for their organisational maintenance, the more exposed they are to government requests in policymaking. Government requests follow a political logic; thus they might promote the concentration of power in the hands of the government, ask for permanent loyalty and so on and so forth.

Common features are observed in Italy and in Spain, both in relation to social actors and to the macroeconomic performance. Social actors are mainly focused on the representation of interests, leading to an organisational configuration that is highly dependent on public funding and on the formal endorsement of institutional representativeness. This is congruent with the idea put forward by Acocella and Di Bartolomeo (2013, 13) in that 'it is always optimal for the government to subsidize the union in order to get a social pact signed, even when cooperation is feasible independently of the transfer'. We should take as a plausible explanation the fact that social actors may be unlikely to sign a social pact unless they get rewards from it. Social actors become rent seekers due to the difficulty of incorporating new members, which negatively affects their budgets. This cast serious doubts regarding the motivation behind social pacts. For instance, Spain has not reinforced the institutions dealing with social concertation, but it has enhanced the institutional clauses benefiting social actors in an attempt to ensure their organisational maintenance. Thus, the government assures loyalty during the policy process under the threat of removing such advantages. A clearly differentiated group includes Germany, Norway and Austria. They are marked by a system that fosters formal consensus between parties as well as by good development of the main economic indicators. Consensus is manifested in the institutional strength of the negotiations on economic policy, but not on the distribution of institutional incentives for social actors. This leads to a pattern of organisational development focused on the bargaining power of social actors and way much less on their ability to represent interests before institutions. Thus, social actors are encouraged to develop a membership strategy hinging on visible benefits instead of a vague collective good. A source of organisational legitimacy is the achievement of successful economic policies through social pacts.

France occupies an intermediate position. Business associations have recently initiated a number of changes to strengthen their logic of membership, in other words, to reinforce the linkages between members and the management team in order to achieve more autonomy from the state and collective bargaining. Otherwise, trade unions do persist in defending organisational development based on institutional incentives. The existence of competing logics is reflected in the difficulties in introducing a large dose of increased flexibility in industrial relations (today only allowed for large companies), something that would cause a gradual loss of trade unions' industrial relations privileges. On the other hand, social pacts have been promoted on very few occasions. Social concertation has therefore generated

very few institutional incentives for the institutionalisation of social pacts and social actors. Finally, the UK helps us to understand the lack of impact of institutions on the organisational development of social actors. As there are no tripartite institutions for dialogue between government, employers and workers, social actors follow a strategy based purely on the logic of membership. Social actors are committed exclusively to their members, who are the ones in charge of the organisation's budget and goals. This allows rapid adjustment to changes and internal demands. Overall, the UK shows a good trend in productivity, although labour costs are not satisfactory.

By way of conclusion, trade unions and employers' associations seem to be highly dependent on institutional rewards, thus weakening their ability to adapt their logic of membership and influence in pursuit of a more coherent representation of interests and impact in the effectiveness of social pacts as instrument to implement economic policies. The examples of Spain and Italy are the best instances to understand the incapacity to resolve political and economic challenges with this instrument.

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The Historical Origins of Regional Economic Inequality in Spain: The Cultural Legacy of Political Institutions

David Soto-Oñate

1 Introduction

As in other works of similar nature, when dealing here with the origins of economic disparities, we start from the basis that innovation and factor accumulation "are not causes of growth; they *are* growth" (North and Thomas 1973) or, at least, they are just *proximate* causes of growth (Rodrik 2003; Acemoglu et al. 2005). This paper is rather interested in the so-called *fundamental* or *deep* causes that set economies on sustainable long-run growth paths. Acemoglu et al. (2005) distinguish three main hypotheses on fundamental causes: geography, institutions, and culture. The latter two form a group that could be called history hypothesis, highlighting its essentially human component, as opposed to the geography hypothesis. When the title refers to the *historical origins* of the regional economic distribution, it points out two issues. The first one is that this distribution can be largely explained by elements of human organization, and the second one is that the organizational variation across regions sinks their roots in a remote past.

If formal institutions and their path dependence were often considered the factors that explain persistence in comparative economic development (Hall and Jones 1999; Acemoglu et al. 2001), the studies about the cultural legacy that formal institutions leave have introduced cultural features as the possible missing link (Guiso et al. 2011) that may explain long-term economic disparities, especially within a nation (Putnam et al. 1993; Guiso et al. 2008a; Tabellini 2010).

This chapter studies the role of certain historical institutions in current regional economic inequality, through their cultural legacy. Those regionally distinctive institutions no longer exist, since all regions are currently integrated—though with

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certain particularities—in a relatively homogeneous institutional framework. It is argued here that the channel through which past political institutions affect current distribution is fundamentally cultural. We start from the theoretical basis that there exist certain cultural traits that are associated with a better economic performance within a liberal institutional framework, are highly persistent, and were partly shaped by political experiences in the distant past.

Our analysis builds on the work "Culture and institutions: economic development in the regions of Europe" (Tabellini 2010), whose aim is studying the role that these cultural traits could have played in current regional economic inequality within five countries—Spain among them. The reverse causality that, according to modernization theory (Inglehart and Baker 2000), exists between economic performance and these cultural traits poses some analytical challenges that he attempts to overcome by delving into history. The current paper tries to address the Spanish case more precisely, including other cultural variables, disaggregating observations into a lower spatial level, such as provinces; developing an alternative proposal about the relevant historical facts for the promotion of these cultural traits; and testing this hypothesis against other so-deemed fundamental causes of development such as geography and human capital.

The chapter proceeds as follows. Section 2 discusses briefly these cultural traits and their relation to economic performance and explains how indicators for both are built. Section 3 contains the two historical hypotheses on which we rely to explain the cross-regional disparities of current cultural traits and their application to the Spanish case. Section 4 poses a two-stage least squares regression on the relation between economic performance and these cultural traits, instrumenting the latter by the historical instrumental variables we previously discussed in Section 3, and investigates the robustness of the obtained results. Section 5 presents some concluding remarks.

2 Culture and Economic Performance

In the last decades, several important empirical studies were conducted on highly persistent cultural traits that find their roots in a distant past (Putnam et al. 1993; Guiso et al. 2008a; Tabellini 2010; Nunn and Wantchekon 2011; Alesina et al. 2013; Talhelm et al. 2014). This cultural legacy is able to persist even after the original circumstances have disappeared. Specifically, we focus here on cultural traits that theoretically promote economic development, either directly or indirectly. In Sect. 2.1, relying on Tabellini (2010) and the social capital research program, we build the variable that attempts to account for the variation of these cultural traits across regions.

In his study, Tabellini (2010) uses four variables as reference in order to measure this cultural variation within his sample: (a) generalized trust, (b) feeling of control over own life, and values related to (c) respect to others and (d) obedience. According to Tabellini, generalized trust and respect to others are traits that

"encourage welfare-enhancing social interactions, such as anonymous exchange or participation in the provision of public goods, and [...] improve the functioning of government institutions." The feeling of control over one's own life is taken as a measure of the conviction that individual effort is likely to pay off. This belief is often related to economic performance since "if individuals are highly motivated to succeed and view economic success as related to their deliberate choices, they are more likely to work hard, to invest for the future, and to innovate and undertake new economic initiatives" (Tabellini 2010). On the other hand, considering obedience as a desirable trait in children is interpreted as an indicator of coercive culture, and "such coercive cultural environments stifle individual initiative and cooperation within a group."

In addition, along with Tabellini's cultural indicators, we take into consideration other variables drawn from the social capital research program. Guiso et al. (2011) provide a brief and intelligible definition of social capital. They consider that social capital is "*civic* capital, i.e., those persistent and shared beliefs and values that help a group overcome the free rider problem in the pursuit of socially valuable activities." This description led them to identify it elsewhere as "good" culture (Guiso et al. 2008b). The most known approaches utilize indicators about generalized trust, participation in associations, the widespread presence of certain civic values or norms, and orientation toward political affairs (e.g., see Putnam et al. 1993; La Porta et al. 1997; Knack and Keefer 1997; Brehm and Rahn 1997; Mota and Subirats 2000; Zak and Knack 2001; Beugelsdijk et al. 2004; Beugelsdijk and van Schaik 2005).

2.1 Construction of a Provincial Indicator About These Cultural Traits

Tabellini (2010) gets the information on generalized trust,[1] control over own life,[2] values of tolerance and respect, and values of obedience[3] from the World Values

[1]From the question: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" Two options are offered: "Most people can be trusted" and "Can't be too careful."

[2]From the question: "Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means "none at all" and 10 means "a great deal" to indicate how much freedom of choice and control you feel you have over the way your life turns out.

[3]Information about the past two variables comes from WVS' following question: "Here is a list of qualities that children can be encouraged to learn at home. Which, if any, do you consider to be especially important? Please choose up to five." The offered qualities are: independence, hard work, feeling of responsibility, imagination, obedience, tolerance and respect for other people, thrift, perseverance, religious faith, and unselfishness.

Survey (WVS). He obtains his variable *pc_culture* from the principal component of these four indicators.

We follow a similar methodology,[4] using those factors along with other similar information from the WVS[5] and from European Social Survey (ESS).[6] From the former, we use the importance of encouraging independence values in children,[7] and from the latter, we use the importance of being free and making one's own decisions[8] and, again, generalized trust.[9] We obtain one single variable—*trust*—from both surveys' information about generalized trust by computing their principal component. We obtain another variable called *independence* from the principal component of the rest of the variables we have mentioned so far—i.e., all of them except those about generalized trust. This variable accounts for the attitude that a culture exhibits toward individual initiative.

The minimum spatial unit that these surveys permit us to aggregate is the *autonomous community*. However, if we took the autonomous community as a unit of reference, we would obtain only seventeen observations,[10] which is an insufficient sample size. For this reason, we attempt to find provincial variability by the inclusion of new cultural variables for which provincial aggregation is possible. For this purpose, we will rely on the work of Mota and Subirats (2000) who carried out a study about social capital in the Spanish autonomous communities. However, by using the same and similar updated sources, we can replicate their variables at a provincial level of aggregation. Their social capital indicator consists of the citizens' political involvement and their associative participation. Citizens' political involvement is measured by their interest in politics,[11] level of information about

[4]Tabellini computes the principal component from the four variables at individual level. As we use data from different surveys, we cannot apply the same methodology. First, we compute the provincial average of each variable and then we extract the principal component.

[5]From WVS, we use the waves from 1991, the first wave with Spain included, to 2005.

[6]From ESS, we take every available wave: 2002, 2004, 2006, 2008, 2010, and 2012.

[7]Using the same question from which Tabellini took obedience and respect as qualities to promote in children.

[8]From the literal question: "Now I will briefly describe some people. Please listen to each description and tell me how much each person is or is not like you. Use this card for your answer. It is important to her/him to make her/his own decisions about what she/he does. She/he likes to be free and not depend on others." Options range from "very like me" to "not like me at all."

[9]From a similar question to the WVS' one: "Using this card, generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people? Please tell me on a score of 0–10, where 0 means you can't be too careful and 10 means that most people can be trusted."

[10]Autonomous cities of Ceuta and Melilla are not included.

[11]From the surveys: CIS (1992), CIS (1998), and CIS (2002). In the three of them, the same question is asked: "Generally speaking, would you say that you are interested in politics a lot, considerably, a little, or nothing at all?" We use the provincial percentage of people who answer "a lot" or "quite" and create a single variable from the principal component of all of them.

the government[12], and their information habits about politics[13]; from the principal component of that information, they obtain a variable called *citizen involvement index*. Associative participation[14] is measured by the participation in twelve kinds of voluntary associations, from which the variable *associative participation index* is obtained. Finally, a variable called *socialcapital* is obtained from the principal component of both indexes. This variable is built according to Mota and Subirats' procedure but is provincially aggregated.

Our main variable, *culture*, is made up from the principal component of these three variables (*trust*, *independence*, and *socialcapital*). In this form, we get a single variable about these cultural traits with provincial variation. The principal component analysis returns a normalized variable, so *culture* shows mean 0 and standard deviation 1. Its highest value is reached in Guipuzcoa (3) and the lowest one in Jaen (−1.64). Figure 1 shows the geographical distribution of the resulting variable (*culture*). This variable reaches its highest values in the north, especially in northeastern Spain.

2.2 Provincial Economic Performance in Spain

The highest levels of per capita GDP are also geographically located in the northeastern quarter of Spain. For our empirical analysis, we use the logarithm of

[12]From the surveys: CIS (1998) and CIS (2002). Both surveys ask this question: "Generally speaking, would you consider you are very informed, quite informed, a little informed, or not informed at all about the activities developed by your autonomous community's government? What about the activities of your autonomous community's parliament? What about your city council's activities?" We use the provincial percentage of people who answer "very informed" or "quite informed" and create a single variable from the principal component of all of them.

[13]From survey CIS (1992), we use the question "Could you tell me how often you read general information newspapers? How often do you listen to the news on the radio? How often do you watch the news on TV?" And from CIS (2010), we use the slightly different question "Now, I would like to ask you some questions about newspapers, radio, and television. How often do you listen or watch the news in the radio or television? Apart from news, do you listen or watch other shows about politics in the radio or television? Apart from sport press, do you read the newspaper (in paper or the Internet)? Do you use the Internet in order to get information about politics or society?" We use provincial percentage of people who answer "every day" and create a single variable from all media in both surveys.

[14]From CIS (1998). We obtain this information from the question: "From the following associations and organizations, can you tell me about each of these organizations whether you belong, whether you have ever belonged, or whether you never belonged to . . . ?" The kinds of associations listed are "sport associations and groups," "local or regional societies," "religious associations," "educative, artistic, and cultural associations and groups," "juvenile organizations or groups," "charitable associations," "ecologist associations," "labor unions," "political parties," "human rights organizations," "pacifist movement's association," and "feminist associations." We use the provincial percentage of people who answer that they belong or belonged to it for each case and extract the principal component from all organizations.

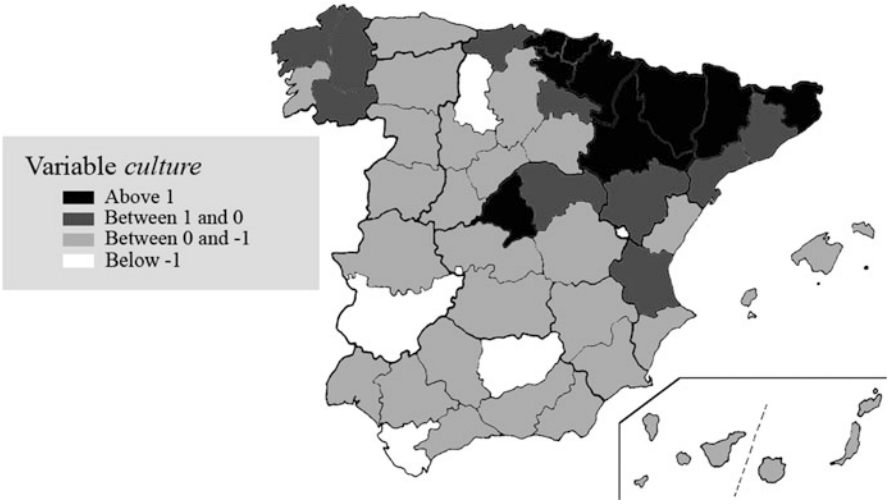

Fig. 1 Geographical distribution of the variable *culture*

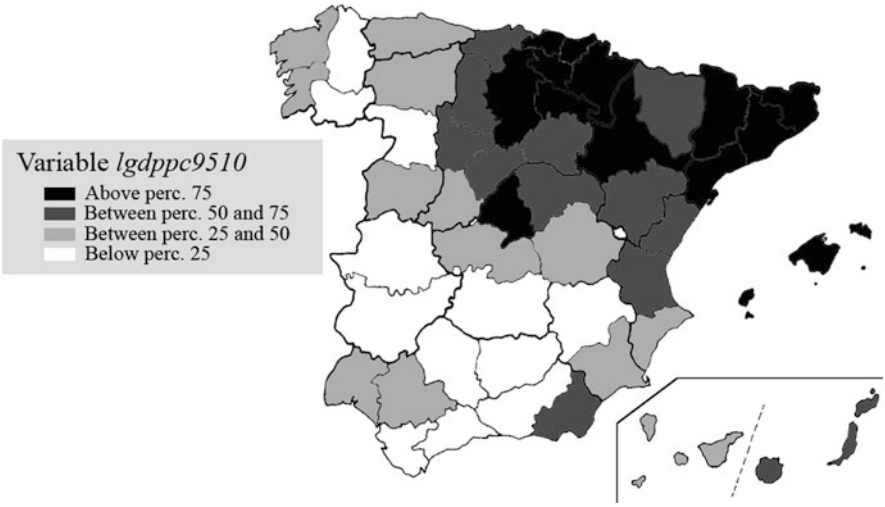

Fig. 2 Geographical distribution of the variable *lgdppc9510*

the average per capita GDP during the period 1995–2010 (*lgdppc9510*)—according to figures from *Instituto Nacional de Estadística* (INE)—as a measure of current economic development. This measure has a mean of 9.72, obtaining in Alava its maximum value (10.15) and Badajoz its minimum (9.39). Figure 2 illustrates the geographical patterns of economic developing according to our measure.

It is noteworthy that this geographical distribution, despite long periods of convergence, remained similar for most of the twentieth century. There is a

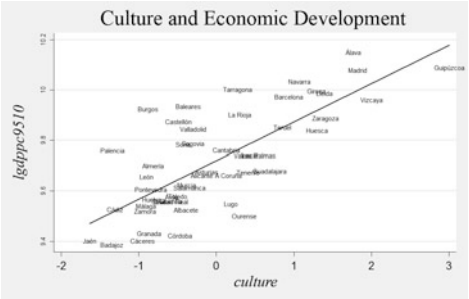

Fig. 3 Scatterplot: *lgdppc9510* versus *culture*

correlation of 0.7 between provincial per capita GDP in 1930 and that in 2000 (Alcaide 2003). The remarkable political and economic transformations of those 70 years barely altered the geographical patterns of development.

A key fact for this work is that the processes that led to this distribution seem to have occurred during the nineteenth century. The nineteenth century started with a very different distribution, where, for instance, Extremadura and Andalusia were among the richest regions and País Vasco, La Rioja, and Aragón were below the average. In the early twentieth century, these positions were already inverted and remained until nowadays.

The correlation between *lgdppc9510* and *culture* is 0.76. Figure 3 displays a scatterplot relating both variables. However, no causal conclusions can be drawn due to the endogeneity of *culture*. Because of this, instrumental variables will be used in order to account only that persistent component of *culture* that is due to historical factors and is exogenous with regard to current economic development.

3 Historical Institutions in the Development of Civic Culture

This section is devoted to historical facts that may be associated to the development of these cultural traits and can be used as instruments for the variable *culture*. We pursue two different lines of argument that, although likely related, exhibit distinct geographical distributions.

3.1 Constraints on the Executive

The first of them is the proposal made by Tabellini (2010) regarding this issue. He considers differences in political institutions and education to be the key historical facts to explain current disparities in these cultural traits. However, in accordance to the concrete course of Spanish history, we do not consider education as an exogenous factor that brought about the cross-regional variation

on these cultural traits, and the results will support this decision. Thus, we only rely on his approach of past political institutions as an instrumental variable for *culture*.

Regarding the effect of political institutions on the development of these cultural traits, he argues that "an autocratic and corrupt regime that survives thanks to a strong hierarchy of privileges and that subjugates the population with the arbitrary use of force [...] will foster mistrust of unfamiliar people, limited as opposed to general morality, a sense of individual helplessness, and resignation"; being the opposite in the republic regime, "where productive entrepreneurs or traders participate openly in the political organization of society, the rule of law is respected, and supreme authority is constrained by checks and balances." [15] He evaluates past political institutions with regard to their constraints on the executive in the years 1600, 1700, 1750, 1800, and 1850. Data on political institutions are collected from Polity IV Project and Acemoglu et al. (2002), and when regional disaggregation is required, as in the case of Spain, Tabellini carries out his own assessment on the basis of their methodology.

Tabellini (see Tabellini's 2005 working paper), following Polity IV's methodology, assigns values from 1 to 7 to his evaluation of constraints on the executive, 1 being "unlimited authority" and 7 "accountable executive, constrained by checks and balances." Therefore, a higher value corresponds to higher institutional constraint on the decision-making powers of chief executives. Between both extremes, other situations are defined: it takes a value of 3 if the executive has to face real but limited constraints (e.g., a legislative body with more than consultative functions), and it takes a value of 5 when executive power is subject to substantial constraints (e.g., a legislature that often modifies or defeats executive proposals for action or refuses funds to the executive). Even values—2, 4, and 6—correspond to transitions between these political situations.

Tabellini (2010) assigns a higher value to current autonomous communities of Aragon, Catalonia, and Valencian Community in years 1600 and 1700 due to the presence of strong Courts (*Cortes*), as opposed to those in Crown of Castile and the equivalent body in Kingdom of Mallorca. We take his variable *pc_institutions*, the principal component of all the periods assessed, just as he built it in his work. In Fig. 4, these two groups are represented. The variable *pc_institutions* takes value 1.98 for Aragon, Catalonia, and Valencian Community and 0.495 for the rest.[16]

However, Tabellini's perspective does not account for the special political situation at that time in the regions of Basque Country and Navarre. They also had a *pactist* relationship with Spanish central power. *Fuero General de Navarra*, *Fuero de Vizcaya*, *Fuero de Guipúzcoa*, and *Fueros de Álava* had to be sworn by the

[15]This perspective is obtained from Putnam et al. (1993).

[16]The original values for this principal component in Tabellini (2010) from his sample of five countries are different, since here we compute a new principal component from a sample reduced to only the Spanish regions.

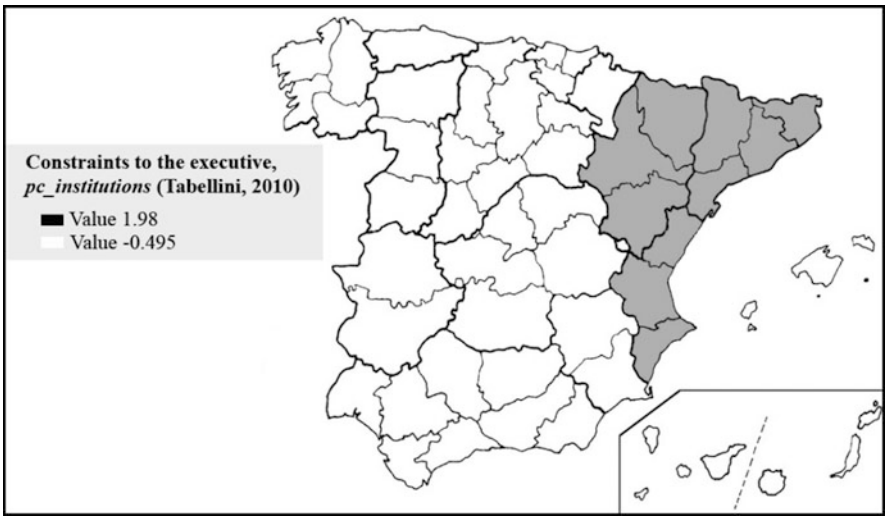

Fig. 4 Constraints to the executive, 1600–1850. *Source*: Tabellini (2010)

king—just as *Fueros Generales de Aragón*, *Furs de Valencia*, and *Constitucions de Catalunya*—and *Cortes de Navarra*, *Juntas Generales de Vizcaya*, *Juntas Generales de Guipúzcoa*, and *Juntas Generales de Álava*, respectively, were in charge of their administration and protection. We thus create a new variable that accounts for this situation (*pc_instit_mod*), being a modification of the one by Tabellini.

According to our approach, Navarra and Basque provinces take a value of 3 in 1600, 1700, 1750, and 1800. This situation officially remains until 1841 in Navarre and 1876 in Basque Country. However, central power's aspirations had been gradually eroding their autonomy from time before; for this reason, we assign to Basque provinces in 1850 the same value as the rest of the regions. Our variable *pc_instit_mod* is made up from the principal component of these modified measures of constraints on the executive for years 1600, 1700, 1750, and 1800—there is no variation in 1850. The geographical pattern of the resulting variable is shown in Fig. 5.

3.2 Municipal Autonomy

The other publication we draw on is Guiso et al. (2008a), who, following Banfield (1958) and Putnam et al. (1993), consider that in order to explain social capital regional disparities in Italy, it is necessary to refer to their free city-state experiences in the Middle Ages. According to their perspective, the particular autonomy of free

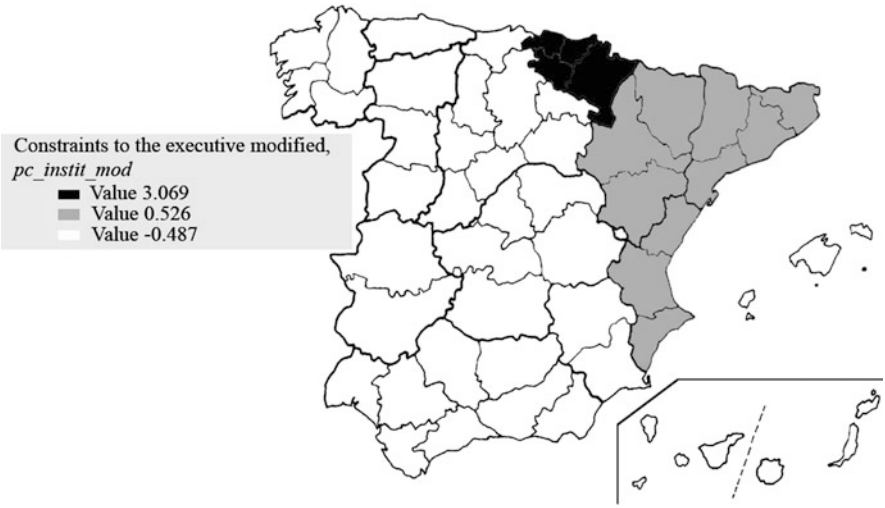

Fig. 5 Modified variable on constraints on the executive *pc_instit_mod*

city-states in the North of Italy permitted the communities to develop this set of civic features.

Italy's case is deeply studied and provides us with some guidance. During the eleventh century, "the Normans invaded the part of the country south of Rome and formed a feudal monarchy, which continued in some forms or another until the Italian unification in 1861" (Guiso et al. 2008a). This regime, highly hierarchical and bureaucratic, precluded the formation of independent city-states; even "any glimmerings of communal autonomy were extinguished as soon as they appeared" (Putnam et al. 1993:123), preventing, by that, the development of these civic features. However, in northern city-states, "those who governed the communal republics acknowledged legitimate limits on their rule. Elaborate legal codes were promulgated to confine the violence of the overmighty. In this sense, the structure of authority in the communal republics was fundamentally more liberal and egalitarian than in contemporary regimes elsewhere in Europe, including, of course, the South of Italy itself [...] The practices of civic republicanism provided a breadth of popular involvement in public decision making without parallel in the medieval world" (Putnam et al. 1993:125). It is understood that the effects of these distinct historical institutional configurations have persisted until the present day by way of culture.

Guiso et al. (2008a) found empirical evidence that supports the causal statements. They not only demonstrate that different historical experiences between North and South led to different levels of social capital but also find differences within the North. Those northern cities that had free city-state experience exhibit nowadays significantly higher levels of social capital than those that had not. We do not find in Spain free city-states cases in the Italian sense, but we do have other kinds

of autonomy experiences at municipal level during the High Middle Ages that presented clear regional disparities.

During the process of the so-called *Reconquista*, the Iberian Peninsula lived a peculiar period in terms of sociopolitical organization. Significant events of this time, like the existence of a weak central and integrative power or the needs to repopulate the new conquered areas, gave rise to a wide range of political and legal arrangements at local level throughout medieval Spain.

The fact that will help us to assess municipal autonomy in the High Middle Ages is the capacity of the town to develop its own legal order. We counterpose two situations: the official adoption of the *Liber Iudiciorum* and the development of an own customary law.

The ancient Visigothic code, *Liber Iudiciorum*, regulated the "particular relations of all kinds, procedural and criminal" (García-Gallo 1978:259). It was an extensive and ambitious legal order that, given its Romanist roots, granted the power to legislate to the king (Gacto et al. 2009:188; Orduña 2003:108). The validity of this code implied generally the impossibility of developing an entire legal tradition based on the customs of the population and evolving according the new requirements.[17]

During the High Middle Ages, *Liber Iudiciorum* ruled in a territorial scope within Kingdom of Leon and Kingdom of Toledo but was extended as local legal order to a multitude of major towns in southern Spain. With the catalog of medieval texts of local law by Barrero and Alonso (1989), we can locate clearly where this legislation officially ruled at that time. This information helps us to build a dummy variable (*liberiudiciorum*) that takes value 1 in the current autonomous communities of Galicia, Extremadura, Andalusia, Asturias, and Canary Islands, along with the provinces Leon, Palencia, Zamora, Salamanca, Toledo, Ciudad Real, Murcia, and Alicante. Figure 6 shows the presence of this code in the Middle Ages.

According to García-Gallo, "in stark contrast to the Visigothic system, centered on the validity of *Liber Iudiciorum*, we find what we could characterized as free law; that is, non-formulated legal order, within which the norms to be applied are freely seek for each case, and for any dispute judges judge freely according to their free will" (García-Gallo 1978:377). "With regards to the expansion of this judicial creation of law, it had deep roots in [Kingdom of] Castile, in Navarra and in Aragon" (Gacto et al. 2009:121–122).

Although not necessarily by the judicial process, in Basque provinces (Gacto et al. 2009:204) and Catalonia (García-Gallo 1978:445), custom-based legislation was also developed.

[17] In some places of the so-called *Extremadura leonesa* – Zamora and Salamanca – some legislative flexibility was permitted, even when *Liber Iudiciorum* was the official legislation. Local law was complemented in order to adapt local organization to frontier conditions. However, we are not going to equalize this legal flexibility to the custom-based law of northeastern regions.

Fig. 6 *Liber Iudiciorum* in High Middle Ages

Fig. 7 Presence of custom-based law

We thus take into account here the regency of a custom-based legislation, either by written codes or by judicial creation of law. We build a dummy variable (*customary*) that takes value 1 in the current autonomous communities of Cantabria, Madrid, La Rioja, Basque Country, Navarra, Aragon, and Catalonia, along with the provinces of Burgos, Valladolid, Avila, Segovia, Soria, and Guadalajara as we see in Fig. 7.

Not all the provinces fit on this dichotomy: there exist some places that neither got *Liber Iudiciorum* nor were ruled by a locally developed customary law. Since the absence of *Liber Iudiciorum* did not necessarily imply the development of an own custom-based legislation, we test both cases in our empirical analysis. Due to this fact, we will be able to assess whether there are statistical reasons to conclude that the formation of these cultural traits is more related to one historical fact over the other.

4 Empirical Analysis

4.1 Methodological Approach

The present study aims to causally associate in an econometric exercise the historical institutions to current economic development, considering these cultural traits as the link that relates them.

Figure 8a illustrates how history would affect current economic performance through two different ways: formal institutions and culture. The dark arrows warn the presence of reverse causation. This fact raises serious difficulties to draw causal conclusions. However, in the concrete Spanish case, although there exist distinctive political histories across the regions, formal institutions are currently constant within the nation, preventing them to be variation transmitters. In this way, current culture and economic performance turn to be isolated from the effect of current formal institutions, as Fig. 8b shows. Nevertheless, a channel of retrocausality still remains, the effect that economic development theoretically has on these cultural traits, in accordance to modernization theory. In a case of reverse causality, exogeneity assumptions are violated, thus making the OLS estimator biased and inconsistent.[18] In order to overcome this problem, sources of cultural exogenous variation, i.e., instrumental variables, must be sought. History plays here a fundamental role, inasmuch as in it we will be able to find key facts associated with the development of these cultural traits and exogenous from the effect of current economic development.

We thus perform a two-stage least squares regression, relating economic performance to cultural traits and instrumenting the latter by historical variables. However, in order to ensure the validity of our model, we must take certain precautions in our identification strategy, by controlling possible effects that go through other channels than the considered.

In the left-hand side column of Fig. 9, we find the relevant historical variables and in the other one their current equivalent. The theoretical difference that we establish

[18]Proof can be seen in Wooldridge (2010, chapter 16).

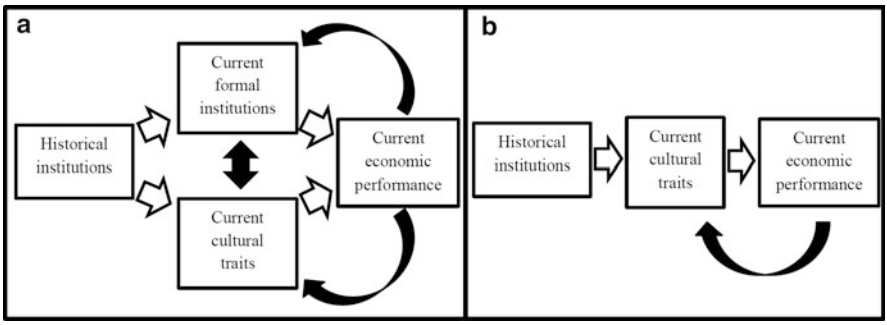

Fig. 8 Effect of history on current economic performance

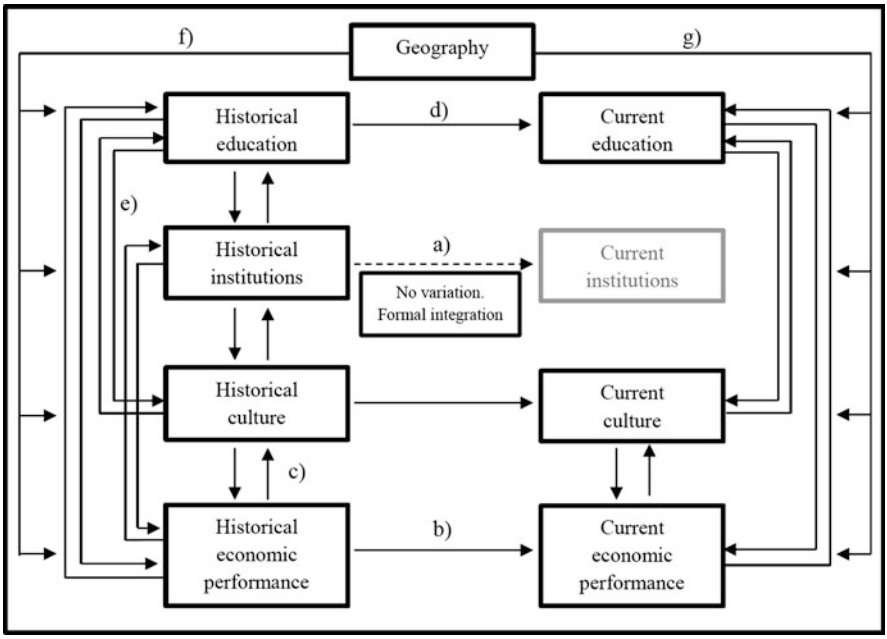

Fig. 9 Identification strategy

here between the historical period and the present one is determined by the very thick dividing line that marked two crucial historical events for our analysis:

1. The Bourbon centralization in the eighteenth century and the constitutional and administrative unification processes of the Liberal State in the nineteenth century. The former seeks to unify the Crown of Castile and the Crown of Aragon under the political institutions of Castile, centralizing the power in the figure of the king in an absolutist regime. In the nineteenth century, under the framework of the reforms toward the Liberal State, Basque and Navarrese autonomies are

gradually eroded until the complete official suppression of their particular laws (*fueros*): in Navarre with the *Ley de Modificación de Fueros* (1841) and in the Basque provinces with the end of the Third Carlist War (1876). However, these regions' autonomy was already substantially reduced after the enactment of *Ley de Confirmación de Fueros* in 1839.

2. The Liberal Revolution, i.e., when main institutional transformations from the Ancient Regime toward the Liberal State occurred. We locate these processes in the first half of the nineteenth century. According to Carreras and Tafunell (2003), in the economic sphere, the Liberal Spain can be considered to be "born between 1833 and 1839."

The first point is of fundamental importance, since it homogenizes the formal institutional environment for all regions. Thus, we do not consider formal institutions to transmit any variation since then.[19] The second one is crucial because it is the moment when main transformations toward a liberal institutional environment take place. As we mentioned in the introduction, these cultural traits are supposed to be favorable for economic performance within this liberal institutional environment. Therefore, for the purposes of the analysis, the theoretical difference between past and present will be determined by the thick and stylized temporal border of the unification processes and the Liberal Revolution.

As said above, in order to overcome validity problems, we assume the stylized fact that these regionally distinctive historical institutions no longer exist while their effects persist through these cultural traits. This is how we isolate culture and current economic distribution from the effect of current institutions. This assumption permits us to use historical institutions as valid instrumental variables for these cultural traits. The dotted-line arrow a in Fig. 9 indicates that no variability transcends through that channel. However, we must concern some issues with regard to three factors that we will need to take into account: the historical distribution of economic development, human capital, and geography.

With regard to the historical distribution of economic development, we should concern about its own persistence, in such a way that current distribution is simply a legacy from the historical one (arrow b) with cultural traits playing no role or even being a consequence of development (arrow c), as modernization theory asserts. In the model, regressions will be controlled for the provincial urbanization rate in 1860[20] (Tafunell 2005), understood as the proportion of population living in tows of 5,000 inhabitants or more, as a measure of historical economic development.

[19] In order to expedite the exposition of the problem, we ignored the distinctive civil laws of Catalonia, Aragon, Valencia, Basque provinces, and Navarre, which persisted somehow until nowadays. In Section 4.3, we will discuss and test the role of these regionally distinctive private laws in our model.

[20] 1860 is the first year for which we have complete data. This moment is effective after the Liberal Revolution, but 1860's series is very similar to that of 1787, showing a correlation of 0.88.

In 1860, the average provincial urbanization rate (*urban1860*) was 19.3 %. The most urbanized provinces were Cadiz, Seville, and Madrid, with 66 %, 61.3 %, and 60.8 % of their respective populations living in tows of 5,000 inhabitants or more, while the least urbanized ones were Ourense, Lugo, and Pontevedra, with 2 %, 2 %, and 2.7 %, respectively.

Human capital stands out as one of the fundamental causes of development (Glaeser et al. 2004; Gennaioli et al. 2013) due to its direct effect on productivity and its positive economic, political, and social externalities. Just as happened with historical economic development, human capital could affect both current economic development directly (arrow d) and the formation of these cultural traits (arrow e), as Tabellini (2010) claims. We must thus control this alternative, and we will do it by including past provincial illiteracy rates, contained in Vilanova and Moreno (1992). Unfortunately, the earliest available data are for 1887, when, according to our narrative, main institutional reforms were already implemented. We assume certain rigidity of individual and public investment in human capital and, thus, of the literacy rate's adaptation to new institutional circumstances during the first decades.[21] Under this assumption, this data can be used as reference to the provincial distribution of education level at the end of the Ancient Regime. The average illiteracy rate in 1887 (*illiteracy1887*) is 66.63 percentage points; the maximum was reached in Almeria (84) and minimum in Alava (35).

On the other hand, the so-called geography hypothesis is often highlighted as a powerful explanatory factor for international comparative development (Gallup et al. 1999; Diamond 1997). This perspective "emphasizes the role of geography, climate and ecology that determine both the preferences and the opportunity set of individual economic agents in different societies" (Acemoglu et al. 2005:399). We take Dobado (2006) as reference, who attempts to econometrically explain, among other things, Spain's regional economic inequality through geographical variables.[22] He uses provincial information about latitude, longitude, altitude, area, length of the coast, sun hours, and average temperature. The included variables in our model will be only the exogenous ones: *latitude*, *longitude*, *altitude*, and *densicoast*—length of the coast divided by province area. In Appendix 1, we list all the variables we use in our regressions with their descriptions and sources. Their main descriptive statistics are shown in Appendix 2.

[21] It makes sense if we consider that only first generations will withstand the differential due to the new institutional context; thus, the largest part of adult population will maintain its previous literacy level. This assumption implies a delay from the moment that institutional transformation is undertaken until the moment literacy rates are completely adapted in all age ranges of the population. But still we are ignoring many other important aspects that could delay this adaptation, like material possibilities to access education or the widespread low awareness of the importance of education (Ruiz 1988).

[22] *La riqueza de las regiones* by Rafael Domínguez (2002) is another work that also mentions geographical causes to Spain's current regional inequality.

4.2 Analysis and Results

4.2.1 OLS Estimates and First-Stage Estimation

In Table 1, several OLS regressions are performed, regressing economic performance directly on all these variables as if they were exogenous and orthogonal. The specifications in columns (1), (2), and (5) regress economic development on geographic variables, illiteracy rates in 1887, and *culture*, respectively. In column (3), current economic development is regressed on the provincial urbanization rates in 1860 (*urban1860*), being nonsignificant; this result invites us to rule out the alternative that current economic distribution could be a simple legacy of historical economic distribution (arrow b). In column (4), we test again the same fact but with another measure, the logarithm of per capita GDP of the autonomous community in 1800 (*lgdppc1800*) provincially imputed, getting similar results. In Equations (6)–(8), *culture* is controlled for combinations of geographic variables and historical illiteracy rates, making *culture*'s coefficient always significant and with expected sign. However, under these conditions, the endogeneity of *culture* invalids any causal argument.

In Table 2, the first stages are displayed. In there, we can see the role that each instrumental variable—*liberiudiciorum*, *customary*, *pc_institutions*, and *pc_instit_mod*—performs in the development of current cultural traits (*culture*). All instrumental variables' coefficients are highly significant when they are individually used—regressions (1), (2), (3), and (4). However, when instrumental variables are combined in the same regression, some remain significant while others systematically lose their significance. Tabellini's variable about historical constraints on the executive—*pc_institutions*—loses its significance when combined with any of the instruments on municipal autonomy (Equations (6) and (8)). Our modified measure for constraints on the executive—*pc_instit_mod*—does remain significant when variables on municipal autonomy are included—(Equations (7), (9), and (10)). Equation (5) combines *liberiudiciorum* and *customary* in the same regression, being both significant, though *liberiudiciorum* only at 10 %. When the two variables on municipal autonomy are combined with *pc_instit_mod* (column 10), *liberiudiciorum* loses all its significance. Relying on these results, we will rule out *pc_institutions* and *liberiudiciorum* as instrumental variables and use only the combination of *pc_instit_mod* and *customary*—like in Equation (9)—for instrumenting *culture*.

It is important to remark that *illiteracy1887* loses its significance in all the specifications except in column (3). This fact means that illiteracy levels could have played no distinctive role in the unequal development of these cultural traits, at least in the Spanish case. Thus, this supports our initial doubts about including illiteracy rates in 1887 as an instrumental variable for *culture* and permits us to rule out arrow e of Fig. 9. On the other hand, among the geographic variables, only *altitude* remains significant in some of the specifications, ruling out almost entirely a hypothetic effect of geography on *culture* (channel f). In column (9), whose specification will be the first stage of our baseline model in Sect. 4.2.2, no variable on geography, historical education, or historical development is significant.

Table 1 Development, culture, education, and geography: OLS estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent var.	*lgdppc9510*							
culture					0.15	0.14	0.13	0.10
					(0.02)***	(0.02)	(0.02)***	(0.02)***
lgdppc1800				−0.05				
				(0.09)				
urban1860			−1.05					
			(1.76)					
illiteracy1887		−0.75				−0.49		−0.72
		(0.19)***				(0.13)***		(0.14)***
latitude	0.02						0.01	−0.01
	(0.01)**						(0.01)	(0.01)
longitude	−0.02						−0.02	−0.02
	(0.01)***						(0.01)***	(0.00)***
altitude	0.02						0.08	−0.02
	(0.08)						(0.05)	(0.05)
densicoast	1.46						1.01	0.99
	(0.50)***						(0.35)***	(0.28)***
cons	8.93	10.20	9.74	9.97	9.72	10.03	9.42	10.56
	(0.40)***	(0.12)***	(0.05)***	(0.43)***	(0.02)***	(0.09)***	(0.29)***	(0.31)***
Obs	50	50	50	50	50	50	50	50
Adjusted R^2	0.32	0.23	−0.01	−0.01	0.56	0.65	0.67	0.8

Notes: Standard errors in parentheses. *Significant at 10 %; **significant at 5 %; ***significant at 1 %. Estimation method: OLS

Table 2 First stage: role of instrumental variables in these cultural traits' development

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent var.	*culture*									
liberiudiciorum	−1.4				−0.54	−1.28	−1.06			−0.37
	(0.325)***				(0.31)*	(.35)***	(0.30)***			(0.37)
customary		1.61			1.25			1.52	1.29	1.04
		(0.29)***			(0.33)***			(.33)***	(0.28)***	(0.37)***
pc_institutions			0.34			0.18		0.12		
			(0.17)**			(0.16)		(.14)		
pc_instit_mod				0.60			0.50		0.47	0.46
				(0.12)***			(0.11)***		(0.11)***	(0.11)***
urban1860	−9.52	−3.61	−13.79	−9.06	−3.30	−7.18	−3.07	−2.43	1.57	1.65
	(11.42)	(10.88)	(13.68)	(8.41)	(10.73)	(11.82)	(7.64)	(11.15)	(7.24)	(7.24)
illiteracy1887	−0.9	1.00	−3.64	−1.60	0.99	−1.20	0.05	0.71	1.59	1.56
	(1.38)	(1.32)	(1.37)**	(1.13)	(1.35)	(1.32)	(1.11)	(1.36)	(1.15)	(1.15)
latitude	0.02	0.042	−0.01	−0.02	0.05	0.03	0.02	0.05	0.043	0.05
	(0.05)	(0.05)	(0.05)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.049)	(0.05)
longitude	0.05	0.02	−0.03	−0.03	0.05	0.07	0.07	0.04	0.048	0.07
	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
altitude	−1.4	−0.92	−0.96	−0.47	−1.04	−1.21	−0.69	−0.82	−0.35	−0.44
	(0.48)***	(0.45)**	(0.60)	(0.43)	(0.46)**	(0.57)**	(0.39)*	(0.50)	(0.35)	(0.37)
densicoast	−1.40	1.68	2.13	1.80	0.60	−0.58	−0.15	2.04	2.18	1.43
	(2.18)	(1.60)	(2.28)	(2.29)	(1.66)	(1.95)	(2.10)	(1.50)	(1.87)	(2.01)
cons	1.23	−2.68	3.25	2.16	−2.41	0.58	−0.27	−2.87	−3.40	−3.20
	(2.85)	(2.94)	(3.03)	(3.06)	(2.92)	(2.84)	(2.79)	(2.88)	(2.77)	(2.77)
Obs	50	50	50	50	50	50	50	50	50	50
Adjusted R^2	0.43	0.51	0.28	0.49	0.52	0.44	0.60	0.50	0.66	0.66

Notes: Standard errors in parentheses. Equations (1), (2), (3), (5), (6), and (8) report robust standard errors; in the rest, errors are uncorrected. *Significant at 10 %; **significant at 5 %; ***significant at 1 %. Estimation method: OLS

4.2.2 Two-Stage Least Squares Regression

In Table 3, the results of the two-stage least squares regressions are presented, where *culture* (Equations (1) and (5)) and its components (Equations (2), (3), and (4)) are instrumented by *customary* and *pc_instit_mod*. In all specifications, the coefficient for cultural variables shows expected sign and is highly significant in the second stage.

It is worthy to note that *customary* is not significant when explaining *trust* (first stage of column (3)), and *pc_instit_mod* is not either when explaining *socialcapital* (first stage of column (4)). This might be due to two reasons. First, it could be that in the true model, the development of these separate components is actually more associated with one historical fact over the other. However, it may be due to the different aggregations of data—*socialcapital* is provincially aggregated whereas *trust* is aggregated by autonomous communities—along with the fact that *pc_instit_mod* does not show provincial variability while *customary* does. Therefore, it may be due exclusively to the defects of the own data.

Column (5) is interested in economic growth in a shorter term, being measured by the logarithm annual average economic growth during the period 1995–2010 (*lgrowth9510*). Once taken into account the initial provincial economic distribution of per capita GDP in 1995 (*lgdppc1995*)—included in the model as an exogenous regressor—*culture* is able to significantly explain economic growth during those 15 years.

With regard to the other variables, note that coefficients of *longitude* and *densicoast* in the second stage of the specifications (1)–(4) are significant, highlighting the possible importance of the proximity to the Mediterranean and continental Europe and, generally, the proximity to the coast. On the other hand, illiteracy in 1887, though it showed no significant role in the first stage, is always significant in the second one (channel d in Fig. 9). This could be of concern if historical educational levels were partly a consequence of the instruments, transferring variation from them to current economic development and thus violating the identification assumptions. This concern is evaluated in Section 4.3.

We perform several tests about three issues that may be of concern when using instrumental variables: the effective endogeneity of the endogenous regressor and the relevance and validity of the instruments. The specifications that use *culture* (columns (1) and (5)) show satisfactory results. The regression that contains *trust* (column (3)) shows validity problems when rejecting the null in the overidentification test. The F-statistics in the specification that contains *socialcapital* (column (4)) alerts for weak instrument problems.[23]

[23]The problem of weak instruments in column (4) is solved when *socialcapital* is instrumented only by *customary*. In the case of validity in Equation (3), when *trust* is instrumented solely by *pc_instit_mod*, the equation is only identified, so overidentification test cannot be used.

Table 3 Culture and economic development: Instrumental variables' estimates

	(1)	(2)	(3)	(4)	(5)
	Second-stage dependent variables: log GDP per capita 1995–2010 (*lgdppc9510*) and log growth of GDP per capita 1995–2010 (*lgrowth9510*)				
Panel A	*lgdppc9510*	*lgdppc9510*	*lgdppc9510*	*lgdppc9510*	*lgrowth9510*
culture	0.12				0.16
	(0.02)***				(0.04)***
independence		0.16			
		(0.03)***			
trust			0.12		
			(0.03)***		
socialcapital				0.16	
				(0.04)***	
urban1860	−1.15	−3.00	−3.24	−0.80	1.93
	(1.05)	(1.17)	(1.53)**	(1.76)	(1.17)*
illiteracy1887	−0.72	−0.46	−1.13	−0.74	−0.37
	(0.15)***	(0.18)***	(0.20)***	(0.24)***	(0.17)**
latitude	−0.01	−0.001	−0.02	−0.02	0.028
	(.007)*	(.008)	(0.01)**	(0.01)	(0.03)***
longitude	−0.02	−0.02	−0.03	−0.03	0.00
	(0.01)***	(.01)***	(0.01)***	(0.01)***	(0.00)
altitude	−0.03	0.05	−0.20	−0.00	0.03
	(0.05)	(.07)	(0.07)***	(0.09)	(.05)
densicoast	0.82	0.78	0.94	0.79	0.55
	(0.27)***	(0.29)***	(0.43)**	(0.45)*	(0.27)**
lgdppc1995					−1.03
					(0.21)***
cons	10.80	10.11	11.64	10.93	8.60
	(0.37)***	(0.44)***	(0.57)***	(0.60)***	(2.16)***
	First stage for endogenous variables of cultural traits (*culture*) and separate components (*independence*, *trust*, and *socialcapital*)				
Panel B	*culture*	*independence*	*trust*	*socialcapital*	*culture*
customary	1.29	1.18	0.30	1.202	0.84
	(0.28)***	(0.33)***	(0.39)	(.398)***	(0.28)***
pc_instit_mod	0.47	0.28	0.65	0.216	0.38
	(0.11)***	(0.13)**	(0.15)***	(.152)	(.12)***
urban1860	1.57	−4.00	11.95	−.001	5.10
	(7.24)	(8.70)	(10.16)	(.010)	(9.03)
illiteracy1887	1.59	−0.20	2.73	.0156	2.78
	(1.15)	(0.01)	(1.61)*	(.017)	(0.94)***
latitude	0.04	−0.04	0.10	0.058	0.07
	(0.05)	(0.06)	(0.07)	(.070)	(0.04)*

(continued)

Table 3 (continued)

Panel B	First stage for endogenous variables of cultural traits (*culture*) and separate components (*independence*, *trust*, and *socialcapital*)				
	culture	*independence*	*trust*	*socialcapital*	*culture*
longitude	0.05	0.01	0.04	0.066	0.10
	(0.04)	(0.04)	(0.05)	(.052)	(0.04)**
altitude	−0.35	−0.85	1.06	−0.001	−0.26
	(0.35)	(0.42)*	(0.49)**	(.001)	(0.28)
densicoast	2.18	1.91	1.02	1.751	−0.88
	(1.87)	(2.25)	(2.62)	(2.70)	(1.47)
lgdppc1995					2.42
					(1.12)**
cons	−3.40	1.36	−6.52	−3.867	−27.68
	(2.77)	(3.32)	(3.88)	(3.998)	(11.69)**
Obs	50	50	50	50	50
F-statistics	28.41	11.56	11.66	7.22	9.45
Endogeneity tests (*p*-value)	0.06, 0.08	0.01, 0.01	0.00, 0.00	0.00, 0.00	0.01
Overidentification tests (*p*-value)	0.87, 0.88	0.42, 0.46	0.04, 0.06	0.40, 0.44	0.47

Notes: Standard errors in parentheses, robust errors in column (5) and uncorrected errors in the rest. *Significant at 10 %; **significant at 5 %; ***significant at 1 %. Estimation method, 2SLS. Instrumental variables, *customary* and *pc_instit_mod*. *F-statistics* is *F*-test against the null that the instruments are irrelevant in the first-stage regression. *Endogeneity tests* report Durbin and Wu-Hausman tests' *p*-value for uncorrected errors and Wooldridge score test's *p*-value otherwise against the null that *culture* is exogenous. *Overidentification tests* report Sargan and Basmann tests' *p*-values for uncorrected errors and Wooldridge's score test *p*-value otherwise with the null being that instruments are valid

4.3 Robustness

Further tests are conducted in this subsection. We start by further testing the validity of the identifying assumptions in Sect. 4.3.1, and then we check the robustness of our results against the inclusion of additional variables in Sect. 4.3.2.

4.3.1 On the Identification Assumptions

The validity of the obtained results depends on the assumption that the instruments are not linked to current economic development through channels different than the cultural one. With regard to the exogeneity of the instruments, the overidentification test has obtained satisfactory results in the baseline specification—column (1) in Table 3. However, in this subsection, we carry out some additional tests about the identification assumptions.

The first one consists of regressing economic performance directly on instrumental variables—one at a time—in the presence of the endogenous variable, *culture*, instrumented by the other instrumental variable. If the instrumental variable is validly identified with the instrumented variable, instrumental variable's coefficient

should not be statistically significant. The results are presented in columns (1) and (2) of Table 4. This condition is accomplished for both specifications.

Another issue that could raise doubts on the validity of the instruments is the continuity of part of the historical formal institutions that were regionally distinctive and may have been a parallel channel. Formal differences in private law actually transcended, and we had not taken them into account in the stylized outline of the case. In order to isolate the instruments of the possible effect of these distinctive legal orders, we will use strategically reduced samples. These subsamples represent critical zones where we can observe variability of at least one of our historical instruments, *customary*, within a specific legal code. We assess the role of culture, instrumented by *customary*, in two subsamples:

(a) Those regions in which Castilian private code already formally ruled before the processes of unification: all the provinces under the Crown of Castile except Basque Country and Navarre. The geographic location of this critical zone of 35 observations is illustrated in Fig. 10a. In column (3) of Table 4, we can see how *customary* significantly explains *culture* in the first stage, and *culture*'s coefficient in the second stage remained significant.
(b) Those provinces of critical zone A plus Catalan provinces and Baleares are included here. Despite the unification of both Crowns under the political

Table 4 On the identification assumptions

	(1)	(2)	(3)	(4)	(5)
Panel A	Second-stage dependent variable: log GDP per capita 1995–2010 (*lgdppc9510*)				
culture	0.12	0.13	0.10	0.13	0.12
	(.03)***	(0.03)***	(0.05)**	(0.04)***	(0.04)***
customary	0.01				
	(0.07)				
pc_instit_mod		−0.00			
		(0.02)			
urban1860	−1.13	−1.14	−0.59	−1.02	−1.41
	(1.05)	(1.06)	(1.07)	(1.00)	(1.88)
illiteracy1887	−0.71	−0.72	−0.84	−0.77	−0.80
	(0.17)***	(0.15)***	(0.17)***	(0.16)***	(0.49)
latitude	−0.01	−0.01	−0.01	−0.01	−0.02
	(0.01)*	(0.01)*	(0.01)	(0.01)	(0.01)
longitude	−0.02	−0.02	−0.02	−0.02	−0.03
	(0.01)***	(0.01)***	(0.01)***	(0.01)***	(0.01)***
altitude	−0.03	−0.03	−0.03	−0.03	−0.05
	(0.01)	(0.05)	(0.07)	(0.06)	(0.12)
densicoast	0.83	0.81	1.34	0.81	0.80
	(0.28)***	(0.28)***	(0.48)***	(0.29)***	(0.29)***
castiliancode				−0.04	
				(0.09)	
cons	10.77	10.80	10.69	10.77	10.95
	(0.41)***	(0.38)***	(0.36)***	(0.37)***	(0.95)***

(continued)

Table 4 (continued)

Panel B	First stage for the endogenous variables on cultural traits (culture) and illiteracy rates in 1887 (*illiteracy1887*)					
	culture	*culture*	*culture*	*culture*	*analfab1887/culture*	
customary	1.29	1.29	0.99	1.13	−0.14	1.06
	(0.28)***	(0.28)***	(0.37)**	(0.35)***	(0.03)***	(0.22)***
pc_instit_mod	0.47	0.47			−0.01	0.45
	(0.11)***	(0.11)***			(0.01)	(0.11)***
urban1860	1.57	1.57	6.35	1.72	−2.99	−3.18
	(7.24)	(7.24)	(12.89)	(7.76)	(0.86)***	(6.44)
illiteracy1887	1.59	1.59	1.11	1.01		
	(1.15)	(1.15)	(1.33)	(1.41)		
latitude	0.04	0.04	0.06	0.03	−0.03	0.002
	(0.05)	(0.05)	(0.05)	(0.05)	(0.01)***	(0.04)
longitude	0.05	0.05	0.04	0.08	−0.02	0.02
	(0.04)	(0.04)	(0.06)	(0.05)	(0.004)***	(0.03)
altitude	−0.35	−0.35	0.01	−0.26	−0.14	−0.57
	(0.35)	(0.35)	(0.39)	(0.42)	(0.04)***	(0.32)*
densicoast	2.18	2.18	5.36	0.57	−0.30	1.71
	(1.87)	(1.87)	(3.91)	(2.2)	(0.25)	(1.86)
castiliancode				−0.90		
				(0.57)		
cons	−3.40	−3.40	−4.26	−2.14	1.91	−0.37
	(2.77)	(2.77)	(2.66)	(3.15)	(0.23)***	(1.70)
Obs	50	50	35	40	50	
F-statistics	19.86	21.87	7.17	10.36	15.81	34.85
Endogeneity tests (*p*-value)	0.18, 0.23	0.11, 0.15	0.54	0.18	0.16, 0.22	

Notes: Standard errors in parentheses, robust errors in column (3) and (4) and uncorrected errors in the rest. *Significant at 10 %; **significant at 5 %; ***significant at 1 %. Estimation method, 2SLS. Instrumental variables, *customary* or *pc_instit_mod. F-statistics* is *F*-test against the null that the instruments are irrelevant in the first-stage regression. *Endogeneity tests* report Durbin and Wu-Hausman tests' *p*-value for uncorrected errors and Wooldridge score test's *p*-value otherwise against the null that *culture* is exogenous. Columns (1), (2), and (5) present regressions on the complete sample of 50 observations, and columns (3) and (4) show reduced samples according to Fig 10a, b, respectively. In specification (5), there are two endogenous variables; thus, two first-stage columns are reported.

institutions of Castile, Mallorca and Catalonia maintained their civil code, unlike Valencia and Aragon—though Aragon recovered it in 1711. If we consider the very generalized assumption that the Catalan and Balearic legal orders share common roots, we could identify them as belonging to a common legal family within which we can observe variation in our instrument *customary*. This can make sense, since, according to Orduña (2003:147), "the conquest of Mallorca was an enterprise driven by the bourgeoisie of Barcelona, which conditioned the development of its legal order, because the repopulation was also carried out by Catalan people." The instrument *customary* shows variability across both areas—Castilian and Catalan-Balearic—as shown in Fig. 10b. In column (4), we carry out the same regression on this new subsample and control

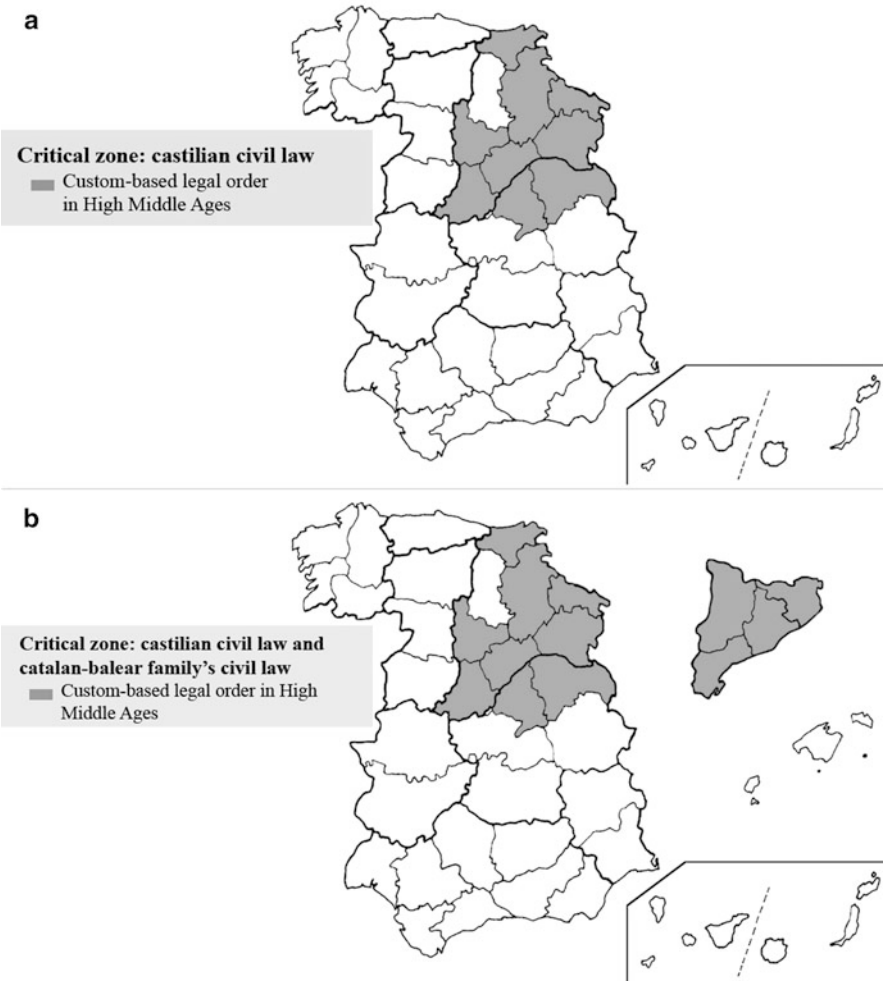

Fig. 10 Critical zones where instruments can be isolated from the effects of civil codes

for the fixed effects of these legal codes by including the dummy *castiliancode*, which takes value 1 in the critical zone A. Results are again satisfactory: *customary*'s coefficient is significant in the first stage, *culture*'s is significant in the second stage, and *castiliancode* never shows significance.

On the other hand, as we could see in Table 3, *illiteracy1887* showed no significant effect on *culture* in the first stage but did on current economic development in the second stage. If the different levels of literacy were partly due to the historical political regimes—something reasonable[24]—then effects from instruments to

[24]For instance, the *Ley 41 of Cortes de Navarra* of 1780–1781 provides for free and compulsory education to all the children between 5 and 12 years old (Ruiz 1988).

current economic development could have been transmitted through an alternative channel, thus violating the exclusion restrictions. This issue is tested in column (5), instrumenting *illiteracy1887* and *culture* by both instrumental variables. In fact, *illiteracy1887* seems to be explained by our political instruments in the first stage, but this part of the illiteracy rates' variation that is due to the instruments—i.e., instrumented *illiteracy1887*—is not significant in the second stage in the presence of *culture*. Therefore, the part of the illiteracy rate that is due to our historical political instruments has no distinctive effect on economic output once the cultural channel is taken into account.

4.3.2 Additional Controls

In Table 5, the results are tested against the inclusion of other additional variables that could be related both to current economic distribution and to some historical components and could be omitted in the model. We include, as if they were exogenous, some *proximate* causes of current economic development such as the average proportion of the active population with post-compulsory education during

Table 5 Additional controls

	(1)	(2)	(3)	(4)	(5)
Dependent variable	*lgdppc9510*				
culture	0.11	0.09	0.13	0.13	0.12
	(0.02)***	(0.02)***	(0.02)***	(0.02)***	(0.02)***
educ9510	0.25				
	(0.34)				
stock9510		0.05			
		(0.03)**			
stockpub9505			−0.03		
			(0.04)		
eqi				−0.10	
				(0.06)*	
congestion0410					0.08
					(0.20)
_cons	10.64	10.57	10.84	10.4	10.71
	(0.42)***	(0.31)***	(0.29)***	(0.46)***	(.44)***
Observations	50	50	50	50	50
F-statistics	20.47	16.99	26.17	21.82	30.64
Endogeneity tests (*p*-value)	0.11, 0.15	0.19	0.07	0.06, 0.08	0.03, 0.05
Overidentification tests (*p*-value)	0.85, 0.87	0.92	0.79	0.51, 0.55	0.91, 0.92

Notes: Standard errors in parentheses, robust errors in column (2) and (3), uncorrected errors in the rest. *Significant at 10 %; **significant at 5 %; ***significant at 1 %. Estimation method, 2SLS. Instrumental variables, *customary* and *pc_instit_mod.* Only the second stage is reported. All regressions are controlled for the geographic variables and *illiteracy1887. F-statistics* is *F*-test against the null that the instruments are irrelevant in the first-stage regression. *Endogeneity tests* report Durbin and Wu-Hausman tests' *p*-value for uncorrected errors and Wooldridge score test's *p*-value otherwise against the null that *culture* is exogenous. *Overidentification tests* report Sargan and Basmann tests' *p*-values for uncorrected errors and Wooldridge's score test *p*-value otherwise with the null being that instruments are valid.

the period 1995–2010 (*educ9510*) as a measure of current human capital, in column (1); the average stock of productive capital per capita during the period 1995–2010 (*stock9510*), in column (2); and the public stock of net capital per capita during the period 1995–2005 (*stockpub9505*), in column (3). Two proxies of subnational institutional functioning are also included: a subjective one, the *European Quality of Government Index* (*eqi*) (column (4)), and an objective one, the average rate of judicial congestion in the period 2004–2010 (*congestion0410*) (column (5)). The description and the source of these variables can be found in Appendix 1.

In the presence of any of these variables, *culture*'s coefficient remains highly significant, with expected sign, and does not change substantially with respect to that in the basic specification.

5 Concluding Remarks

This chapter was devoted to the role of certain past political institutions and their cultural legacy as a fundamental cause of the economic disparities between the Spanish regions. The obtained results support this cultural hypothesis and showed robustness against other potential fundamental causes. However, we cannot rule out the direct effect of geography and human capital on current economic distribution.

One of the main contributions of this paper is the review of Tabellini's historical narrative for the Spanish case. First, we chose to discard illiteracy rates as an exogenous cause of the uneven development of these cultural traits and consider only essentially political factors. We have also revised Tabellini's valuations about past constraints on the executive and proposed alternative political factors that have also been associated with the formation of these cultural traits in the literature.

We emphasized that in order for these cultural traits to have the expected positive effect, they had to be enveloped in a liberal institutional system. According to this perspective, these traits did not have their expected effect until the Spanish Liberal Revolution. This institutional transformation triggered the process toward the new regional economic distribution.

This work was aimed to present the causes of the *differences* among regions within a partially common situation. It should also be pointed out that while these differences had persisted somehow up to the present, they do not necessarily have to remain that way. The increasing regional mobility, favored by the uprooting of the new globalized economic order, and national mass media seem to create a climate of mutual influence or assimilation, capable of enhancing a cultural convergence at national level. Furthermore, institutional arrangements or new comparative opportunities may arise that could make more valuable other cultural traits in which other regions are richer.

We have not taken into account aspects related to social structure. Putnam et al. (1993), for instance, suggested that higher social capital levels are more likely to be found in more egalitarian societies as opposed to "vertically structured, horizontally fractured communities." Further research can address the role of social structure within this approach.

We cannot either rule out that deep and previous elements of culture had been a determinant for the adoption of the formal institutions that we have taken as instrumental variables. This would be solved if all regions had started from a homogeneous situation in a stage prior to the institutional divergence. However, Iberian Peninsula was a melting pot of cultures in the era prior to the *Reconquista*, and the subsequent migration movements further complicate the analysis. According to our narrative, as in Tabellini (2010) and Guiso et al. (2008a), historical institutions are treated as exogenous accidents that subsequently gave rise to cultural traits. But if culture and formal institutions were a product of mutual adaptation or even if the political factors were endogenous with respect to culture—reasonable possibilities—our instrumental variables would keep being valid if they meet the exclusion restrictions.

A.1 Appendix 1: Variables' Description, Aggregation, and Source

Variable	Description	Aggregation	Source
lgdppc9510	Log of annual average per capita GDP during the period 1995–2010	Province	INE
lgrowth9510	Log of annual average per capita GDP growth in 1995–2010	Province	Based on INE data
Variables on culture			
socialcapital	Principal component from information about citizen's political implication and associative participation, following Mota and Subirats (2000)	Province	Based on CIS data
independence	Principal component from variables on society's attitudes toward individual independence	Community	Based on WVS and ESS data
trust	Principal component from information about generalized trust	Community	Based on WVS and ESS data
culture	Principal component from last three variables	Province	Own

(continued)

Variable	Description	Aggregation	Source
Instrumental variables			
liberiudiciorum	Legal order based on Visigothic *Liber Iudiciorum* in High Middle Ages	Province	Based on Barrero and Alonso (1989), García- Gallo (1979) and Gacto et al. (2009) information
customary	Custom-based legal order in High Middle Ages	Province	
pc_institutions	Assessment of constraints on the executive during the period 1600–1850	Province	Tabellini (2010)
pc_instit_mod	Modified version of *pc_institutions*	Province	Own
Control variables			
urban1860	Urbanization rate in 1860	Province	Tafunell (2005)
lgdppc1800	Relative index of per capita GDP in 1800	Community	Carreras et al. (2005)
illiteracy1887	Illiteracy rates in 1887	Province	Vilanova and Moreno (1992)
latitude	Latitude degrees of the capital of the province	Province	Agencia Española de Meteorología (aemet.es) (2013)
longitude	Longitude degrees of the capital of the province	Province	aemet.es (2013)
altitude	Altitude in meters of the capital of the province	Province	AEMET (2012)
densicoast	Province's coast length divided by province area	Province	Based on INE (2003) data
educ9510	Average proportion of active population with post-compulsory education during the period 1995–2010	Province	Fundación Bancaja and Instituto Valenciano de Investigaciones Económicas, IVIE (2014)
stock9510	Provincial productive capital stock in tens of thousands of euros per inhabitant during the period 1995–2010	Province	Fundación BBVA and Instituto Valenciano de Investigaciones Económicas, IVIE (2013)

(continued)

Variable	Description	Aggregation	Source
stockpub9505	Provincial public stock of net capital in tens of thousands of euros per inhabitant during the period 1995–2005	Province	Fundación BBVA and Instituto Valenciano de Investigaciones Económicas, IVIE (2009)
eqi	European Quality of Government Index	Community	Charron et al. (2013)
congestion0410	Average judicial congestion during the period 2004–2010	Province	Consejo General del Poder Judicial, CGPJ

A.2 Appendix 2: Main Descriptive Statistics

Variable	Obs	Mean/freq.	Std. dev.	Min	Max
lgdppc9510	50	9.72	0.20	9.39	10.15
lgrowth9510	50	−0.01	0.154	−0.44	0.33
socialcapital	50	0	1	−1.84	3.19
trust	50	0	1	−1.69	1.90
independence	50	0	1	−2.00	1.80
culture	50	0	1	−1.64	3.00
liberiudiciorum	50	25[a]			
customary	50	20[a]			
pc_institutions	50	0	1	−0.50	1.98
pc_instit_mod	50	0	1	−0.49	3.07
illiteracy1887	50	0.64	0.13	0.35	0.84
urban1860	50	0.19	0.17	0.02	0.66
lgdppc1800	50	4.56	0.31	3.93	5.14
latitude	50	40.10	3.16	28.2	43.5
longitude	50	3.84	3.73	−2.82	16.25
altitude	50	0.37	0.368	0.01	1.13
densicoast	50	0.03	0.06	0	0.29
educ9510	50	0.75	0.05	0.57	0.83
stock9510	50	2.98	0.77	1.78	5.29
stockpub9505	50	1.16	0.35	0.70	2.52
eqi	50	0.11	0.32	−0.47	0.67
congestion0410	50	1.30	0.06	1.19	1.45

[a]Instead of mean, the frequency that the dummy variable takes value 1 is displayed

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Institutional Change in Spain from Francoism to Democracy: The Effects of the Great Recession

Gonzalo Caballero and Marcos Álvarez-Díaz

1 Introduction

Spanish economic history in the second half of the twentieth century was a story of success. The Spanish population lived midway through the last century in an agrarian and underdeveloped economy that had not experienced an industrialization process that other European neighbors had already undergone in the nineteenth century. Understanding this process of economic and social modernization in Spain requires the study of the dynamics of institutional change in the country.

Institutional change in Spain from Francoism to democracy implied a change of institutional equilibrium. The institutional equilibrium that emerged after the Spanish Civil War (1936–1939) implied a predatory state in self-reinforcing institutions, but those institutions would be self-destructing institutions in the long run. Franco's regime established a dictatorship that was assuming a set of institutional modifications over time, and specifically, the dictator accepted the application of an economic reform of market by means of the Plan of Stabilization and Liberalization in 1959. Nevertheless, the dictator did not accept a process of democratization and political freedom, and the dictatorship survived until the death of the dictator in 1975. Then, a new institutional framework was established through the political transition that allowed the approval of the 1978 Spanish Constitution. This new political framework implied a contractual state and a democratic system in a new institutional equilibrium. This equilibrium implied self-enforcing institutions in the short run and self-reinforcing institutions in the long run. Therefore, the process of institutional change of Spain in the second half of the twentieth century implied a change of institutional equilibrium from a predatory state toward a contractual

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and democratic state (Caballero 2008). The process of institutional change was initiated in a political dictatorship and an economic autarky framework that implied lack of both market economy and democracy and finished in a democracy with economic and political freedom, a decentralized multilevel state, and a welfare state. The Spanish society lived a process of modernization and economic advance in democracy, and the institutional framework that had emerged since the political transition seemed to adequately adapt to the different circumstances over the decades. Specifically, the Spanish economy went through an uninterrupted economic expansion from the mid-1990s until 2007.

But the subprime crisis that appeared in the US economy in 2007 led to the most serious international economic crisis since the Great Depression of the 1930s. The Great Recession intensely affected the world economy since 2008, and specifically in that year, Spain entered into a deep recession, and the previous efforts to modernize the Spanish economy were not sufficient to avoid the worst effects of the economic crisis. In fact, the effects of the Great Recession were especially deep in the Spanish case, and the macroeconomic landscape largely deteriorated. The huge Spanish economic crisis since 2008 included two periods of economic recession and an unemployment rate that has grown beyond 25 % since 2012. This has been the highest level of unemployment in all the advanced economies around the world during the Great Recession.

The Great Recession has had a huge negative impact on living standards in Spain, and the social cohesion of the Spanish society has been damaged. Moreover, the economic crisis is having some institutional, political, and electoral effects in Spain. These effects include the rise of general strikes, the appearance of new social protests, and movements organized by civilian platforms, as well as the electoral success of a new far-left political party that propels a political breakup with the existing institutional equilibrium, the deterioration of the political situation, and the decline of political trust, among others. These institutional trends have weakened the existing institutional equilibrium that had emerged in the political transition of the 1970s.

Studying empirical cases of institutional change is a relevant topic in the new institutional political economics (Alston et al. 1996; Schofield and Caballero 2011; Schofield et al. 2013). This essay reviews the process of institutional change in Spain from Francoism to democracy and studies the effects of the Great Recession on the Spanish institutional and political framework. The goal of this research agenda is to understand whether the economic crisis can imply a change of institutional equilibrium in Spanish society. This chapter presents some ideas and empirical evidence, but we have to recognize that the research program on the relationships between economic crisis and institutional change in the Spanish case is yet in an emerging phase.

The paper is structured in the following way. Section 2 studies the process of institutional change from Francoism to democracy in Spain. Section 3 presents the Great Recession in the Spanish economy. Section 4 analyzes the institutional, political, and electoral effects of the Great Recession in Spain, and it includes new empirical evidence on the decline of political trust. Section 5 concludes.

2 Institutional Change from Francoism to Democracy

Throughout Spanish history, periods abounded in which the institutional framework was characterized by the presence of a predatory state, consistent with the notion put forward by North (North 1981; North and Weingast 1989; Caballero and Arias 2013). This scenario implied that the State was at the service of particular and non-inclusive interests and that there was no division of powers guaranteeing property rights and the credibility of the government's commitment, in short, an institutional framework that was in no way favorable to economic development.

General Franco's dictatorship (1939–1975) constituted the last and most forthright way in which the predatory state took form in Spain. However, Franco's regime underwent a process of institutional adaptation that obliges us to distinguish between different stages in Francoism. Whereas Franco's predatory regime in the 1940s acted consistently with its genesis by provoking a deep economic depression, the "hinge decade" of the 1950s meant a turning point that was reinforced in 1959 by the Stabilization Plan and market liberalization that generated, in the 1960s and early 1970s, the Spanish variant of *desarrollismo*. In fact, the Spanish experience corroborated the hypotheses of Barzel (1997), North (2000), and Olson (2000) on the possibility of economic growth emerging with the passage of time under a sovereign that maximizes its wealth (similarly to what might occur with a "stationary bandit"). In Olson's terms, the cause should be sought in the "invisible second hand" which leads the predatory interests to use power, to some extent, in a way coherent with the general interest, despite its initial intention (Table 1).

The death of the dictator in 1975 allowed the making of a new institutional framework that was very different from the regime that had emerged after the Civil War. Understanding the process of institutional change from Francoism to democracy in Spain requires the study of the different stages of Francoism. The following subsections present the different stages of the process of institutional change during this period (Fig. 1).

2.1 The Predatory State in the 1940s

The new authoritarian regime that in 1939 eliminated democracy and the parliamentary system of the Republic established a lifelong presidency reserved for

Table 1 The Spanish economic growth in the twentieth century

Period	Average rate per capita
1900–1935	1.1
1935–1950	−0.9
1950–1999	3.8

Source: García Delgado and Jiménez (1999)

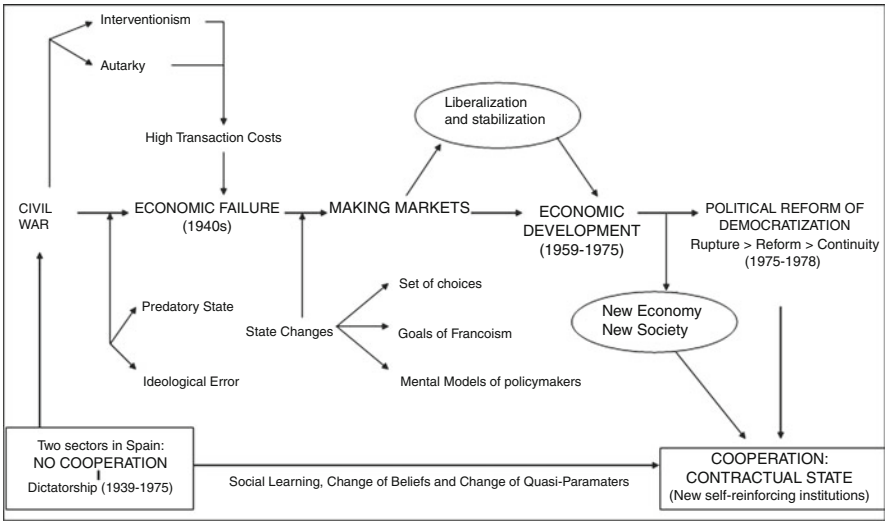

Fig. 1 Institutional change and political economy from Francoism to democracy

General Francisco Franco. This institutional framework was based on an agency relationship in which the State was to be in the service of a principal which incorporated only certain social sectors characterized by their anti-republicanism. In particular, the Northian predatory state took the form of an autocracy, in which the dictatorial regime decided the size of the State and could take control of the fiscal residues, understood as the difference between total output and the cost of the state government (Przeworski and Limongi 1993).

In particular, Francoism adopted a political formula that concentrated all power in the dictator: the *Caudillo* was not limited except by its own will, and the regime had absolute capacity of decision to apply the political-economic program that it considered suitable. Nevertheless, the failure of the economic policy of Francoism became especially evident throughout the 1940s, when that predatory state acted according to its genesis and nature.

At this stage, markets were limited in their function of allocation mechanism, and the institutional framework moved away from one suitable for capitalist development. Public intervention was characterized by a regulation implemented via a multiplicity of regulations and direct controls on the performance of the economic agents in the interior and the policymaker-established prices, amounts, and recipients. The establishment of companies, agricultural and industrial production, internal and external commercialization, the labor market, and the financial and exchange markets were characterized by the discretionary and extra-budgetary management of the predatory state. This dictatorial intervention derived from Franco's distrust in economic freedom and involved an expropriation of economic rights that affected all of society, reducing the value of goods (González 1989).

But in addition to this interventionism, the predator assumed a pretension of national self-supply that meant the substitution of imports (autarky), relying thus on protectionism that was built on a conviction about the State's role as director of the economy (that is to say, the traditional paternalism of the Spanish State).

In this way, this institutional framework that did not respect the rights of private property and entailed high transaction costs explains the economic failure of the 1940s. The predator meant a "long night" for the Spanish economy in establishing an institutional formula that nothing would approach the technical frontier of production; in fact, the previous maximum production that took place in 1930 did not recover until 1952.

The predator and the economic depression coexisted in the Spanish economy until 1950. This genuine predatory state constituted self-enforcing institutions during the 1940s (an equilibrium, a stationary state) that prevailed but did not perpetuate over time (Caballero 2008; Greif 2006). Three factors explain this institutional equilibrium of the 1940s in the short run:

1. The predatory state itself—understood as the winning military army of the war—looked to sustain itself in power, and in a society that had just undergone a civil war, rivals did not exist who seriously defied this established state, though this was after World War II, when a greater sensation of fragility of the survival of the regime came about.
2. There was a demand for that institutional framework, because part of the Spanish population demanded that political regime in spite of its economic cost, due to their ideological preferences. Moreover, some social and political groups saw their economic income guaranteed in that institutional framework; although the size of the cake had been reduced, those groups were able to take control of a greater piece. The situation of favoritism and lack of competition was able to generate followers of this inefficiency in the system.
3. The ideology of Francoism did not consider the quantification of the costs that the predatory policy implied for growth. The predator thought that interventionism and autarky were channels for development, showing a remarkable ignorance about the effects of the economic policy.

The Spain of the 1940s corresponded to a situation near balance and institutional stability that can only be understood in a society terrified by the potential and real violence of the regime and by the memories of civil confrontation.

2.2 The Pivotal Decade of the 1950s

In the 1950s, a process of institutional readaptation was initiated in Spain, and it implied the gradual elimination of some of the characteristic institutional elements of the 1940s. In this way, the exit of the depression and the first samples of growth coexisted.

New circumstances in the inner and outer surroundings forced the predator to adapt itself to modifying the institutional framework. This decade corresponded with a phase of adaptation and change of the economic policy of the regime, which little by little moved away from the protectionist and interventionist model of the previous decade, and it would definitively leave it in 1959. In this way, these years corresponded with a "pivotal or hinge decade" between the situation of the 1940s and the new scene of the 1960s.

The first question that we must consider is why the predator initiated a process of institutional change during this period. The answer to this question comes from the analysis of the three different elements of the maximization process that explains the policymaking of Francoism's State:

1. The set of choice possibilities of the State. The set of policies that the predator could choose was modified by changes in external and internal restrictions. Among these external factors, there predominated the new scene of the Cold War, and this was to mean the end of isolation for Spain. In this sense, there appeared a set of economic political possibilities linked to the surroundings that previously were not at the disposition of the Spanish State. But the changes also affected the internal factors, because, with the passage of time, the economic penury of the population implied a risk for the survival of the predator. In fact, in these years there arose the first strike movements and the first protests of a civil society that started to require some changes.
2. The pursued goals. The predator maintained its intention to perpetuate itself in power to serve the interests of the traditional sectors of the Spanish society. If the objective of the State was to maintain itself in power, this forced it to obtain several intermediate objectives, among which economic growth and the well-being of the population were to occupy growing priority. The State would have to apply policies that contradicted its genuine ideology and its original postulates. This situation generated a trade-off between the goals of the State (economic growth versus the ideology of Francoism), but due to the continuous strengthening of civil society with the passage of time, the goal of economic growth would occupy a more and more important place in the political-economic agenda of the regime.
3. The nature of the State as a decider. The State of Francoism continually modified its decider nature, passing from one irrational mental model to another with doses of much greater rationality and realism. The ideology of the regime was adapting learning with experience, and in the 1950s some important changes took place. In this direction, we can indicate the importance of the change in the mainstream of Spanish economic thought, the role of the first generations of economists that emerged from the Spanish university, and the external recommendations of organizations such as the IMF and the OEEC. All these factors were extending a message of liberalization of the markets and recovery of basic balances.

Due to these three processes of change, the result was the modification of the institutional framework of the Spanish economy. The 1950s implied a period of beginning of change in which autarky and economic interventionism still prevailed,

but in which there already existed some changes. After the biennium of transition (1949–1950) in which Spain made its first contacts with the USA (González 1989), the 1951 change of ministers opened a period in which the policies that were applied attenuated the rigidity of autarky and previous economic interventionism. The institutional framework did not play a stimulant role in economic growth yet, but little by little it stopped preventing the development of the possibilities of the Spanish economy.[1]

The last 2 years of the period constituted the biennium of pre-stabilization (1957–1958). In 1957 the Spanish economy lived in a situation of increasing inflation. This growth in prices was accompanied by a deficit in the balance of payments. The new government of 1957 understood that the growth of prices was a fundamental problem, for which reason it applied a monetary policy of credit contraction and carried out a tax reform to increase the public revenues.[2]

In this scene of adaptation of the predatory state, the tensions between those in favor of the old policy of inflation and industrialization and those in favor of the new policy of stabilization and liberalization were evident. Impelled by the international current of convertibility, the regime, in its effort to survive, decided on a new economic order of stabilization and liberalization. The challenge was confronted via the Plan of Stabilization and Liberalization in 1959.

2.3 Economic Reform of Markets, Development, and Modernization Since 1959

In the process of adaptation of the Francoist predatory state, 1959 was the year of inflection in the economic policy of the regime. In that year, the regime bid decisively for a new economic policy of stability, liberalization, and market.

The practical suspension of payments of the Spanish economy in 1959 implied the reaction of the government and the approval of the Plan of Stabilization in July of that year. This reform was built on the ideas of internal and external economic liberalization and openness, the establishment of a mixed economy based on flexibility and market discipline (eliminating the discretionary performance of the government), financial discipline (monetary and budgetary policy of stabilizing character), and a sole and realistic exchange rate.

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[1] In addition, the agreements with the USA allowed the entry of currency that was fundamental to importing the goods of equipment essential to increasing production. In this way, private investment and growth recovered. In these years, Spain experienced an industrial revolution that in 1958 allowed industrial production practically to double that of 1950 (González 1989).

[2] The reserves of the Spanish economy were becoming exhausted. In parallel, toward 1958, two phenomena of doubtless relevance to the external position of the Spanish economy took place: (a) on the one hand, Spain entered international economic organizations (the IMF, OEEC, World Bank); (b) on the other hand, in December of 1958, the main European currencies adopted external convertibility.

In this way, the State redefined the institutional framework of the economy, as well as its own role of intervention. The interventionist tradition of the Spanish State had consisted of exhaustive control of commercial or financial external operations and a multiplicity of direct controls on performance of internal economic agents. This interventionism was characterized by its extensiveness and intensity, its inefficiency for economic growth, its barriers to entry, and its restrictions on competition, corporatism, and lack of social control (Serrano and Costas 1990). In reality, an extreme interventionism by the public sector in the private sector attenuating the right of property and elevating transaction costs did not suitably delimit its role in public or private affairs.

The 1959 reform meant that the State accepted the main role of the market as an allocation mechanism, differentiating more clearly the public from the private affairs and resigning its tradition of discretionary intervention to a great extent. In addition, the institutional reform granted great importance to stability in the markets. In a Spanish economy which lived in a situation of vicious circles (public deficit, printing money, inflation, deficit in the balance of payments, and exhaustion of reserves), the success of the Spanish economic policy was nonviable if in the new market economy it did not decisively undertake discipline and macroeconomic stabilization.

In this way, the State assumed a program of liberalization and stabilization. The Plan of Stabilization of 1959 looked for internal and external balance, putting special emphasis on monetary and financial discipline of the State to obtain price stability, as well as equilibrium in the balance of payments (for which the peseta was devaluated and an exchange rate established of 60 pts/$).

The application of the Plan in July 1959 as an indivisible program caused a traumatic shock in the economy. After a brief initial depressive effect, the objectives sought (price stability, contained exchange rate, adjusted balance of payments, reduction of imports, increase of tourism, and foreign investment) became reality. The Plan established the basis for a stage of strong growth that allowed the Spanish economy to register the highest growth rates of the Western world, except Japan (Table 2).

In 1959 this economic liberalization (internal and external) and stabilization meant a transcendental change in the Spanish economy, representing the end of autarky and the advance *par excellence* in the economic modernization of the country.[3] Table 3 shows the change of the productive structure of the country.

Table 2 The Spanish development in the 1960s (comparative analysis of the growth rates per capita)

Growth rates per capita	Spain	Italy	France	Germany	UK	USA
1960–1973	6.3	4.3	4.2	3.4	2.4	2.6

Source: Prados and Sanz (1996)

[3]The principles of the Plan have impregnated the processing of Spanish economic policy since 1959, but with different degrees of intensity depending on the moment. For example, the pressures

Table 3 Distribution of GDP and employment by sectors in Spain, 1940–1975

	Sectors	1940	1950	1960	1975
GDP (%)	Agriculture	32.7	30.7	23.6	10.1
	Industry	23.3	26.9	34.8	38.4
	Services	44.0	42.4	41.6	51.5
Employment (%)	Agriculture	52.5	50.0	42.3	23.8
	Industry	24.3	25.7	28.5	37.0
	Services	23.2	24.3	29.2	39.2

Source: Prados and Sanz (1996)

2.4 The Political Transition (1975–1978): A New Self-Enforcing Institution

The death of General Franco in November 1975 opened up a period of institutional change as the keystone of the dictatorial regime disappeared from the political scene. The whole institutional framework, both formal and informal, of the regime was based on implicit or explicit political contracts in which Franco was a contracting party. His death broke that framework and opened up a new process of contracts between political agents in which each one of these sought to readjust its position. We can point out that the political transition in Spain, which lasted from December 1975 to December 1978, was composed of two distinct stages:

Stage 1. A first phase in the state mutation process lasted from December 1975 (after the death of the dictator) to June 1977 (first democratic elections, still pre-constitutional elections). During this period, the predatory state still survived the dictator but took the necessary steps for its own self-dissolution.

During the first 6 months of 1976, the government led by Arias Navarro tried to sustain the reform process that allowed the predatory state model to live on: This meant, at most, adapting Franco's basic laws to a limited regime of representative democracy. However, the failure of Arias Navarro's "opening up" government should be interpreted as a defeat of the reform in the face of the political opposition that defended rupture. This was reflected in the collective choice process as *Rupture* > *Reform* (rupture preferred to reform) (Colomer 1998).

With the arrival of Adolfo Suárez to the presidency of the government in July 1976, the governmental priority became the backing of transition using legal means toward a new democratic state model. The overwhelming public support for a Political Reform Act, seen in the December 1976 referendum, meant the dissolution of the Franco-based parliament and the introduction of a democratic system of government. This law unblocked the path toward a new legitimacy without breaking with the legality of the previous regime—using the monarchic legitimacy—and

of those in favor of the old autarkic policy provoked the establishment of the 1960 tariff (that maintained discriminated areas of protection) and the application of the Development Plans in the 1960s and early 1970s. Many economists continued to insist on the necessity of continuing the process of reform in the direction of the Plan (Requeijo 1989).

made the elaboration of a new constitution possible. In the collective choice process, reform was preferred to continuity: *Reform* > *Continuity* (Colomer 1998).

Stage 2. The next phase lasted from June 1977 (general elections) to December 1978, when the 1978 Constitution was passed by referendum. In this phase the institutions of the former regime had disappeared, and a period of gestation and birth of the contractual state was faced.

The minority government, led by Adolfo Suárez after the 1977 elections, developed a policy of consensus that took cooperative solutions to the limit. The transactions between the various political groups allowed a constitutional text to be drawn up that was backed by both chambers between July and October 1978 and later approved in a referendum with a high degree of consensus (87.9 % of votes in favor).

This historical process, in which Suárez's reformist government advocated agreeing with the left-wing opposition ("pro-rupture") on the making of a democratic contractual state, meant a loss of influence for the supporters of continuity who were more averse to rupture. In the collective choice process, the result was that rupture was preferred to continuity: *Rupture* > *Continuity*.

It is therefore worth stating that the collective choice process showed up some coherent and transitive preferences that were expressed in the following order: *Rupture* > *Reform* > *Continuity* (Colomer 1998). Rupture was therefore the preferred stable option resulting from the political transition process and culminated in the 1978 Constitution.[4] Contrary to the Spanish tradition of political imposition, the various political agents of the transition agreed on the formation of a contractual state (in the Northian sense). Democratic consolidation was made possible inasmuch as the democratic mechanism itself became self-enforcing; that is to say, the incentive structure made it possible for the relevant players to adhere and adapt their behavior to the new system of rules. From the former Franco supporters to the Communist Party, all the political players were interested in adhering to the new system of rules in a cooperative exercise aimed at avoiding all possible confrontation. Thus, this system configured institutions that were self-enforcing (Weingast 2004). Furthermore, this structure of institutions would be consolidated by later experience as self-reinforcing in the sense of Greif and Laitin (2004): That is, the changes the new system induced in the various quasi-parameters

[4] According to Caballero (2008), we can point out four causes that motivated the transition from the predatory state of Franco's dictatorship to the contractual state model of the Constitution of 1978: (a) the economic development of the 1960s and early 1970s would become a cause of democracy. The argument goes that with the modernization of the 1960s, the Spanish economy entered into a "transition zone" (Huntington 1991), in which the possibilities for democratization were multiplied. An increasingly complex market economy calls for a democratic political regime, in such a way that market reform preceded political change. (b) When Franco died, the Spanish economy was affected by problems derived from the international economic crisis, and the crisis damaged the legitimacy of the Franco regime. (c) The Spanish citizens assumed the convenience of the political and economic model of European societies where the welfare level was higher. (d) The democratic European environment demanded of Spain that she assume a democratic regime.

(income distribution, knowledge, organizations, culture, social behavior) ended up reinforcing the basic institutional framework that had emerged with the birth of the Constitution (Caballero 2008).

2.5 *Contractual State and Democracy Since 1978: Self-Reinforcing Institutions*

The political transition generated a new institutional framework for the Spanish economy and society. The new scenario, set by the 1978 Constitution, established the division of powers, third-party enforcement by means of an independent judicial system, a constitutional court, a parliamentary system, the right to vote through universal suffrage, and a competitive electoral system that permitted alternating government, in short, a set of rules that allowed, by reducing transaction costs, a great gain in efficiency compared to the previous situation.

Furthermore, the new institutional solution generated a clear boundary between what was public and what was private. The traditional discretional interventionism of the Spanish predatory state gave way to a regulated system in which the constitutional basis and the organizational structure of the State limited the scope of public powers and configured a space for the private sector to act for itself, for free functioning of the market economy.

Actually, despite its many faults, the Spanish economy had been functioning according to certain market principles since the 1960s. This was so because the economic reform of the market in Spain had preceded the political reform of democratization. As has already been pointed out, during the 1950s and particularly in 1959, economic policy abandoned absolute autarchic interventionism over prices, quantities, and recipients, freeing the economy from a set of practices that were asphyxiating it. The 1959 reform meant a boost for the construction of a market economy by conceding a regime of higher economic freedom, but the institutional basis for Spanish economic policy under Franco was no guarantee of a market economy. Thus, the predatory state model involved receptiveness to calls for a return to the "recommended economy" that was made up of particular, non-inclusive interests (for instance, in the 1964 Development Plans).[5]

Thus, the regime lived alongside a liberalization that allowed markets but did not build a solid institutional basis for these to emerge efficiently. Political transition allowed this challenge to be overcome by making the State partly active, which, by favoring transaction cost reduction, gave impetus to efficient exchanges.

[5]The creation of markets that were free from discretionary public interference was not credible under the Franco regime, as nothing stopped the regime from reneging on previous commitments and not fulfilling them. Thus, the Development Plans could be analyzed as a holdup phenomenon, which meant a step backward by not fulfilling ex post the political contract of the 1959 Plan.

According to the thesis formulated by Olson (2000), there are two necessary preconditions for the good running of an economy: on the one hand, the guaranteed and well-defined right to private property for all and the impartial compulsory execution of contracts and, on the other, the absence of depredation. The political structure set up in 1978 meant qualitative leaps in both directions: Spain achieved a market-augmenting government that was powerful enough to protect and establish the right to private property and the enforcement of contracts and at the same time limited so as not to deprive individuals of those rights (Olson 2000). This limitation in government power included, among other issues, acts defended by the Constitutional Court, two chambers in the Parliament, and a multilevel territorial government, so that ways were opened up for the presence of veto players that resolved the *trade-off resoluteness–decisiveness* (i.e., the contradiction between the resolution of the public powers to maintain a given policy and their capacity to promote changes of policy) in favor of guarantees in the commitment to no depredation (Tsebelis 1995; Cox and McCubbins 2001).

The progressive buildup of veto players on the political stage occurred in three phases: immediately, the division of powers placed parliament and judicial power at the center of the political scene; later, and progressively, growing decentralization of the State gave subcentral governments a great decision-making capability [constituting a "market-preserving federalism" in the sense of Weingast (1995)] (Caballero 2005); and finally, in the 1990s, and from at least a formal point of view, the creation of independent regulatory agencies—including the central bank—introduced greater doses of complexity to the policymaking processes. All of these triggered a profound mutation in the governance structure of public policy in Spain, making the agency relationship between the policy players much more complex.

The market economy thus found some appropriate institutional bases, which guaranteed the irreversibleness of the capitalist economic transition process begun in the 1950s. Political power confirmed the market's leading role as a mechanism for allocation. Yet, at the same time, the existence of market failures opened up the field of action for political powers searching for correction in the deficiencies in resource allocation (Caballero and Arias 2010).

Regarding political performance, the constitutional framework has allowed the adequate performance of democracy since the political transition. For example, regular elections took place to elect the members of Congress. Table 4 shows the number of deputies of each political party that were elected in each general election. These results allowed political alternation in the government, and there were six presidents of the government in the recent history of Spanish democracy: Adolfo Suárez (1977–1981, Democratic Center Union), Leopoldo Calvo-Sotelo (1981–1982, Democratic Center Union), Felipe González (1982–1996, Socialist Party), José María Aznar (1996–2004, Popular Party), José Luis Rodríguez Zapatero (2004–2011, Socialist Party), and Mariano Rajoy (elected in 2011, Popular Party).

The change of the main cultural, social, and political quasi-parameters of the Spanish society since the political transition reinforced the existing institutional

Table 4 Spanish general elections and number of elected deputies in Spain, 1977–2008

Political parties	1977	1979	1982	1986	1989	1993	1996	2000	2004	2008	2011
PCE/IU	20	23	3	7	17	18	21	8	5	2	11
PSOE	118	121	202	184	175	159	141	125	164	169	110
UCD	165	168	11	–	–	–	–	–	–	–	–
CDS	–	–	2	19	14	–	–	–	–	–	–
AP/CP/PP	16	9	107	105	107	141	156	183	148	152	186
CIU	11	8	12	18	18	17	16	15	10	10	16
PNV	8	7	8	6	5	5	5	7	7	6	5
ERC	–	–	–	–	–	1	1	1	8	3	3
Others	12	14	5	11	14	9	10	11	8	8	19
Total	350	350	350	350	350	350	350	350	350	350	350

Abbreviations: *PCE/IU* Spanish Communist Party/United Left, *PSOE* Spanish Worker Socialist Party, *UCD* Democratic Center Union, *CDS* Social and Democratic Center, *AP/CP/PP* Popular Alliance/Popular Coalition/Popular Party, *CIU* Convergence and Union, *PNV* Basque Nationalist Party, *ERC* Republican Left of Catalonia

equilibrium for decades; that is to say, those changes implied an adaptation of the institutional framework, but they did not break the main core of the political and institutional equilibrium. For example, the Spanish Constitution has not been substantially modified since its birth.[6] In this sense, Caballero (2008) concluded that the institutional equilibrium that emerged with the political transition was working in the form of self-reinforcing institutions (Greif 2006; Kingston and Caballero 2009).

3 The Great Recession in Spain

The Spanish economy worked on the institutional equilibrium that emerged in the political transition, and Spain was joined to the Economic European Community in 1986. The European business cycle and the European economic institutions have had a growing relevance to the Spanish economy because it was opened and incorporated into the European Monetary Union. After the crisis of the early 1990s, the Spanish economy went into an expansive phase that was considered a Spanish economic miracle. Nevertheless, the Great Recession broke the positive evolution of the Spanish economy. Tables 5 and 6 show the evolution of the annual growth rate and the unemployment rate in recent years in Spain.

[6]There were only two reforms of two articles of the Spanish Constitution since 1978, and they did not imply a change in the institutional equilibrium of the country. The change of article 135 of the Spanish Constitution in 2011, regarding budgetary stability and the payment of the public debt, was the only relevant change, but it did not affect the self-enforcing political institutions.

Table 5 Annual growth rate of GDP in Spain

Year	Annual rate of growth	Year	Annual rate of growth
1998	4.50	2006	4.10
1999	4.70	2007	3.50
2000	5	2008	0.90
2001	3.70	2009	−3.80
2002	2.70	2010	−0.2
2003	3.10	2011	0.10
2004	3.30	2012	−1.60
2005	3.60	2013	−1.20

Source: INE

Table 6 Unemployment rate in Spain

Year	Unemployment rate	Year	Unemployment rate
2001	10.55	2008	11.34
2002	11.47	2009	18.01
2003	11.48	2010	20.06
2004	10.97	2011	21.64
2005	9.16	2012	25.03
2006	8.51	2013	26.36
2007	8.26		

Sources: EPA (average of the four quarters of each year). INE

3.1 The Spanish Economic Miracle at the Beginning of the Twenty-First Century

At the beginning of the twenty-first century, the evolution of the Spanish economy must be framed in a context of worldwide prosperity, high economic growth, and price stability. Before the Great Recession, the Spanish economy had been one of the fastest growing and most successful economies in Europe (Royo 2009). The Spanish economy went through an uninterrupted expansion from 1993 to 2008. The expansion was more vigorous than in other advanced economies. The real output increased by 58 % in Spain between 1995 and early 2008 (Fernández-Villaverde and Ohanian 2009). For example, Spain's GDP grew at an average rate of 3.6 % from 2000 to 2007, 1.4 % higher than the EU-15 average. Growth was more moderate in terms of GDP per capita, as the population was growing at a fast rate, the result of a notable increase in immigration (Myro 2010), but in any case, Fig. 2 shows the expansive phase of the Spanish economy in per capita terms.

The successful performance of the Spanish economy was shown in the first paragraphs of the diagnosis and challenges of *The Spanish National Reform Program on Convergence and Employment* in 2005 (OEP 2005, p. 13): "The Spanish economy is currently demonstrating a high rate of GDP growth, three times the European average, while the unemployment has dropped below 10 % for the first time since 1979. The dynamism of the Spanish economy is not new. The growth

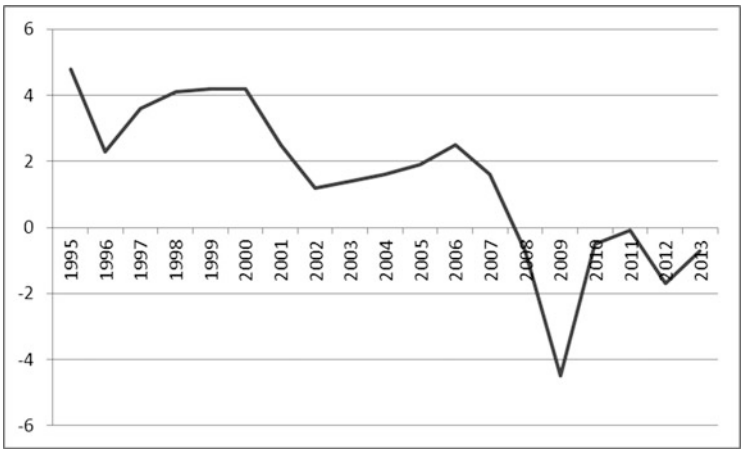

Fig. 2 Evolution of the growth rate of real GDP per capita in Spain (1995–2013)

in the country's GDP has been consistently above European levels with a mean differential of close to 1.4 % percentage points since 1996."

According to Table 6, the analysis of the Spanish employment rates was conclusive in those years: "Since the mid '90s until 2007, the Spanish economy experienced a very strong job creation, allowing the employment rate to increase by about 20 percentage points. Starting from the last position among the EU-15's countries, Spain converged to the EU-15 average employment rate, surpassing Italy, catching up with France and cutting the distance to countries like UK, Germany or Finland" (Felgueroso and Jiménez-Martin 2009, p. 2).

However, the period of prosperity in Spain gave rise to several basic imbalances which made it especially vulnerable to the international financial crisis when it clearly broke in 2008 (Fernández-Villaverde and Ohanian 2009; Felgueroso and Jiménez-Martin 2009; Myro 2010; Royo 2009). For example, during the long period of prosperity at the beginning of the twenty-first century, Spain experienced a large construction boom and a bubble in the real estate market (Fernández-Villaverde and Ohanian 2009). In fact, the Spanish economy was specialized in a growth model where the construction sector was a fundamental one. The disproportionate prominence of the housing construction sector in the GDP can be explained by three factors: the existence of low interest rates, easy access to financing (the financial entities themselves encouraged and stimulated family debt), and confidence in the permanent revaluation of property (Myro 2010).

Moreover, the Spanish economy suffered a current account balance deficit. At the end of 2007, this reached 10 % of the GDP, brought about exclusively by the strength of private demand, given that the public administrations acted in a countercyclical manner in order to control the inflationary trends that were appearing.

During the growth period, political credit cycles allowed large inflows of capital and the abandonment of economic reforms in Spain, and, according to this

argument, Fernández-Villaverde et al. (2013) explain that the reform reversal and institutional deterioration suffered by the Spanish economy made worse the negative consequences for growth with the Great Recession.

3.2 The Economic Crisis in Spain Since 2008

As with the majority of the countries which make up the world economy, in 2008, Spain entered a deep economic recession which threatened to significantly reduce its GDP. The Great Recession has affected the entire world economy, but the growth of unemployment has been much more intense in some countries that had real estate bubbles. This was the case of Spain, among others.

Following the general trend of developed countries, Spain entered a deep recession in 2008 (Caballero 2010) (Table 5). Moreover, the increase in house prices had created a bubble which was estimated at around 25 % of existing prices in 2005. But in the spring of 2008, the cycle changed in Spain, and the large rally in housing prices was definitively replaced by falls in prices, a high number of foreclosures, and increasing difficulties in those financial institutions that had heavily engaged in real estate lending (Fernández-Villaverde and Ohanian 2009). There was a sharp adjustment of house-building activity, and Spain's GDP only grew by 0.9 % in 2008 as a result of the effect of contraction worldwide and the national economic issues.

After almost a decade of vigorous growth, since the end of 2008, the Spanish economy has fallen into a deep crisis, with only a slight and temporary recovery in 2010–2011. The macroeconomic landscape has largely deteriorated, and the growth rate of the Spanish gross domestic product (GDP) was negative in 2009, 2010, 2012, and 2013 (Table 5). This state of affairs depicted a situation of huge economic crisis and extended to the whole Spanish economy, including the banking, industry, and service sectors. Therefore, Spain has been suffering the effects of two painful economic recessions, and the decline in economic activity was also evident in other indexes: electricity consumption, cement consumption, fuel consumption, the number of licenses granted for the building of new homes, overnight hotel stays, etc., with high levels of interannual falls.

The widespread fall in Spain's economic activity in the Great Recession was transmitted to the employment market (Table 6). Job destruction in annual terms intensified, and the unemployment rate was growing over the 26 % mark. This was the highest level of unemployment in all of the advanced economies around the world in the Great Recession. This implied a widespread drop in consumption, while it also has had repercussions on family saving.

Traditionally, the inflation rate in Spain has been high (even reaching rates of over 4 % in 2008) and always above eurozone country averages. However, in the present crisis context, an important and surprisingly rapid aspect of Spain's economic adjustment process is the steep reduction in inflation experienced in Spain. This adjustment in the evolution of prices was a direct consequence of the economic recession and the imbalances that existed in the Spanish economy. The moderation

of consumer prices is a natural reaction in the face of a fall in demand and agents' expectations. In the specific case of the Spanish economy, the drop in consumption, rapid job destruction, and the excess of installed industrial capacity explain the rapid drop in inflation (Caballero et al. 2010).

4 Political and Institutional Effects of the Great Recession in Spain

The Great Recession has implied a deep economic crisis in Spain, and this has had relevant effects on the political and institutional situation of Spanish society. This section shows some of these effects that affect the institutional equilibrium that has existed in Spain since the political transition.

The Spanish economic downturn since 2008 has implied a growing political dissatisfaction and the perception of politics as a problem, and several social movements have emerged to demand a political and electoral change (e.g., the 15-M Movement) or to react against some effects of the economic crisis (e.g., the evictions due to the mortgage law). Moreover, the new situation has been reflected in electoral politics. Firstly, in the 2011 national general elections, the party in the government (Socialist Party, PSOE) has suffered its worst result in democracy. Secondly, a new far-left political party (*Podemos*) was created in 2014, and it received over 1,200,000 votes in the 2014 European Parliament election. Furthermore, the empirical analysis reveals the procyclicality of political situations and trust in Spain. We are going to review the results of a previous analysis about the effects of the crisis on the Spanish political situation, and we present new empirical evidence and an original modeling analysis about the effects of unemployment on political trust. This way, the economic crisis explains the growing political dissatisfaction and the decline of political trust in Spain.

4.1 Politics Perceived as a Problem, Dissatisfaction, and Social Movements

According to the surveys of the Spanish Center of Sociological Research, the percentage of Spaniards that consider "politics, politicians and political parties" one of the three most serious problems of Spain has considerably grown in recent years. In fact, politics has been perceived as a big problem with the crisis, especially since the end of 2009, and this trend achieves a maximum in March 2013, when 31.4 % of respondents consider politics one of the main problems of Spain. Unemployment, economic problems, and corruption have been the only three problems that have been perceived as more serious problems than the quality of politics in Spain.

When policymaking is not able to give a solution to the big economic problems of a country and society perceives the decline of the quality of life of citizens, then citizens tend to punish the assessment of political institutions and politics. This seems to have occurred when the Spanish economic crisis implied a change in the welfare level of the citizens. Moreover, while the risk premium for the Spanish sovereign debt was high after the onset of the crisis, the government turned to cuts in public spending, focusing on public service, health and education programs, and unemployment benefits, among others. All these restrictive political measures have notably affected the welfare perceptions and political attitudes of Spanish society.

This bleak picture is a constant threat to social cohesion and undermines the institutional basis of the Spanish economy profoundly. By way of this, assessment of the political situation has sharply fallen in Spain, and several social movements and general strikes have shown how political institutions have greatly dissatisfied society. We can present several examples of this: Firstly, there were three general strikes from 2010 to 2012 in Spain, and this level of social protest is really very high if we take into account that there had been four general strikes from 1978 to 2012. Secondly, there have been a large number of social pacific protests organized by civilian platforms such as the 15-M Movement or *Indignados*. The 15-M Movement occupied one of the Madrid main squares (Puerta del Sol) since May 15, 2011. Most participants identified with the ideological left but were not satisfied with the traditional political parties, and they wanted to change the electoral and political rules, eliminate political corruption, reduce the power of banks and bankers, and limit financial markets (Likki 2012; Calvo et al. 2012). Moreover, other social protest platforms related to the problems of eviction and the default of preferential financial shares were appearing.

4.2 Elections and the Appearance of a New Far-Left Political Party

The Socialist Party (PSOE) was governing in Spain since 2004, and it was in power when the Great Recession arrived in Spain in 2008. At the beginning of the crisis, the government tried to deny the existence of a crisis, and it did not adopt a plan to prevent a deep depression. At the end of 2008, the Spanish government implemented an economic stimulus plan, but it did not prevent the crisis. The increase in public spending caused by automatic stabilizers, along with the decrease in tax revenues and the bailout of the Spanish economy, put public finances at stake, and the European Union imposed a change of the Spanish economic policy in the spring of 2010. The Spanish citizens perceived that the economic policy of the socialist government was not a success.

In 2011 there was a general election, and the Socialist Party had its worst result since the democratic transition. On the other hand, the Popular Party (PP) achieved an absolute majority in Congress, and a change of president took place.

Table 7 The results of the 2014 European Parliament election in Spain

Political party	Number of votes	Percentage of votes	Number of elected members of European Parliament in Spain
PP	4,074,363	26.06 %	16
PSOE	3,596,324	23.00 %	14
Izquierda Plural	1,562,567	9.99 %	6
Podemos	1,245,948	7.97 %	5
UPyD	1,015,994	6.50 %	4
CEU	850,690	5.44 %	3
EPDD	629,071	4.02 %	2
C's	495,114	3.16 %	2
LPD	324,534	2.07 %	1
Primavera Europea	299,884	1.91 %	1

Nevertheless, the support for the new government has fallen since 2011, according to the electoral surveys, and the Socialist Party did not electorally recover. In fact, some analysts have emphasized the decline of bipartisanship in Spain.

This electoral trend of the fall of the Spanish bipartisanship has been corroborated by the results of the 2014 European Parliament election. In this election, the electoral support of the two main political parties (PP, PSOE) has been substantially reduced, and a new far-left political party (*Podemos*) appeared (Table 7). *Podemos* was created some months before the elections, and it did not have a traditional electoral campaign. Its campaign was based on social networks and the popularity of its leader as a participant in TV political debates. *Podemos* propels a political breakup with the existing institutional equilibrium, and it is an heir of the 15-M Movement ("Movimiento 15-M"). It received over 1,200,000 votes in the European election, and the post-electoral surveys are confirming that its number of voters would grow in the next elections. This new political party is challenging the existing political bipartisanship, and it would like to change the Spanish Constitution.

4.3 The Deterioration of the Political Situation Over the Business Cycle

It is of evident interest to understand and assess the effect of the economic crisis on the political situation in Spain. However, in spite of this interest, there has not been too much empirical research on this topic until now. In order to shed some light, Álvarez-Díaz et al. (2015) have studied whether the business cycle had a statistically significant impact on the evolution of the political situation in Spain from 1992 to 2012. They also quantified such impact, designing an econometric time series model.

This analysis begins by assuming that the political situation in Spain can be represented by the unemployment rate according to the following general expression:

$$PS_t = \beta_0 + \beta_1 \cdot U_t + \beta_2 \cdot E_t + \varepsilon_t \quad \forall t = 1, \ldots, T \tag{1}$$

where a linear functional form is assumed, and the β parameters reflect the impact of the explanatory variables on the explained variable. *PS* is the explained variable and represents the political situation in Spain. The data necessary to construct this proxy were taken from the surveys conducted by the Spanish Sociological Research Center (CIS). Specifically, this variable was built based on the proportion of interviewers who answer that they assess the political situation in Spain as "good" or "very good." The variable *U* is the unemployment rate, which is assumed to be a good measure of the business cycle (Stevenson and Wolfers 2011). The data for unemployment were obtained from the Labor Force Survey (EPA), which is performed by the Spanish National Statistics Institute (INE). *E* is a dummy variable that takes the value one when a general election is held in Spain. As usual, ε is the disturbance term, which is assumed to be an independent and identically distributed random variable. This modeling exercise used quarterly data, and the sample covered the period from 1992:Q2 to 2012:Q3. This length of time provides a detailed description of the business cycle in Spain, as it covers a period of economic booms and busts. This fact is described in Fig. 3, where the temporal evolution of the variables is shown.

In order to avoid a problem of spurious relationships, the first step followed was to research whether there was a long-run causal relationship between the variables *Political Situation* and *Unemployment*. Therefore, it was necessary to check whether the variables *PS* and *U* are cointegrated, that is to say, if there was a long-run causal effect of the variable *U* on *PS*; otherwise, the estimation of the model represented in Eq. (1) could yield spurious results. There are different methods to carry out a

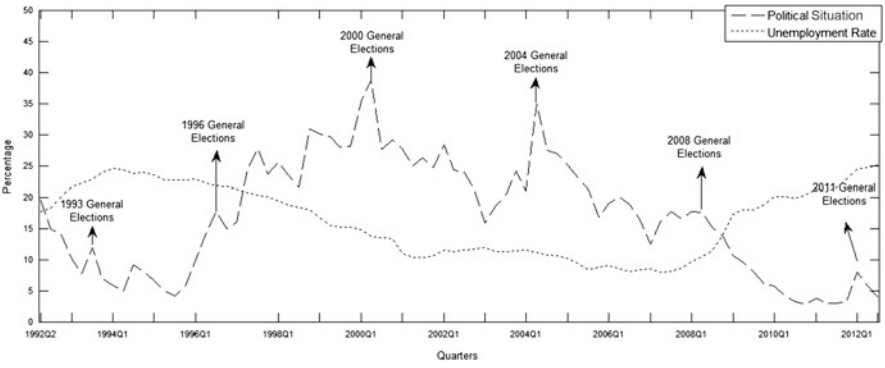

Fig. 3 Time evolution of political situation and unemployment rate. *Source*: Álvarez-Díaz et al. (2015)

cointegration analysis, such as the two-step residual-based procedure of Engle and Granger (1987) or the Johansen's rank regression technique. However, Álvarez-Díaz et al. (2015) used the ARDL bounds testing approach (Pesaran et al. 2001). This approach is based on the Wald or F-statistic in a generalized Dickey–Fuller type regression and is used to test the significance of lagged levels of the variables in a *Conditional Unrestricted Equilibrium Correction Model* (UECM) (Pesaran et al. 2001). This approach has numerous advantages that justify its use to detect long-run relationships instead of the other procedures (Pesaran and Shin 1999; Pesaran et al. 2001). The ARDL bounds testing approach to cointegration revealed that the variable *Unemployment* was an influencing factor of the *Political Situation* in the long run. Therefore, it seems that there is a causal relationship, and non-chance relationship, between the business cycle, approximated by the unemployment rate, and the political situation in Spain over the period considered in the study. As long as this relationship was statistically discovered, the next step was to model it. Following the modeling procedure explained in Pesaran et al. (2001), Álvarez-Díaz et al. (2015) assumed that the *Error Correction Model* (ECM) associated with the long-run relationship represented in Eq. (1) could be determined as

$$\Delta PS_t = \gamma_0 + \sum_{i=1}^{p-1} \gamma_i \cdot \Delta PS_{t-i} + \sum_{j=0}^{p-1} \mu_j \cdot \Delta U_{t-j} + \phi \cdot ECT_{t-1} + \omega_t \qquad (2)$$

where ω_t is the disturbance terms and ECT_t is the error correction term defined as

$$ECT_t = y_t - \widehat{\beta}_0 - \widehat{\beta}_1 \cdot U_t - \widehat{\beta}_2 \cdot E_t \qquad (3)$$

The symbol Δ is the first-difference operator, the μ_j coefficients reflect the short-run effects, and the ϕ parameter describes the speed of the adjustment back from any deviation from the long-run equilibrium. If the estimate of this parameter is negative and statistically significant, then the estimated coefficients $\widehat{\beta}_1$ and $\widehat{\beta}_2$ in Eq. (1) can be assumed to be good approximations of the long-run impact of the explanatory variables on the variable *Political Situation*. In this case, the estimated coefficient for ϕ was -0.1 and was statistically significant at a 10 % level. The estimated value of this coefficient implies that the speed of adjustment to the long-run equilibrium after a shock is approximately 10 quarters. Moreover, the regression fits reasonably well and passes the diagnostic tests against autocorrelation and heteroskedasticity. It seems, therefore, that the estimated coefficients $\widehat{\beta}_1$ and $\widehat{\beta}_2$ are adequate to assess the impact of the variables U and E on PS. Table 8 shows the estimated coefficients of the long-run equation represented in Eq. (1). According to these estimates, an increase of 1 % in the unemployment rate will imply a reduction of 1.01 % in the assessment of the political situation perceived by citizens. Additionally, the assessment of the political situation improves by 5.52 % when general elections are held in Spain.

In summary, the empirical findings obtained by these authors seem to support the academic literature that claims that the current economic crisis has negatively

Table 8 Point and bootstrap interval estimation of the long-run parameters

Variable	Estimated coefficients	*p*-Value	Bootstrap interval estimation
Intercept	32.99	0.00	(28.94, 37.18)
U	−1.01	0.00	(−1.25, −0.77)
E	5.52	0.08	(0.62, 10.88)

Note: The bootstrap confidence interval is constructed using the accelerated bias-corrected method considering 10,000 replications and a confidence interval of 90 %. *Source*: Álvarez-Díaz et al. (2015)

affected the perception that citizens have of the institutions and, in particular, of the political situation (Álvarez-Díaz et al. 2015).

4.4 The Decline of Political Trust: New Empirical Evidence

The evolution of trust in government and political institutions in recent years has been studied in different countries. Maintaining a good performance of the political, social, and economic system requires a certain level of trust, but the world economic crisis is undermining political trust in national governments and politics. People tend to trust in governments that are able to generate economic growth and create jobs (Fiorina 1978; Mackuen et al. 1992; Roth et al. 2011), so it follows that a high level of unemployment would imply a lower assessment of the political institutions and, consequently, a sharp decline of trust in political institutions.

In this subsection, we are going to analyze the procyclicality of political trust in Spain. We assume that *Political Trust* can be correctly represented by the following *Autoregressive Distributed Lag* (ARDL) model:

$$PT_t = \alpha + \delta \cdot T + \sum_{j=0}^{q} \beta_j \cdot U_{t-j} + \sum_{j=1}^{q} \lambda_j \cdot PT_{t-j} + \theta \cdot E_t + \varepsilon_t \qquad (4)$$

The variable *PT* is a measure of the political trust in Spain offered by the Spanish Sociological Research Center (CIS).[7] On the right-hand side of expression (4), the variable *U* represents the number of registered unemployed, which is used as a proxy for the business cycle. The data for this variable were obtained from the Spanish National Statistics Institute (INE). Both *PT* and *U* were taken in logarithms to reduce the variability, and the variable *U* was seasonally adjusted to control the seasonality. Following Álvarez-Díaz et al. (2015), the authors decided also to include a dummy variable *E* that takes the value 1 when a general election is held in

[7]These data can be downloaded from www.cis.es/cis/opencms/ES/11_barometros/Indicadores_PI/gobierno.html.

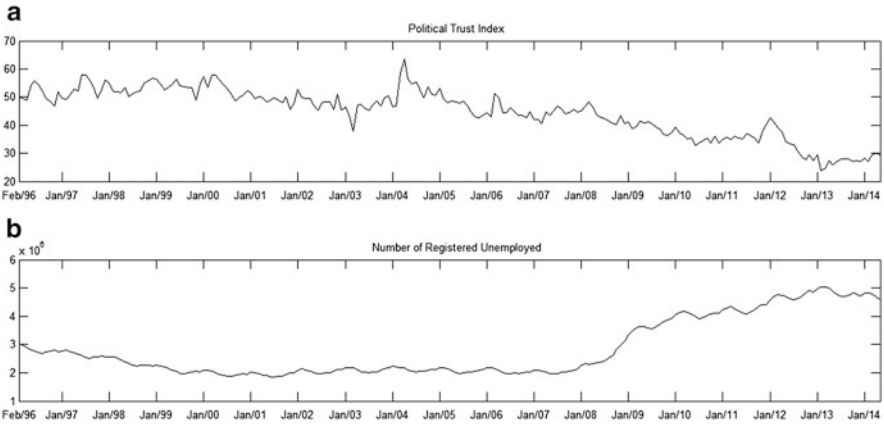

Fig. 4 Time evolution of political trust and registered unemployment

Spain. Figure 4 depicts the time evolution of these variables. Finally, T is collecting the trend and ε is the disturbance term of the model.

The sample covers the period from February 1996 to May 2014, and the periodicity of the data is monthly. There are basically two reasons that justify the use of monthly data instead of annual or quarterly data. The first one is that the use of monthly data can be more useful for political consultants, campaign managers, and pollsters. The second reason is that it is possible to get more accurate and consistent estimates with monthly data because it is possible to have a larger amount of observations.

From the ARDL model represented in Eq. (4), the authors derived the *Unrestricted Error Correction Model* (UECM) by means of a simple reparameterization

$$\Delta PT_t = \alpha + \delta \cdot T + \sum_{j=1}^{q-1} \alpha_j \cdot \Delta PT_{t-j} + \sum_{j=0}^{q-1} \gamma_j \cdot \Delta U_{t-j} + \phi \cdot PT_{t-1} + \vartheta \cdot U_{t-1} + \eta \cdot E_t + \varepsilon_t \tag{5}$$

where Δ is the first-difference operator, T is the trend, and ε_t is assumed to be a white noise error term. ϕ and ϑ are the parameters that reflect the long-run relationship. In turn, α_j and γ_j represent the short-run dynamics of the model. The great advantage of using this UECM is that it is possible to reach two goals. The first one is that it can be used to study whether there is a significant long-run relationship between the dependent variable PT and the explanatory variable U using the bounds testing approach to cointegration (Pesaran et al. 2001). Second, if a long-run relationship is found, then the UECM can be employed to represent properly such a relationship (Laurenceson and Chai 2003). Regarding the first goal, the ARDL bounds testing approach to cointegration showed that the variables PT

Table 9 Long-run estimated coefficients, statistical significance, and diagnostic tests

Variable	Estimated coefficients		*p*-Value	
Intercept	1.66		0.00	
Trend	−0.0004		0.00	
PT_{t-1}	−0.21		0.00	
U_{t-1}	−0.05		0.00	
E_t	0.08		0.07	
Diagnostic test				
			Value	*p*-Value
Adjusted -R^2			0.15	–
Autocorrelation	LM test	LM(1)	0.022	0.88
		LM(12)	0.34	0.98
Heteroskedasticity	Breusch–Pagan–Godfrey test		1.09	0.37
Misspecification	Ramsey's RESET test		1.81	0.16

and *U* had a long-run relationship. Specifically, this method provides statistical evidence that these variables are cointegrated, and, therefore, it is possible to affirm that the business cycle had a statistical causal effect on the political trust in Spain. Table 9 shows the long-run estimated coefficients of the UECM represented in Eq. (5).

The estimation of this model verifies that (a) the estimated long-run coefficients are statistically significant and show a sign coherent with prior expectations and (b) it does not exhibit any problems of autocorrelation, heteroskedasticity, or misspecification. Given that the estimated model satisfies these requirements, then the estimated coefficients $\widehat{\vartheta}$, $\widehat{\mu}$, and $\widehat{\phi}$ can be used to assess the long-run effects of the variables *U* and *E* on *PT* by using the expressions (Bardsen 1989)

$$\widehat{\gamma}_U = -\frac{\widehat{\vartheta}}{\widehat{\phi}} \tag{6}$$

for the estimation of the effect of the variable *U* and

$$\widehat{\gamma}_E = -\frac{\widehat{\mu}}{\widehat{\phi}} \tag{7}$$

so as to assess the impact of the variable *E*. Table 10 shows the estimates of the long run of these variables on *PT*. The estimated long-run effect of the variable *U* on *PT* ($\widehat{\gamma}_U$) tells us that an increase of 1 % in the number of registered unemployed will imply a decrease of 0.26 % in the political trust of the citizens. In turn, when a general election is held in Spain in a specific month, then the political trust will experience a growth of 0.37 % that month. The variability and statistical significance of these point estimates are evaluated by using bootstrap confidence intervals. Table 10 also reports the bootstrap confidence intervals for each effect. In

Table 10 Point and bootstrap interval estimation of the long-run effects

Variable	Estimated coefficients	Bootstrap confidence interval
$\widehat{\gamma}_U$	−0.26	(−0.40, −0.10)
$\widehat{\gamma}_E$	0.37	(0.01, 0.86)

Note: The bootstrap confidence interval is constructed using the accelerated bias-corrected method considering 10,000 replications and a confidence interval of 90 %

all cases, the intervals do not cover the zero value. This result implies that there seem to be strong statistical arguments that the estimated effects are statistically different from zero at the 10 % level of significance.

The results reported in this subsection corroborate and strengthen the findings obtained in Álvarez-Díaz et al. (2015) because it seems that the business cycle has a significant effect on the perception that citizens have about the Spanish political situation and on the level of political trust.

5 Concluding Remarks

This chapter presents an analysis of the process of institutional change in Spain from Francoism to democracy. We have answered a set of relevant questions on the relationship between institutions, politics, and economics: How was the path of institutional change in the contemporary Spanish economic history? What was the process of institutional change inside Francoism? Did the Spanish political transition imply a change of the rules of the game? Was there a change of institutional equilibrium? What is the institutional equilibrium on which the Spanish economy is working in the democratic stage? Is the Great Recession affecting this institutional equilibrium? Which are the political and institutional effects of the Great Recession?

The analysis of this chapter has adopted a historical, dynamic, and institutional approach that has incorporated the answers to these questions. This contribution provides the following arguments on the Spanish experience, among others:

1. The institutional equilibrium that emerged after the Spanish Civil War in Spain implied a predatory state in self-enforcing institutions, but those institutions would be self-destructing institutions in the long run.
2. When the dictator died, a new institutional framework was established through the political transition that allowed the approval of the 1978 Spanish Constitution. The new political framework implied a contractual state and a democratic system. This new equilibrium implied self-enforcing institutions in the short run and self-reinforcing institutions in the long run.
3. After almost a decade of vigorous growth, since the end of 2008, the Spanish economy has fallen into a deep crisis. The macroeconomic landscape has largely deteriorated, and the growth rate of the Spanish GDP was negative in 2009, 2010,

2012, and 2013. This state of affairs depicted a situation of huge economic crisis that included two economic recessions.

4. The Spanish economic downturn has implied a growing political dissatisfaction and the perception of politics as a problem, and several social movements have emerged to demand a political and electoral change (e.g., the 15-M Movement) or to react against some effects of the economic crisis (e.g., the evictions derived of the mortgage law). Moreover, there were three general strikes between 2010 and 2012.
5. According to the existing estimates on the evolution of political situation over the business cycle, an increase of 1 % in the unemployment rate has implied a reduction of 1.01 % in the assessment of the political situation perceived by citizens four quarters later in Spain. Additionally, the assessment of the political situation improves by 5.52 % when general elections are held in Spain.
6. Moreover, this essay has provided a new empirical analysis on the decline of political trust in Spain. This analysis corroborates the previous results on the relevance of the business cycle to explain political attitudes. Our estimates conclude that an increase of 1 % in the number of registered unemployed will imply a decrease of 0.26 % in the political trust of the Spanish citizens. In turn, when a general election is held in Spain in a specific month, then the political trust will experience a growth of 0.37 % that month.
7. Moreover, we have pointed out that the social and economic situation in Spain has affected electoral politics, and the 2011 general election and the 2014 European Parliament election have shown some changes in the electoral scenario. For example, in the 2014 European election, the electoral support of the two main political parties (PP, PSOE) has substantially fallen, and a new far-left political party (Podemos) has appeared. *Podemos* is an heir of the 15-M Movement, and it received over 1,200,000 votes in the European election in Spain. The post-electoral surveys are confirming that its number of voters would grow in the next elections. This new political party is challenging the existing political bipartisanship, and it would like to change the Spanish Constitution. It represents a new political actor that propels a political breakup with the existing institutional equilibrium.

This analytical narrative explains the dynamics of change of institutional equilibrium in Spain and presents empirical evidence to understand whether the existing economic crisis can imply a change of institutional equilibrium in the next future. The research agenda is open, and it includes institutional, political, economic, and social elements. New interdisciplinary efforts are required to advance in this research agenda that studies a key issue for the future of the Spanish society and economy.

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Institutional Determinants: A Case Study of IMF Programme and Non-programme Countries

Omer Javed

1 Introduction

During the last three decades or so, many countries have been under an IMF (International Monetary Fund) programme at one point or the other. Out of 188 IMF member countries,[1] 129 have utilized IMF resources at least at once during 1980–2009. These countries are called the "programme countries." Programme countries can then be classified into "prolonged users"[2] (44 members) and "non-prolonged users"[3] (85 members). Moreover, there are 59 "non-programme countries."[4]

Literature review indicates at most a neutral impact of IMF programmes on economic growth of the recipient countries (IEO 2007; Bird and Willett 2004). Moreover, IMF has also made note of this criticism by initiating an in-house discussion in this regard (IEO 2007). Many authors including Kuncic (2014) have asked IMF to revisit the underlying basis of its programmes and to move away from

[1]Complete list at: https://www.imf.org/external/np/sec/memdir/memdate.htm.

[2]Prolonged users are those countries that have been in an IMF programme for 7 or more years in a 10-year time period (Independent Evaluation Office 2002, pp. 9 and 24).

[3]The author, following the definition of prolonged users by IEO, defines non-prolonged users as those IMF member countries who during a 10-year time period remained under an IMF programme, but for less than 7 years.

[4]The author classifies IMF member countries that have not been in an IMF programme during 1980–2009 as nonprogramme countries.

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the approach of neoclassical school of economic thought, which marginalizes the role of institutions by assuming a world with zero-transaction cost.[5]

The research of new institutional economics (NIE) on the other hand has pointed out that countries which have focused on improving institutional quality have had positive consequences for economic growth. This is because enhancement of institutional quality leads to curtailing costs,[6] improving protection of private property rights,[7] etc. that in turn leads to greater innovation, investment and economic growth. Furthermore, Ugur (2010) based on his analysis of empirical research (conducted between 1995 and 2004) pointed out that not only there existed a relationship between economic growth and institutional quality, but some of the studies analysed indicated the direction of causation from institutions to economic growth (Ugur 2010, p. 16). Kuncic (2014), among others, therefore suggested that the framework of NIE be adopted.

Given the overall importance laid done in literature on enhancing institutional quality for improving economic growth outcome, focus seems to be either too little or altogether missing in IMF programmes, which have not targeted determinants of institutional quality as such. On the contrary, research indicated that IMF programmes concentrated heavily on squeezing the demand side of the economy of programme countries for achieving macroeconomic stability, but such a thrust was not matched by a supporting set of policies on the supply side (e.g. in improving institutional quality) that safeguarded against a negative fallout on economic growth (another goal of IMF) of these countries of such a demand side squeeze (Haque and Khan 1998; Bird 2001, 2007; Arpac et al. 2008).

Motivated by the background highlighted above, the chapter therefore, will make an attempt to identify the important determinants of institutional quality—both political and economic—(PIQ and EIQ, respectively) within the overall framework of NIE. The focus will be on finding the significant determinants in the case of non-programme countries and programme countries. The reason behind such a breakdown of countries is the presumed level of difference in economic development that leads to some member countries, as against others, asking for IMF's support. Such a difference in the economic outlook induces, therefore, to explore significant institutional determinants that are more context specific to a particular set of countries. Moreover, in doing the above, it is hoped that the current study will augment IMF programmes. Lastly, the study focuses on a time period of 1980–2009, representing a time duration of increasing number of IMF programmes.

[5]Costs involved included (among others) costs associated with collecting and analysing information and also for enforcement (Dahlman 1979, p. 148).

[6]These are costs associated with transactions due to underlying information asymmetries, and the fact that individuals have varied perceptions about the working of the world, institutions reduces such costs (Harriss et al. 1995; North 1994, p. 17).

[7]Eggertsson (1996, p. 7) indicates that in Institutional Economics, property rights meant the right of actors (in an economy) to employ or use their assets (Alchian 1965).

The study unravels as follows: review of important literature is at Sect. 2, methodological and data discussion is at Sect. 3, while Sect. 4 takes up discussion on estimation and results; conclusion is in the last section.

2 Literature Review

According to Barro and Lee (2005), while the role envisioned in the Bretton Woods in 1944 for IMF was to provide short-term financing for exchange rate stability, but after the breakdown of the Bretton Woods system (of an exchange rate system related with par value) in 1973, its role assumed a new dimension in the shape of providing (technical and) financial support to countries in economic/financial crisis. The lending windows primarily included the Standby Arrangements, Extended Fund Facility and Structural Adjustment Facility (SAF), which transformed into Enhanced SAF and subsequently became Poverty Reduction and Growth Facility (Butkiewicz and Yanikkaya 2005).

As the scope of lending evolved and enhanced, the number of countries making use of IMF resources also multiplied. Moreover, programme countries included many developing countries with only a few exceptions that did not borrow from IMF even at least once since 1970 (Barro and Lee 2005). A number of countries thereafter became prolonged users of IMF resources, and this group enlarged over time (IEO 2002), raising in turn the question of moral hazard—whether recipient countries have become irresponsible given the apparent ease at which assistance has been made available by IMF on a continued basis (Evrensel 2002).

There is, however, mixed evidence on the effectiveness of IMF programmes, especially in terms of its impact on economic growth performance of recipient countries. The main criticism thus far has been that IMF programmes have remained rigid and one size fits all, rather than being more country specific, with the main suggestion in literature being that IMF needed to revisit its programme framework (Buira 1983; Bird 2001, 2007; Stiglitz 2001; Vreeland 2006; Abbott et al. 2010). This programme inflexibility, therefore, contributed to weak economic growth (which mostly remained either negative or neutral), especially for the developing countries (Abbott et al. 2010). In general, compared to countries that were not in IMF programmes, programme countries had a greater public sector and acuter macroeconomic imbalances, including current account deficits, and also overall lower levels of income (Joyce 1992).

Moreover, NIE continues to remain critical of the neoclassical underlying basis of IMF programmes, which assumes a world of zero-transaction costs. It appears that this underlying thinking has not allowed IMF programmes to enlarge their scope and focus on institutional quality determinants. Hence, they have emphasized mainly the demand side variables of the economies of recipient countries. The same lack of focus has been witnessed in the way IMF evaluated the success of its programmes, where it did not gauge the impact of programmes on factors that improved the quality of institutions (Nsouli et al. 2004). IMF programmes,

therefore, need to internalize the political economic context specific to a particular recipient country while making an assessment about the extent of successful programme implementation in that country (Arpac et al. 2008).

The emphasis placed on institutions for the overall working of the economy could be traced in time in the writings of Smith (1976), with the same reflected in the works of major thinkers like Mill (1861) and Myrdal (1968), among others. Unfortunately, such an emphasis remained only limited in the writings of few thinkers, as is evident from insignificant importance given to institutions in the overall neoclassical economic thinking (Ugur 2010). Rodrik (2000) indicated that the role of institutions started to assume greater prominence around the 1980s, at the back of increasing realization that institutions allocated resources in a way that resulted in greater innovation and higher production (Shirley 2008).

So what are institutions, and how do they differ from organizations? A framework of rules and regulations created by humans to govern, constrain and shape the way they interact is called institutions (North 1990, p. 3; Lin and Nugent 1995, pp. 2306–2307). Institutions are called formal institutions when they are in the shape of written rules and informal institutions when they are the unwritten conventions (North 1990, pp. 4, 37 and 47). Here, it appears pertinent to indicate that institutional change overall happens as a consequence of positive variation in learning that is internal to a society and the one that happens externally (North 1994, p. 5). Moreover, while institutions provide rules for a game, organizations consist of the players of that game and evolve through mutual interaction (North 1990, pp. 4 and 5). Furthermore, institutions mainly exist as political and economic institutions (IMF 2005; Joskow 2008; Kuncic 2014) and act either in an inclusive or extractive way[8] (Acemoglu 2006; Acemoglu and Robinson 2008; Acemoglu and Robinson 2012, pp. 74–82).

Studies like the ones by Hall and Jones (1999) and by Rodrik et al. (2002) surveyed literature and indicated that there existed a large amount of empirical research that highlighted that improvement in institutional quality positively impacted economic growth. For example, both Afonso and Jalles (2011) and Acemoglu and Johnson (2005, p. 953) indicated that improvement in institutional quality determinants, like protection of private property, resulted in an increase in per capita income. Similarly, Rodrik et al. (2002) and Rodrik (2007) indicated that most cross-section regression analyses pointed out that variables that enhanced institutional quality, as against trade or geography, were more correlated with economic growth. Also, Easterly (2002) found little consequence of variables like technological innovation (which are otherwise traditionally considered crucial) on economic growth. Moreover, Aron (2000) pointed towards a number of studies

[8]An inclusive institution creates an environment, which adopts participatory approach and enhances inclusion by improving upon institutional determinants like protection of property rights. Institutions, on the other hand, work in an extractive way by creating an environment that results in resource transfer from one to another group. Also, either of the two environments is an outcome of collusion between the political and economic institutions (Acemoglu and Robinson 2012, pp. 74–82).

that showed significant correlation between economic development measures and institutional quality variables (Shirley 2008, p. 626).

3 Data and Methodology

3.1 Theoretical Design

The setting of the current study is the framework of NIE. According to this framework, institutions play a seminal role in reducing transaction costs[9] and in doing that positively impact economic exchange (Coase 1992, p. 197). This, in turn, means that as institutional change takes place in a constructive way (or in other words as institutional quality improves), economic growth is affected by such a change in a positive way.

The current study, therefore, explores the determinants of both political and economic institutional qualities (on lines similar to IMF 2005).

3.2 Sample

The current study focuses on IMF's programme and non-programme countries, during a period of 1980–2009.

3.3 Data and Variable Description

Based on literature review, **political/governance-related variables** include (1) aggregate governance index (calculated by taking a simple average of World Governance Indicators (WGI; World Bank),[10] produced by Kaufmann et al. (2010)) [11] and (2) military (a military officer is chief executive or not) from the Database of Political Institutions.[12] **Economic variables**, on the other hand, include (1) KOF

[9]Traders reduce costs related to personal exchange privately (Williamson 1985), but state intervention is required to lower cost-related exchange that is impersonal in nature (Milgrom et al. 1990).

[10]http://data.worldbank.org/data-catalog/worldwide-governance-indicators.

[11]http://info.worldbank.org/governance/wgi/index.aspx#home.

[12]http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20649465~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html.

index of globalization[13] and three measures of economic freedom (Index of Economic Freedom produced The Heritage Foundation/Wall Street Journal[14]) with regard to (2) investment freedom, (3) monetary freedom, (4) property rights and, lastly, (5) real GDP, where GDP at constant 2005 US$ has been taken from World Development Indicators[15].

While the above indicates independent variables, the dependent variables are (1) economic and (2) political institutional quality. Economic institutional quality has been estimated by the proxy of economic freedom index (EFI) and is produced by the Cato Institute,[16] which has also been employed by IMF (2005). The coverage of EFI includes government size, legal framework, property rights, monetary and external sectors and credit and labour markets. Previous studies have also employed proxies like freedom of the press, economic environment (Freedom House) and investment profile (International Country Risk Guide, ICRG). On the other hand, Polity II (from the Polity IV dataset of Marshall et al. 2011) has been taken as the proxy of political institutional quality[17] and covers political dynamics.[18] Other proxy variables for political institutional quality employed by previous studies, include, corruption perception index (Transparency International) and democratic accountability (ICRG).

At the same time, based on literature review, explanatory variables that are expected to be suffering from the problem of endogeneity, for overall institutional quality, include aggregate governance index, monetary freedom, property rights and real GDP, while KOF index of globalization and investment freedom only in the case of economic institutional quality.

3.4 Econometric Methodology

The following functional form gives insight about the model:

$$\mathrm{IQ}_{it} = f\left(\mathrm{IQ}_{i,t-1}, X_{it}, Z_{it}\right) + \mu_{it} \tag{1}$$

where IQ_{it} stands for institutional quality. $\mathrm{IQ}_{i,t-1}$ is the lag of the dependent variable; X_{it} is a vector of political/governance-related variables, while Z_{it} is a vector of economic variables. μ_{it} is the error term.

[13] http://globalization.kof.ethz.ch/.

[14] http://www.heritage.org/index/explore.

[15] http://data.worldbank.org/data-catalog/world-development-indicators.

[16] http://www.cato.org/economic-freedom-world.

[17] http://www.systemicpeace.org/.

[18] http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/9263?q=PolityIIandsearchSource=icpsr-landing.

More specifically

$$\mathrm{EIQ}_{it} = \alpha_i + \alpha_1 \mathrm{EIQ}_{i,t-1} + \alpha_2 X_{it} + \alpha_3 Z_{it} + \eta_t + \nu_{it} \tag{2}$$

$$\mathrm{PIQ}_{it} = \beta_i + \beta_1 \mathrm{PIQ}_{i,t-1} + \beta_2 X_{it} + \beta_3 Z_{it} + \delta_t + \lambda_{it} \tag{3}$$

where α_i and β_i are the country-fixed effects, respectively, for each equation. η_t and λ_t are the time-specific effects for the two equations, respectively, while ν_{it} and λ_{it} are the error terms.

First-difference transformation of Eqs. (2) and (3) eliminates any possible heterogeneity by removing the country-fixed effect as follows:

$$\Delta\mathrm{EIQ}_{it} = \gamma_1 \Delta\mathrm{EIQ}_{i,t-1} + \gamma_2 \Delta X_{it} + \gamma_3 \Delta Z_{it} + \tau_t + \sigma_{it} \tag{4}$$

$$\Delta\mathrm{PIQ}_{it} = \pi_1 \Delta\mathrm{PIQ}_{i,t-1} + \pi_2 \Delta X_{it} + \pi_3 \Delta Z_{it} + \theta_t + \varepsilon_{it} \tag{5}$$

where Δ stands for change between years t and $t-1$ for a variable. At the same time, time effects are represented by τ_t and θ_t, respectively. Furthermore, σ_{it} and ε_{it}, respectively, are the error terms.

The transformed models have been estimated by Arellano and Bover (1995) approach, which has the advantage of allowing model information incorporated in both level and difference forms, simultaneously. Moreover, to deal with the statistical problem of correlation between lagged dependent variable and the error term, further lags of the dependent variable (which in turn act as instruments) are included, with the approach of generalized method of moments (GMM) recommended for such models by Arellano and Bover (1995) and Blundell and Bond (1998).[19] Furthermore, using Stata software,[20] "xtabond2" command (developed by Roodman 2009) has been employed in the current study to estimate the system above. Also, for dealing with serial correlation and arbitrary heteroscedasticity, robust standard errors have been employed in GMM estimation in the current study.

4 Estimation and Results

Tables indicate estimations for economic and political institutional quality. Table 1 indicates estimations for non-programme and programme countries for the case of economic institutional quality, while Table 2 indicates estimation for the case of political institutional quality (for the two subgroups countries).

[19]While Arellano and Bover (1995) extended the original work by Arellano and Bond (1991); Blundell and Bond (1998) developed the original work further.

[20]http://www.stata.com/.

Table 1 Dependent variable—economic freedom index—non-programme and programme countries

	Economic freedom index (EFI)															
	Non-programme countries								Programme countries							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag EFI	0.814***	0.726***	0.703***	0.936***	0.840***	0.776***	0.691***	0.376***	0.893***	0.818***	0.805***	0.933***	0.875***	0.859***	0.747***	0.496***
	(0.037)	(0.077)	(0.051)	(0.044)	(0.042)	(0.059)	(0.039)	(0.086)	(0.058)	(0.059)	(0.043)	(0.019)	(0.062)	(0.040)	(0.040)	(0.053)
Military	−0.556*							0.168	−0.0338							−0.0118
	(0.296)							(0.540)	(0.115)							(0.113)
Aggregate governance index		0.00578***						0.00439		0.00695***						0.00994***
		(0.002)						(0.005)		(0.002)						(0.004)
KOF index of globalization			0.0101***					0.0112*			0.00717**					−0.00771
			(0.004)					(0.007)			(0.003)					(0.006)
Monetary freedom				0.00126				0.00593				0.000851				0.00258
				(0.003)				(0.005)				(0.002)				(0.004)
Investment freedom					0.00230*			−7.86E−05					0.00142			0.00264
					(0.001)			(0.002)					(0.002)			(0.002)
Property rights						0.00505***		−0.00249						0.00405*		−0.00426
						(0.002)		(0.003)						(0.002)		(0.003)
Log real GDP							0.120***	0.078							0.145***	0.178***
							(0.032)	(0.101)							(0.039)	(0.066)
Constant	1.269***	1.548***	1.368***	0.256***	0.910***	1.152***	1.027***	2.435***	0.656*	0.958***	0.831***	0.423***	0.796**	0.812***	0.611***	1.805***
	(0.275)	(0.506)	(0.338)	(0.083)	(0.266)	(0.384)	(0.243)	(0.581)	(0.388)	(0.332)	(0.183)	(0.136)	(0.372)	(0.261)	(0.213)	(0.544)
Observations	333	332	355	337	337	337	363	288	738	719	791	719	719	719	787	606
Number of countries	37	43	40	41	41	41	42	36	89	96	95	94	94	94	96	88
AR(1)	0.000583	0.000105	9.80E−05	0.000624	0.000499	0.000362	0.000431	0.00019	2.69E−08	4.09E−08	1.38E−09	2.44E−08	8.59E−08	2.28E−08	1.83E−09	2.10E−07
AR(2)	0.216	0.746	0.409	0.196	0.204	0.233	0.487	0.262	0.255	0.251	0.213	0.332	0.314	0.36	0.201	0.399
AR(3)	0.141	0.27	0.237	0.124	0.139	0.159	0.137	0.077	0.662	0.818	0.553	0.715	0.727	0.781	0.474	0.638
Hansen OIR test	1	1	1	1	0.838	1	1	1	0.345	0.998	1	1	0.482	1	1	1

Note: robust standard errors in parentheses. Columns indicate models, which have been estimated using System-GMM approach. The first seven columns indicate the models that have been taken separately to see the individual impact of a variable(s) and to avoid the issue of collinearity among variables. The eighth column analyses the impact of variables taken together. Time dummies are not reported to save space, while all available lagged values of endogenous variables are used as instruments. The *p*-values of the Hansen OIR (overidentifying restrictions) test is used to check the null hypothesis of the instrument set being valid and exogenous, while the null of no autocorrelation is checked through Arellano–Bond AR(1), AR(2) and AR(3) tests

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table 2 Dependent variable—Polity II—non-programme and programme countries

	Polity II															
	Non-programme countries								Programme countries							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag Polity II	0.441***	0.870***	0.824***	0.883***	0.819***	0.941***	0.971***	0.960***	0.504***	−0.00518	0.550***	0.532***	0.566***	0.771***	0.921***	0.554***
	(0.165)	(0.075)	(0.063)	(0.069)	(0.088)	(0.030)	(0.012)	(0.033)	(0.108)	(0.059)	(0.040)	(0.055)	(0.055)	(0.034)	(0.015)	(0.070)
Military	−5.775***							0.187	−1.929***							0.166
	(1.727)							(0.313)	(0.586)							(0.532)
Aggregate governance index		0.0149						0.0041		0.0817**						0.0442*
		(0.011)						(0.009)		(0.040)						(0.023)
KOF index of globalization			0.0465***					0.0142			0.107***					−0.00809
			(0.018)					(0.015)			(0.018)					(0.038)
Monetary freedom				0.00986				−0.000769				0.0340**				−0.00592
				(0.009)				(0.004)				(0.015)				(0.007)
Investment freedom					0.0381**			0.000967					0.0621***			−0.00264
					(0.017)			(0.002)					(0.011)			(0.006)
Property rights						0.00175		0.00773						0.0300**		0.0133
						(0.002)		(0.005)						(0.015)		(0.014)
Log real GDP							0.0794*	−0.331							0.0917	−1.024
							(0.042)	(0.343)							(0.060)	(0.764)
Constant	2.472***	−0.587	−2.551**	−0.302	−1.527**	0.478**	−0.617	1.717	2.256***	−0.115	−5.234***	−0.245	−1.127**	−0.173	−0.961*	7.814
	(0.769)	(0.574)	(1.009)	(0.505)	(0.723)	(0.239)	(0.390)	(1.599)	(0.575)	(1.415)	(0.784)	(0.927)	(0.507)	(0.600)	(0.498)	(5.411)
Observations	1,255	498	1,262	622	622	625	1,165	456	2,730	1,179	2,845	1,444	1,444	1,444	2,721	1,016
Number of countries	45	46	46	46	46	46	45	44	104	111	110	108	108	108	110	102
AR(1)	0.0573	0.0648	0.00783	0.183	0.141	0.218	0.0216	0.214	3.25E−07	0.263	0	3.77E−06	8.80E−06	1.69E−05	1.34E−10	0.0108
AR(2)	0.0664	0.305	0.0598	0.319	0.354	0.313	0.0641	0.528	0.65	0.135	0.65	0.226	0.318	0.319	0.599	0.324
AR(3)	0.237	0.299	0.0995	0.418	0.37	0.649	0.102	0.364	0.101	0.805	0.149	0.411	0.491	0.434	0.275	0.129
Hansen	1	1	1	1	1	1	1	1	0.223	1	1	1	1	1	1	1

Note: robust standard errors in parentheses. Columns indicate models, which have been estimated using System-GMM approach. The first seven columns indicate the models that have been taken separately to see the individual impact of a variable(s) and to avoid the issue of collinearity among variables. The eighth column analyses the impact of variables taken together. Time dummies are not reported to save space, while all available lagged values of endogenous variables are used as instruments. The *p*-values of the Hansen OIR (overidentifying restrictions) test is used to check the null hypothesis of the instrument set being valid and exogenous, while the null of no autocorrelation is checked through Arellano–Bond AR(1), AR(2) and AR(3) tests

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Instruments are valid and exogenous[21] since all specifications pass Hansen-*J* statistic test (Hansen 1982; related with overidentifying restrictions (OIR)). Overall significant *F*-test and Arellano–Bond tests for serial correlation lend further support/credibility to the model.

It can be seen in Tables 1 and 2 that in all the estimations (for both EIQ and PIQ and across the two subgroups of countries), dynamic process is highly evident since lags of both EFI and Polity II have a positively significant consequence. This points out that institutional quality is path dependent and evolves over time.

Table 1 indicates that a military personnel as chief executive will significantly and negatively impact the economic institutional quality of both the non-programme countries and programme countries (here though insignificantly). At the same time, the impact on political institutional quality becomes highly significantly negative for both the subgroups (Table 2).

The importance of improving level of governance can be seen from the significantly positive consequence of aggregate governance index for EIQ in the case of both non-programme and programme countries (Table 1). Although the index has significantly positive consequence for PIQ in the case of programme countries, the same is only insignificantly positive in the case of non-programme countries (Table 2).

Openness remains important for improving overall institutional quality (for the two subgroups of countries) as shown by a highly significantly positive impact of KOF index of globalization.

Table 2 points out that monetary freedom is estimated to be significantly positive for improving PIQ for the case of programme countries, although the same positive impact becomes insignificant in the case of non-programme countries (and is similar to the impact on EIQ for the two subgroups of countries; see Table 1). Also, as can be seen in Tables 1 and 2, the increase in the level of investment freedom has a significantly positive consequence for both the PIQ and EIQ, in the case of programme and non-programme countries (though the impact becomes insignificantly positive in the case of programme countries for EIQ).

As one of the most important determinants of institutional quality in literature, property rights holds a significantly positive impact on the overall institutional quality—economic and political—for both the programme and non-programme countries (with the only exception for PIQ of non-programme countries, where the impact though still remains positive but only insignificantly; see Tables 1 and 2).

Real GDP growth has an estimated significantly positive impact on overall institutional quality for both the programme and non-programme countries (although the positive impact becomes insignificant in the case of PIQ of programme countries).

[21]For detailed insights on this, see Roodman (2007).

5 Conclusion

This study has been motivated by the lacklustre performance of IMF programmes in terms of their consequence on the economic growth of recipient countries. In line with this, it was realized that IMF programmes have not traditionally focused on supply-side determinants of the economy, especially those that enhanced institutional quality, which have, otherwise, been seen in NIE literature to have a positive consequence for economic growth of countries in general. Hence, an analysis was made to bring out the significant determinants of institutional quality in the case of non-programme and programme countries.

Many of the determinants of institutional quality taken in the current study have an estimated significantly positive impact on the overall economic and political institutional quality of IMF member countries. Specifically, while military in power negatively influences institutional quality, growth in real GDP, greater property rights and more openness, along with an overall improvement in the level of governance, all play a highly important role in improving institutional quality. At the same time, more monetary and investment freedom also significantly and positively impact institutional quality. Moreover, estimations indicate that institutional quality exhibits a path dependent nature.

The study also indicates that institutional determinants that are important for improving institutional quality (economic and political) in the case of non-programme countries also hold the same significance in the case of programme countries and hence need to be focused upon in IMF programmes.

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Part II
Democracy

An Experimental Study of Jury Voting Behavior

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1 Introduction

This chapter uses experimental analysis to test the Feddersen and Pesendorfer (1998) theoretical results regarding the Condorcet jury theorem. Under the assumption that jurors will vote strategically (rather than sincerely based on private information), Feddersen and Pesendorfer derive the surprising conclusion that a unanimity rule makes the conviction of innocent defendants more likely, as compared with majority rule voting. Previous experimental work largely supported these theoretical predictions regarding strategic individual behavior, but failed to find support for the conclusions about the relative merits of unanimity and majority rule procedures in terms of group decisions. We extend this literature with an experiment in which the cost of convicting an innocent defendant is specified to be more severe than the cost of acquitting a guilty defendant. This payoff asymmetry results in a higher threshold of reasonable doubt than the 0.5 level used in earlier studies. We find very little evidence of the strategic voting predicted by theory (even for our asymmetric payoff structure) and no difference between the use of unanimity and majority rules. Overall, it was very difficult for the juries in our experiment

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to achieve a conviction, and no incorrect convictions occurred. Our experimental results suggest that the standard risk neutrality assumption can lead to misleading conclusions. We argue that a high cost associated with convicting the innocent can interact with risk aversion to produce an even higher threshold of reasonable doubt than would result from risk neutrality, which tends to neutralize the negative effects of strategic voting under a unanimity rule.

Democratic states have institutions that protect the public. This protection extends even to those accused of crimes. Judicial systems vary. As recently made public in the Oscar Pistorius murder trial, South Africa uses a non-jury trial, whereas the United States grants the right to a trial by jury of peers for a felony crime. Judicial processes are structured with various safeguards to avoid the double loss of convicting an innocent person, while the actual criminal remains free. The effectiveness of these safeguards is unclear. Between 1971 and 2014, an estimated 144 people in the United States who had been convicted of crimes and sentenced to the death penalty were released from prison on the basis of new evidence of serious errors of procedure or substance (www.deathpenaltyinfo.org). In some cases, ex post DNA-based tests provided clear indications of false convictions. On June 19, 2014, the *New York Times* reported that New York City reached a $40 million settlement with the five men convicted of raping a jogger in Central Park in 1989. The men were convicted by a 12-person jury based on their videotaped confessions, but the convictions were overturned when another man confessed to the crime and DNA evidence supported his confession (Weiser, 2014).

Concerns regarding the potential to "misread" the evidence and wrongly convict an innocent person have existed for centuries. Condorcet (1785) showed that if each juror receives an independent "signal" of guilt or innocence that is more likely to be correct than not, then an increase in the number of jurors will increase the probability of reaching the correct verdict via majority voting. Moreover, the probability that the group decision is correct approaches 1 as the group size increases. This result, known as the Condorcet jury theorem, is statistical in nature and is based on the strong assumption that one juror's signal is independent of others' signals.[1] In practice, evidence is often incomplete or clouded by other factors, and hence, it is important to protect the innocent from false conviction. It is commonly assumed that convictions will be more difficult to obtain under unanimity than under majority rule, and hence, unanimity is often required for crimes with severe punishments.

Feddersen and Pesendorfer (1998) challenged the notion that a unanimity requirement tends to protect the innocent from false convictions. Instead of assuming that each individual juror's vote mirrors that person's signal of guilt or innocence, Feddersen and Pesendorfer formulate a model of strategic voting that is sensitive to the specific procedures used to determine the collective decision. Under unanimity, a vote to convict would not affect the outcome *unless every other juror*

[1]See Ladha (1992) and references therein for a discussion of the restrictive nature of the assumptions of the Condorcet jury theorem and the effects of relaxing them.

votes to convict. A juror who reasons in this manner may be hesitant to acquit, even when the person's own signal indicates that the defendant is innocent. This hesitance to vote for acquittal should be especially strong with large numbers of jurors, which could result in more, rather than fewer, convictions under unanimity, as compared with majority rule.

With strategic voting, the analysis of an individual's voting decision depends on beliefs about the behavior of other jurors, conditional on their signals. Feddersen and Pesendorfer base their analysis on a Nash equilibrium in which jurors' beliefs are consistent, on average, with actual behavior of others. They conclude that the unanimity rule is inferior to the use of majority voting, especially in terms of protecting the innocent. On the basis of these purely game-theoretic arguments, they appeal for reform of jury voting procedures for criminal trials in the United States.

Individual jurors in the Feddersen and Pesendorfer model base their voting decisions on private information and, in some cases, on publicly observed actions of other voters. Analysis of voting behavior with asymmetric information is complex and requires heroic assumptions about strategic rationality and precise information processing. Although game-theoretic predictions have been used successfully to explain data patterns in recurring interactions in markets and professional sports, juries are typically formed on an ad hoc basis and often consist of people with little or no prior jury experience. Hence, there are no opportunities for the types of learning and adjustment that are commonly thought to promote equilibrium behavior with beliefs that are consistent in a game-theoretic sense. Empirical tests of the strategic voting model are particularly important given the unintuitive nature of the conclusion that a unanimity requirement results in a higher rate of false convictions than a majority requirement.

Empirical studies can be based on a comparison of jury decisions between states with different conviction standards (e.g., super majority versus unanimity), using econometric methods to compensate or control for demographic and institutional differences that may affect juror behavior. Any analysis of conviction rates is seriously complicated by the fact that the decision to prosecute in the first place is endogenous, based on case-specific evidence and perhaps even on jury procedures. Moreover, observed differences in conviction rates do not necessarily indicate differences in rates of false convictions, which are much more difficult to ascertain. We do not know of any convincing empirical studies of the effects of jury voting procedures on false conviction rates.

It would be even more difficult to use empirical methods from naturally occurring trials to evaluate a specific theoretical model of strategic voting, since the variables of interest—private information and costs of incorrect verdicts—are not possible to observe. In contrast, these variables are directly *induced* in the laboratory so that theoretical predictions can be calculated. The laboratory environment sacrifices much of the rich context of a jury trial in order to minimize "extraneous" effects that could have a major impact on behavior, e.g., demographic differences and similarities between the defendant and the jurors. Moreover, experimental methods make it possible to change the voting rule while holding other factors (individuals,

quality of their information, etc.) constant, in order to make causal inferences about the procedures themselves.

An initial experiment with majority voting was reported by Ladha et al. (1996), who consider a setup in which a randomly determined event can have one of two possible values, and there is a noisy private signal for each voter that conveys information about which value was realized. In their setup, informative voting (a vote that reveals one's own signal) is not a Nash equilibrium.[2] But there is a symmetric Nash equilibrium in which all three people in the group vote for one of the outcomes, regardless of their private information about which of two unobserved conditions is relevant.[3] As a result of this strategic uninformative voting, the group decision is not correct as often as would be predicted by the Condorcet analysis with sincere, informative voting that corresponds to a person's private information signal. However, Ladha et al. (1996) show that there is another *asymmetric* Nash equilibrium in which two of the people in the group vote informatively and one person does not. This asymmetric equilibrium has the drawback that it would require some coordination in terms of who votes informatively, but it has the attractive feature that the group decision is correct even more often than with strategic, uninformative voting. The groups of three voters in the experiment were able to generate correct decisions in over 90 % of the cases, a proportion that even exceeds the 78 % prediction of the Condorcet jury theorem with sincere informative voting in this setting! Subjects in some sessions were asked to provide narrative descriptions of their decision process, and some of these narratives were indicative of behavior that would be expected with coordination in which one person votes uninformatively and lets the other two determine the outcome with votes that indicate their signals. The authors conclude that "... the benefits of majority rule are robust. Groups do better than individuals, **even in experiments that were designed to maximize the advantages of uninformative voting by individuals**" (Ladha et al. 1996, p. 24). These results are suggestive of information aggregation by majority voting, although there is no consideration of the alternative of requiring unanimity.

Guarnaschelli et al. (2000) provide direct experimental tests of the Feddersen and Pesendorfer (1998) results and those of Coughlan (2000) who suggests that

[2]The design is motivated by the earlier work of Austen-Smith and Banks (1996), who showed that it is not always a Nash equilibrium to vote informatively in games with asymmetric information. Indeed, informative voting is not a Nash equilibrium in the Ladha et al. setup. The intuition is that even if a person believes that the others are voting informatively, the only way that a person's vote could be decisive in a three-person setting is if the other two split, which would imply that each person saw a different signal (under informative voting). The information structure for the private signals was such that the signal associated with one of the options, *W*, was particularly decisive. In particular, if at least one other person observed the signal that would produce a vote for *W* under informative voting, then the others' beliefs based on this knowledge would make them prefer to vote for *W* regardless of their own signals, so informative voting cannot be a Nash equilibrium in this setup.

[3]To see that there is a symmetric equilibrium with uninformative voting (the same vote for option *W* regardless of one's own private signal), note that this voting behavior is a best response to uninformative voting for option *W* by the others, since a single vote does not affect the outcome.

a straw vote held before an actual vote will reveal the private information of each of the voters, decreasing fears of being pivotal among unanimity voters. In particular, Guarnaschelli et al. (2000) tested the unintuitive Feddersen and Pesendorfer prediction that the unanimity rule would increase the likelihood of convicting the innocent, relative to simple majority rule. They also considered the unintuitive predictions about the effects of group size. The experiments consisted of 15 rounds in which half of the subjects were randomly rematched into groups of either size 3 or of size 6. Each subject privately observed a draw from the jar, without seeing which jar was being used. Then the group had to reach a decision regarding the color of the jar (red or blue, where red corresponded to guilty and blue to innocent). In the red jar, there were seven red marbles and three blue, with the opposite holding for the blue jar. Thus the probability of drawing the "correct" color was 0.7. Each person in a group earned \$0.50 if the group decision was correct and \$0.05 otherwise. Since the payoff gain (\$0.50–\$0.05) for a correct decision is the same regardless of which jar (red or blue) is being used in a particular round of the experiment, it is straightforward to show that a voter would prefer that the outcome of the vote be red when the person's belief that the jar used is red is greater than 0.50. In other words, the "threshold of reasonable doubt" is 0.50 in this case. In this experiment, a naïve voter would vote red (blue) whenever a red (blue) marble is observed. Strategic voting in the symmetric Nash equilibrium also involves voting red after seeing a red signal, but the equilibrium prediction involves a mix in the sense that there is a significant probability of voting red (convict) after seeing a blue (innocent) signal. The predicted incidence of voting red after seeing a blue draw is 31 % with three-person groups under unanimity and 65 % with six-person groups under unanimity, which would tend to generate even more false convictions with larger groups. Three-person groups are predicted to make false convictions 14 % of the time, compared to 19 % of the time in six-person groups.

Guarnaschelli et al. (2000) report clear evidence of strategic voting. A large fraction of the subjects voted to convict when they saw a blue (innocent) draw; the percentage of these strategic "crossover" votes increased from 36 % with group size 3 to 48 % with group size 6. This increase is in line with predictions in a qualitative sense, but the observed increase was not as sharp as the more than doubling that was predicted. However, in contrast to the Feddersen and Pesendorfer predictions, the observed false conviction rate of 19 % for three-person unanimity groups was higher than for six-person unanimity groups, which only had a false conviction rate of 3 %. Moreover, the observed incidence of incorrect convictions was lower for groups of 6 under unanimity than under majority rule. Overall, although individual voting behavior deviated from naïve voting in a manner consistent with the Feddersen and Pesendorfer predictions, the response was not as sharp as predicted, and there was enough noise in observed behavior to cause group (convict or acquit) decisions to be inconsistent with some of the unintuitive theoretical predictions.[4]

[4]Guarnaschelli et al. (2000) also consider the predictions of a quantal response equilibrium (McKelvey and Palfrey 1995). This equilibrium generalizes the notion of a Nash equilibrium,

Table 1 Comparison of observed behavior and Nash equilibrium predictions with simultaneous unanimity voting with $p = 0.7$ in Guarnaschelli et al. (2000) and Ali et al. (2008)

	Predicted probability (%)	Observed frequency (%)
Committee size 3:		
Vote to convict with guilty signal		
Ad hoc committee	100	95
Standing committee	100	94
Vote to convict with innocent signal		
Ad hoc committee	31	36
Standing committee	31	35
Committee size 6:		
Vote to convict with guilty signal		
Ad hoc committee	100	90
Standing committee	100	94
Vote to convict with innocent signal		
Ad hoc committee	65	48
Standing committee	65	52

Ali et al. (2008) extended the Guarnaschelli et al. (2000) experiments in a number of ways. In particular, they addressed the potential differences between standing committees, in which the same group makes a series of decisions, and ad hoc groups, in which a group (of either 3 or 6 subjects) makes only one decision before being rematched. Specifically, they used data from the Guarnaschelli et al. paper for ad hoc committees, and they conducted new experiments with similar parameters for standing committees. Their results showed no evidence that the nature of the matching configuration (ad hoc or standing committees) affected voting behavior. As observed previously, they found evidence of voting to convict when seeing an innocent signal. However, they also observed more correct decisions in terms of acquitting the innocent (between 0.81 and 0.99) than in terms of convicting the guilty (between 0.27 and 0.47). Table 1 provides an overall comparison of the theoretical predictions and experimental results for the unanimity treatment in these two papers.

The most notable result in the right column is the observed tendency to vote to convict with an innocent signal that increases with committee size, but not as much of an increase as is predicted in the Nash equilibrium.

Our paper builds on this growing experimental literature. Recall that the Nash equilibrium considered by Feddersen and Pesendorfer implies that the false conviction rate is an increasing function of the group size. Therefore, we chose a jury size of 12, which is a common size in many US locations when the nature of the charge

introducing some randomness in individual decisions while preserving the consistency of belief and choice proportions. They conclude that the quantal response equilibrium provides a better explanation of group outcomes in their experiment.

is serious. All subjects vote simultaneously in each round, either under unanimity or majority rule, with the treatment order reversed in every other session. An important difference between our design and those mentioned above is that we induce a threshold of reasonable doubt greater than the 0.50 used in the Guarnaschelli et al. (2000) and Ali et al. (2008) studies. This is done by making the payoff loss for convicting the innocent greater than the payoff loss from acquitting the guilty, which raises the threshold of reasonable doubt above a half, as explained below. This difference is important. Strategic voting involves voting against one's signal—voting guilty when the signal is innocent or innocent when the signal is guilty. With a threshold of 0.50 and unanimity rule, if there is any strategic voting, it will only take the form of voting to convict when an innocent signal is observed. Recall that under unanimity, only one acquit vote is needed to make the group decision acquit. Thus, since the cost of errors are equal, a subject who sees an innocent signal may worry about being pivotal and incorrect, but a subject who sees a guilty signal knows that their own vote will not affect the outcome unless everyone else has also voted guilty. In contrast, with a higher threshold, indicating a greater loss from the error of convicting an innocent defendant than from the error of acquitting a guilty one, subjects may be more concerned with avoiding the larger penalty from an incorrect conviction. The compelling concern of Feddersen and Pesendorfer (1998, p. 31) is that erroneous convictions are worse than erroneous acquittals; they note the "terrible consequences of convicting an innocent" as motivation to abandon the use of unanimity rule in jury trials. We agree with the conjecture that most people would view false convictions as being more problematic, and therefore, we incorporate this difference in the payoffs faced by subjects in the experiment. Another way to protect the innocent under majority rule is to require a stronger majority to convict, and in our experiment, we use a 5/6 requirement, with 10 out of 12 votes needed to convict.

To summarize, our experimental design has a larger jury size, payoffs that imply a higher threshold of reasonable doubt, and a stronger majority rule requirement than was the case in previous experimental papers discussed above. For the parameterization used, we find much weaker evidence for strategic voting than has been reported by previous studies. Overall, it is very difficult for our juries to achieve a conviction, and we never observe an incorrect conviction. Conversely, we observe far more incorrect acquittals than predicted by theory under both unanimity and majority rule. In the next section, we describe the experimental procedures and derive the Nash equilibrium predictions for the parameterization used in the experiment.

2 Experimental Design

Each of the 12 jurors sees a private signal, g or i, that is correlated with the guilt, G, or innocence, I, of the defendant. The probability that the signal matches the true state is symmetric: $\Pr(g|G) = \Pr(i|I) = 3/4$. Jurors may vote to acquit, A, or convict, C, such that if at least k jurors vote to convict, then the defendant is convicted;

otherwise she is acquitted. Thus, in our unanimity sessions, $k = 12$. For our majority rule treatment, we depart from the other papers in the area by considering a 5/6 requirement, with $k = 10$, rather than a simple majority for the majority rule treatment. The induced preferences in the experiment imply equal payoffs of \$4 for "correct" outcomes when a guilty defendant is convicted or an innocent defendant is acquitted. The payoff asymmetry used for "incorrect" outcomes reflects the notion that it is worse to convict the innocent, with a payoff of \$0, than to acquit the guilty, with a payoff of \$2. Thus, $\mathrm{u}(A|I) = \mathrm{u}(C|G) = U(4)$, $\mathrm{u}(C|I) = U(0)$, and $\mathrm{u}(A|G) = U(2)$, where U represents a subject's utility for money, which would be concave in the case of risk aversion. To derive a threshold of reasonable doubt, suppose that a person's subjective probability of guilt is P, so that the expected payoff for a group decision to convict is $P\,\mathrm{u}\left(C\middle|G\right) + (1-P)\ \mathrm{u}\left(C\middle|I\right) = PU(4) + (1-P)\,U(0)$, which equals P if we normalize the utility of \$4 to be 1 and the utility of 0 to be 0. Similarly, the person's expected payoff for a group decision to acquit is $P\,\mathrm{u}\left(A\middle|G\right) + (1-P)\,\mathrm{u}\left(A\middle|I\right) = PU(2) + (1-P)\,U(4) = PU(2) + (1-P)$, given the normalization. The expected utilities for these two outcomes are equal when $P = 1/[2\text{–}U(2)]$. With risk neutrality (linear utility), $U(2) = 1/2$ and $P = 2/3$, which serves as the threshold of reasonable doubt in this case. With risk aversion (concave utility) and $U(4)$ normalized to be 1, it must be the case that $U(2) > 1/2$ and $P > 2/3$. Thus aversion would result in a higher threshold of reasonable doubt. This is intuitive since the possible payoffs for a group decision to convict incorporate the "downside risk" of the worst outcome, i.e., the \$0 payoff for convicting the innocent.

Following Feddersen and Pesendorfer (1998), we will use benchmark predictions based on risk neutrality, but we will reconsider possible risk aversion effects at a later point. Table 2 shows the equilibrium predictions (assuming risk neutrality) for our setup (derivations are presented in Appendix 1). The top row indicates that jurors are predicted to vote to convict uniformly after seeing a guilty signal. This result is intuitive, since a vote to convict will only be pivotal if a large number $(k-1)$ of others also vote to convict, so the impetus provided by one's own signal is reinforced by strategic thinking about what others might have observed when one's vote is pivotal. In contrast, recall that a vote to acquit under unanimity is only pivotal if everyone else votes to convict. The Nash equilibrium used by Feddersen and Pesendorfer assumes that behavior for each voting rule is random for those

Table 2 Equilibrium predictions under risk neutrality for the experimental setup

	Unanimous voting rule	Majority voting rule
Panel A: Individual decisions		
Vote to convict with guilty signal	1.00	1.00
Vote to convict with innocent signal	0.72	0.39
Panel B: Jury decisions		
Convict an innocent defendant	0.79	0.04
Acquit a guilty defendant	0.07	0.73

who see an innocent signal. Such random behavior is only optimal if a person is indifferent about how to vote after seeing an innocent signal, conditional on the random behavior of others. The probabilities shown in the second row (representing beliefs about others' behavior) are calculated to yield this indifference. Even with our relatively high threshold of reasonable doubt, the model predicts that jurors are far more likely to vote to convict after seeing an innocent signal under unanimity (0.72) than under majority rule (0.39). As a result, the probability of convicting an innocent defendant is far higher (0.79) under unanimity than under majority rule (0.04). Conversely, guilty defendants are predicted to be acquitted much more often under the 5/6 majority rule than under unanimity. The bottom two rows of the table provide a dire view of the predicted effects of unanimity voting in this setting. Unanimity is predicted to yield an incorrect jury decision more often than with the 5/6 majority, and the proportion of costly errors (convict an innocent defendant) is about 11 to 1 with unanimity, whereas the proportion of costly errors is only about 1 to 18 for majority rule.

The experiment was conducted at the College of William and Mary, with undergraduate subjects who participated in 20 periods of voting. Subjects were recruited in groups of 13 people for each of the six sessions. A monitor was randomly selected from each group, and the remaining 12 students served as the jury. Each voting period began with the monitor rolling a six-sided die behind a screen at the front of the room. A red or blue cup was selected with an equal probability, and its contents were placed in an unmarked container. The red cup represented "guilt," and the blue cup represented "innocence." This context was not provided to subjects, and the group was not referred to as a jury. If the roll of the die yielded a 1, 2, or 3, private information draws were drawn from the blue cup, which contained three blue marbles and one red marble. If the roll of the die yielded a 4, 5, or 6, draws were made from the red cup, which contained three red marbles and one blue marble. The description of the two cups was presented in a simple table in the instructions, which are presented in Appendix 2.

Each subject was approached privately, and the experimenter drew a marble from the cup and showed it to the subject. Then the marble was returned to the cup, so the contents of the cup were the same for each private draw. After every subject saw a private draw from the cup, with replacement, they all voted simultaneously on what they believed was the color of the cup being used for the draws. Ten rounds of voting were conducted using the unanimity voting rule: The group decision was red if all 12 people voted "R." Otherwise, if any one person voted "B," the group decision was blue. In addition, ten rounds of voting were conducted using a 5/6 majority voting rule (conviction required at least 10 of the 12 "R" votes). There were six sessions, with the ten rounds of unanimity voting coming first in half of the sessions and second in the other half.[5] Any correct group decision resulted in earnings of $4 for each person. If the group decision was blue and the red cup was

[5] At the end of every session, there were two additional periods of voting. In one of the periods, subjects faced higher payoffs than in the first 20 rounds, and in the other period, payoffs were

actually used for the draws, each person in the group earned $2. Finally, if the group decision was red and the blue cup was actually used for the draws, each person in the group earned $0. Note that subjects received a $2 payment for an incorrect acquittal but received nothing for an incorrect conviction. These payoffs correspond to a 2/3 threshold of reasonable doubt (under risk neutrality) as noted above. Each session lasted for about an hour and yielded average earnings of about $31.

3 Results

We begin by focusing on individual voting behavior. Table 3 shows overall percentages of votes to convict under each voting rule, conditional on the observed signal. As noted above, each treatment involved ten periods of voting, followed by ten periods with the other treatment, with the treatment order reversed in half of the sessions. Thus, Table 3 also distinguishes between votes that were cast during the first ten periods of the experiment compared to the second ten periods. Note that subjects were most likely to vote to convict (86 % of the time) when they observe a guilty signal during the second ten periods of a majority voting session. Hence subjects observing a guilty signal voted to acquit 14 % of the time in the second part. As expected, under both voting rules, subjects were far more likely to vote to convict if they observed a guilty signal.

For each row in Table 3, the percentages are higher on the right side, which indicates that subjects are more likely to vote to convict in the second part, periods 11 through 20 than in the first part, irrespective of the their signal or the voting rule. However, those differences are only statistically significant in one case. The nonparametric Wilcoxon test indicates that there are significant differences in the probabilities of voting to convict after observing an innocent signal under the unanimity voting rule in the first ten periods relative to the second ten periods.[6] As

Table 3 Vote percentages conditional on signal and voting rule

	Periods 1–10 (%)	Periods 11–20 (%)	Z-stat (prob > $\|\mathbf{z}\|$)
Panel A: Unanimity voting rule			
Vote to convict with guilty signal	73	82	1.121 (0.262)
Vote to convict with innocent signal	6	31	2.010 (0.043)
Panel B: 5/6 majority voting rule			
Vote to convict with guilty signal	73	86	1.447 (0.146)
Vote to convict with innocent signal	10	20	0.918 (0.358)

asymmetric across subjects. The results from those two periods of voting are not included in this paper.

[6]The unit of observation for the Wilcoxon tests is the subject-level probability of voting guilty conditional on observing a specific signal for the ten periods of the experiment conducted with a

Table 4 Comparison of observed individual behavior and mixed strategy Nash equilibrium with risk neutrality

	Nash prediction (%)	Observed (%)	Z-stat (prob > $\|\mathbf{z}\|$)
Panel A: Unanimity voting rule			
Vote to convict with guilty signal	100	78	−4.667 (0.000)
Vote to convict with innocent signal	72	19	−7.209 (0.000)
Panel B: 5/6 majority voting rule			
Vote to convict with guilty signal	100	80	−5.060 (0.000)
Vote to convict with innocent signal	39	15	−4.777 (0.000)

noted below, wrongful acquittals are more common than wrongful convictions, and if behavior in the second part is influenced to some extent by past errors, this might explain the increased frequencies of votes to convict in the second part. Another possible explanation for this increasing tendency to vote strategically to convict with an innocent signal could be that the effects of risk aversion are diminished as subjects have a better idea of their likely earnings in the second part of a session, and a reduction in risk aversion lowers the threshold of reasonable doubt for the asymmetric error costs that we use, which could also result in more strategic votes to convict.[7]

In Table 4 we compare observed individual behavior with mixed strategy Nash equilibrium predictions (with risk neutrality). First, note that the voting rule does not have much of an effect on the observed percentages of votes to convict with a guilty signal (78 % for unanimity vs. 80 % for majority rule).[8] However, our subjects fall short of the Nash prediction in both cases. Recall that the model predicts that subjects will always vote to convict upon observing a guilty signal. Our subjects are also fairly consistent in their likelihood of voting to convict after observing an innocent signal (19 % for unanimity and 15 % for majority rule).[9] Note that the Nash predictions are vastly different from observed behavior, and our subjects fall short

particular voting rule. Thus, there were a total of 72 observations for each test. As a robustness test, we also performed the Wilcoxon tests at the session level by averaging the subject-level probability of voting guilty conditional on observing a specific signal with a particular voting rule for each session. This resulted in a total of six observations for each test. By using session-level data, we allow for the possibility that decisions are not independent across subjects within a particular experimental session. Using the session-level data, we find marginally significant order effects when subjects see an innocent signal under the unanimity voting rule ($z = 1.964$) and when subjects see a guilty signal under majority rule ($z = 1.964$).

[7]This possibility was suggested to us by an anonymous referee.

[8]Using the individual-level average probability as the unit of observation ($N = 72$), $z = 0.182$ for the Wilcoxon test. Using the session-level average probability as the unit of observation ($N = 6$), $z = 0.560$ for the Wilcoxon test.

[9]Using the individual-level average probability as the unit of observation ($N = 72$), $z = 0.182$ for the Wilcoxon test. Using the session-level average probability as the unit of observation ($N = 6$), $z = 0.320$ for the Wilcoxon test.

Table 5 Group decisions conditional on voting rule

	Correct group decisions (% of total for 10 rounds)		Incorrect group decisions (% of total for 10 rounds)	
	Acquit	Convict	Acquit	Convict
Panel A: Unanimity voting rule				
Rounds 1–10	21 (70 %)	0 (0%)	9 (30 %)	0 (0 %)
Rounds 11–20	18 (60 %)	0 (0 %)	12 (40 %)	0 (0%)
Panel B: 5/6 majority voting rule				
Rounds 1–10	13 (43 %)	0 (0 %)	17 (57 %)	0 (0 %)
Rounds 11–20	15 (50 %)	2 (7 %)	13 (43 %)	0 (0 %)
Total	67	2	51	0

of the predicted probability in both cases. The difference between the predicted and observed probabilities was largest when subjects observed an innocent signal under the unanimity voting rule. The Nash equilibrium prediction is that subjects would frequently vote to convict in this case (72 % of the time). However, we observed this type of strategic voting behavior very infrequently. A series of Wilcoxon tests reveal that the observed probabilities are significantly different (at the 1 % level) from the relevant Nash prediction in every case.[10] Recall that these Nash predictions are based on the assumption of risk neutral agents, and the failure of the model to predict behavior in these experiments could be explained by risk aversion which would raise the threshold of reasonable doubt, as noted in the previous section.

Given the large discrepancies between predicted and observed individual behavior, we now examine how individual voting patterns translated into jury outcomes. Table 5 provides summary information on group decisions. When voting under majority rule, an incorrect group decision was reached in 30 of the 60 periods of voting. When voting under unanimity, an incorrect group decision was reached in 21 of the 60 periods of voting. The nonparametric Wilcoxon test indicates that there are no significant differences in the number of incorrect jury decisions under majority rule and unanimity ($z = 1.361$).[11]

Table 5 provides additional information about the distribution of correct and incorrect decisions. Note that all of the incorrect group decisions were acquittals. Convictions were achieved in only 2 out of 120 total periods of voting, and both

[10]The *Z*-stats presented in Table 4 use the individual-level average probability as the unit of observation ($N = 72$). When we use the session-level average probability as the unit of observation ($N = 6$), all of our results hold qualitatively. Specifically, individual voting behavior is significantly different from the Nash prediction for every comparison in Table 4.

[11]For the Wilcoxon tests regarding group decisions, we use the session-level number of incorrect decisions for a particular voting rule as the unit of observation. Thus, there were a total of six observations for each voting rule. Using the same session-level unit of observation, we also did a Wilcoxon test for treatment order effects and concluded that the number of jury errors was not significantly different when majority rule was in effect for the first ten periods versus when unanimity rule was in effect for the first ten periods ($z = 0.801$).

Table 6 Comparison of observed group behavior and mixed strategy Nash equilibrium with risk neutrality

	Nash prediction (%)	Observed (%)	Z-stat (prob > $\|\mathbf{z}\|$)
Panel A: Unanimity voting rule			
Convict an innocent defendant	79	0	2.882 (0.002)
Acquit a guilty defendant	7	100	2.882 (0.002)
Panel B: 5/6 majority voting rule			
Convict an innocent defendant	4	0	2.882 (0.002)
Acquit a guilty defendant	73	94	1.922 (0.065)

convictions came under majority rule.[12] Thus, our experiments lend no support for the notion that unanimity leads to more convictions, either correct or incorrect.

In Table 6 we compare observed group behavior with the mixed strategy Nash equilibrium predictions, assuming risk neutrality. Under unanimity rule, relative to the Nash prediction, groups are far less likely to convict an innocent defendant and far more likely to acquit a guilty defendant. In both cases, observed behavior is significantly different from the theoretical prediction. Group behavior is more closely aligned with theory under majority rule, although the observed probability of convicting an innocent defendant is still significantly different from the theoretical prediction.[13]

To further understand the conditions that led to correct and incorrect group decisions, we also examined how group decisions varied based on the distribution of signals observed by the 12 subjects in the group. Here we focus only on acquittals since there were only two convictions in the entire experiment and they were both consistent with the true state. One might wonder if we observed so many incorrect acquittals because many subjects were unlucky to observe innocent signals when the true state was guilty. Figure 1 addresses this concern. The gray lines in the figure represent correct acquittals. Notice that the majority of correct acquittals were made in periods where few subjects observed guilty signals. In the unanimity voting rule sessions, all of the correct acquittals came when there were five or fewer guilty signals observed during the voting period. In the majority voting rule sessions, correct acquittals were reached in voting periods with as many as seven guilty signals, but most of them were in periods with four or fewer observed guilty signals. Alternatively, the black lines in Fig. 1 represent incorrect acquittals, which were generally decided in periods with many observed guilty signals. Over half of the incorrect acquittals occurred in periods in which 9 or more of the 12 subjects observed guilty signals. Thus, the incorrect acquittals did not result from bad signals, but rather from the reluctance of subjects to vote guilty even when they observed guilty signals.

[12]Recall that the true state (innocent or guilty) was randomly determined by the throw of a six-sided die and was a priori 50 %. Over all 120 periods of voting in the experiment, the true state was innocent in 67 periods and was guilty in 53 periods.

[13]All of the Wilcoxon results presented in Table 6 use the session-level probability of reaching a particular group decision. Thus, the number of observations is 6 for each test.

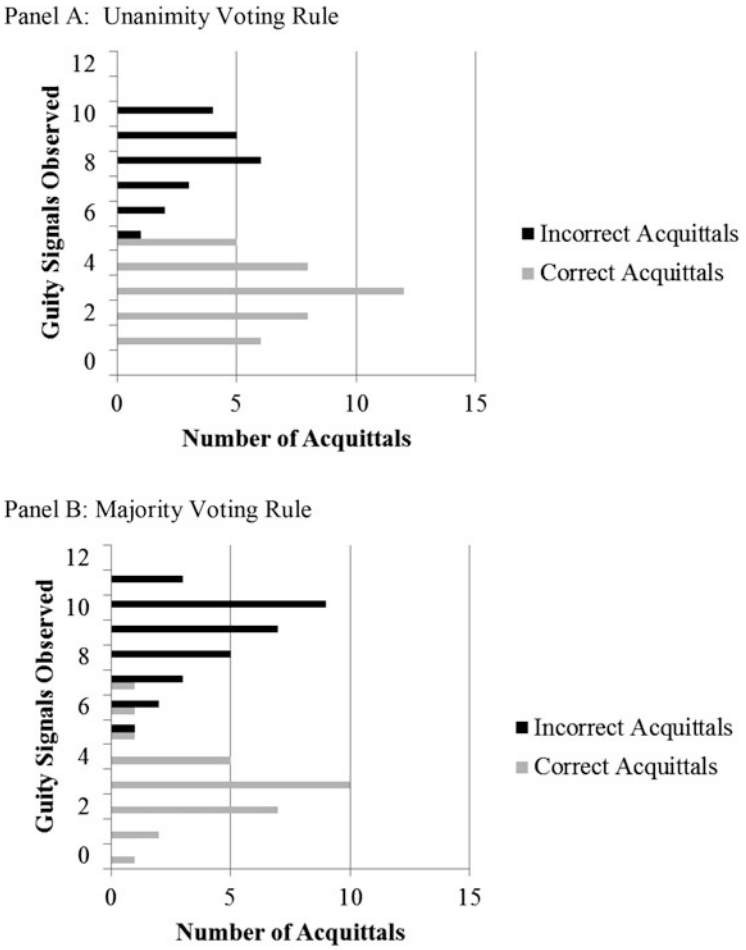

Fig. 1 Acquittals based on total guilty signals observed in a period. *Panel A*: Unanimity voting rule. *Panel B*: Majority voting rule

Assuming our subjects are risk neutral, this reluctance is not simply due to the high threshold of reasonable doubt, since the effect of the asymmetric payoffs that determine the threshold are built into the Nash equilibrium predictions in Table 4 that people who observe a guilty signal will always vote to convict.

4 Conclusion

We present results from a series of experiments designed to test the model of jury voting behavior described in Feddersen and Pesendorfer (1998). A key innovation of this model is the assumption that jurors' votes do not always reveal their

private signals regarding guilt or innocence, but rather that people vote strategically. Specifically, after observing a signal of innocence, jurors will vote to convict with a positive probability, and this probability is higher under unanimity than under majority rule. And as the jury size grows, the probability of voting strategically increases under unanimity. Thus, the model has the unintuitive implication that the unanimity voting rule is inferior to the use of a majority rule, especially in terms of protecting the innocent.

Feddersen and Pesendorfer use their results to assert that jury trials must be changed from unanimity to majority in the United States: "... retaining the unanimity rule in capital cases is exactly the wrong thing to do... Our results suggest that it would be better to combine a supermajority rule with a larger jury for cases in which it is desirable to reduce the probability of convicting an innocent" (1998, 31). Many critics (see, e.g., Margolis 2001) have questioned the policy relevance of the Feddersen and Pesendorfer model, given that it incorporates several strong simplifying assumptions, e.g., ignoring possible effects of jury deliberation, among other things.

Our experimental results indicate that some of the main predictions do not hold, even when the experiment design incorporates extreme assumptions like the absence of jury deliberation. For the setup used in the experiment, the Nash prediction under risk neutrality involves widespread strategic voting (72 %) under unanimity and a nontrivial amount of strategic voting (39 %) under the majority rule. The model also predicts that innocent defendants will be convicted a staggering 79 % of the time under unanimity. We find far less strategic voting than predicted by theory (19 % for unanimity and 15 % for majority rule), and there are no significant differences across voting rules. Further, jurors in the experiment never convict an innocent defendant, regardless of voting rule. It is straightforward to show that risk aversion results in a higher threshold of reasonable doubt. Thus, risk aversion is one possible explanation for why our subjects are generally reluctant to vote guilty. Overall, our results present a cautionary tale of the pitfalls of making policy changes based on the implications of particular parameterizations of theoretical models.

Appendix 1: Derivations of Nash Equilibria and Model Predictions

Our parameters
Probability the signal matches the true state: $p = 0.75$
Threshold of reasonable doubt: $q = 0.667$
Number of jurors: $n = 12$
Number of guilty votes required to convict under majority rule: $\widehat{k} = 10$
Note that while here our threshold of reasonable doubt is 0.667, and we added $4 to all of the payouts in the experiments, these computations remain valid.

A. Nash equilibrium probability a juror will vote guilty after observing an innocent signal under unanimity voting from Feddersen and Pesendorfer (1998, p. 26, Equation 3)

$$\sigma(i) = \frac{\left(\frac{(1-q)(1-p)}{qp}\right)^{1/(n-1)} p-(1-p)}{p-\left(\frac{(1-q)(1-p)}{qp}\right)^{1/(n-1)}(1-p)}$$

$$\sigma(i) = \frac{\left(\frac{(1-2/3)(1-3/4)}{2/3\times 3/4}\right)^{1/(12-1)} (3/4)-(1-3/4)}{3/4-\left(\frac{(1-2/3)(1-3/4)}{2/3\times 3/4}\right)^{1/(12-1)}(1-3/4)}$$

$$\sigma(i) = 0.720389$$

B. Nash equilibrium probability a juror will vote guilty after observing an innocent signal under majority rule voting from Feddersen and Pesendorfer (1998, pp. 33–34, Appendix B)

$$\sigma\left(i,\widehat{k}\right) = \frac{p(1+f)-1}{p-f(1-p)}$$

$$\sigma\left(i,\widehat{k}\right) = \frac{0.75(1+0.641859)-1}{0.75-0.641859(0.25)},$$

$$\sigma(i) = 0.392502$$

where f is determined by

$$f = \left(\frac{1-q}{q}\left(\frac{1-p}{p}\right)^{n-\widehat{k}+1}\right)^{1/(k-1)}$$

$$f = \left(\frac{1-0.667}{0.667}\left(\frac{1.75}{0.75}\right)^{12-10+1}\right)^{1/(10-1)}$$

$$f = 0.641859$$

C. Probability an innocent defendant will be convicted under unanimity voting from Feddersen and Pesendorfer (1998, p. 26)

$$l_i\,(p,q,n) = \frac{(2p-1)\left(\frac{(1-q)(1-p)}{qp}\right)^{1/(n-1)}}{p-(1-p)\left(\left(\frac{(1-q)(1-p)}{qp}\right)^{1/(n-1)}\right)}$$

$$l_i\,(0.75,0.667,12) = \frac{(2(0.75)-1)\left(\frac{(1-0.667)(1-0.75)}{(0.667)(0.75)}\right)^{1/(12-1)}}{0.75-(1-0.75)\left(\left(\frac{(1-0.667)(1-0.75)}{(0.667)(0.75)}\right)^{1/(12-1)}\right)}$$

$$l_i\,(0.75,0.667,12) = 0.790312$$

D. Probability a guilty defendant will be acquitted under unanimity voting from Feddersen and Pesendorfer (1998, p. 26)

$$l_o(p,q,n) = 1 - \left(\frac{(2p-1)}{p-(1-p)\left(\left(\frac{(1-q)(1-p)}{qp}\right)^{1/(12-1)}\right)} \right)$$

$$l_o(0.75, 0.667, 12) = 1 - \frac{(2(0.75)-1)}{0.75-(1-0.75)\left(\left(\frac{(1-0.667)(1-0.75)}{(0.667)(0.75)}\right)^{1/(12-1)}\right)}$$

$$l_o(0.75, 0.667, 12) = 0.069895$$

E. Probability an innocent defendant will be convicted under majority rule voting from Feddersen and Pesendorfer (1998, p. 30)

$$l_I\left(\widehat{k}\right) = \sum_{j=\widehat{k}}^{n} \binom{n}{j} \left(\gamma_I\left(\widehat{k}\right)\right)^j \left(1-\gamma_I\left(\widehat{k}\right)\right)^{n-j},$$

where

$$\gamma_I\left(\widehat{k}\right) = (1-p)\,\sigma\left(g,\widehat{k}\right) + p\sigma\left(i,\widehat{k}\right)$$

Our parameters and above give

$$\gamma_I\left(\widehat{k}\right) = (1-0.75)\,(1) + (0.75)(0.392502)$$

$$\gamma_I\left(\widehat{k}\right) = 0.5443765$$

Since for us

$$\widehat{k} = 10$$
$$R = 12$$

we need only to find the sum

$$\sum_{j=10}^{12} \binom{n}{j} \left(\gamma_I\left(\widehat{k}\right)\right)^j \left(1-\gamma_I\left(\widehat{k}\right)\right)^{n-j}$$

Thus,

$$l_I(10) = \binom{12}{10}(0.5443765)^{10}(1-0.5443765)^2 + \binom{12}{11}(0.5443765)^{11}(1-0.5443765)^1 + \binom{12}{12}(0.5443765)^{12}(1-0.5443765)^0$$

$$l_I(10) = 0.038795$$

F. Probability a guilty defendant will be acquitted under majority rule voting from Feddersen and Pesendorfer (1998, p. 31)

$$l_G\left(\widehat{k}\right) = 1 - \sum_{j=\widehat{k}}^{n} \binom{n}{j} \left(\gamma_G\left(\widehat{k}\right)\right)^j \left(1-\gamma_G\left(\widehat{k}\right)\right)^{n-j},$$

where

$$\gamma_G\left(\widehat{k}\right) = p\sigma\left(g,\widehat{k}\right) + (1-p)\ \sigma\left(i,\widehat{k}\right)$$

Our parameters and above give

$$\gamma_G\left(\widehat{k}\right) = (0.75)(1) + (1-0.75)\,(0.392502)$$

$$\gamma_G\left(\widehat{k}\right) = 0.8481255$$

Thus, we have

$$l_G(10) = 1 - \binom{12}{10}(0.8481255)^{10}(1-0.8481255)^2 - \binom{12}{11}(0.8481255)^{11}(1-0.8481255)^1 - \binom{12}{12}(0.8481255)^{12}(1-0.8481255)^0$$

$$l_G(10) = 0.72935$$

Appendix 2: Instructions for Unanimity Treatment

This is an experiment in the economics of decision-making. Various agencies have provided funds for the experiment. Your earnings will depend partly on your decisions and partly on chance. If you are careful and make good decisions, you

may earn a considerable amount of money, which will be paid to you, in cash, at the end of the experiment today. The experiment will consist of three parts. We will throw a six-sided die at the end of the session. If the result of the die throw is 1, 2 or 3, you will be paid 1/2 of your cumulative earnings for Part I and all of your earnings for Part IIIa of the experiment. If the result of the die throw is 4, 5, or 6, you will be paid 1/2 of your cumulative earnings for Part II and all of your earnings for Part IIIb of the experiment. In addition, you will be paid $6 for showing up today.

We will begin by reading these instructions out loud. Please follow along. If you have any questions as we are reading, raise your hand and your question will be answered for everyone.

Before beginning, we will choose one of you to assist us in the experiment today. This person, who will be called the monitor, will help us by throwing dice and drawing colored balls from a container. The monitor will also observe procedures to ensure that the instructions are followed. The monitor will be paid the average of what all participants earn. We will now assign each of you a number from 1 to 13, and we will throw a 20-sided die to select the monitor.

In this experiment, you will be asked to predict from which randomly chosen cup a ball was drawn. We will begin by having the monitor roll a six-sided die behind a screen at the front of the room. If the roll of the die yields a 1, 2, or 3, we will draw from the blue cup, which contains three blue balls and one red ball. If the roll of the die yields a 4, 5, or 6, we will draw from the red cup, which contains three red balls and one blue ball. Therefore it is equally likely that either cup will be selected. Since the monitor will roll the six-sided die behind a screen, *you will not see the result of the die throw or know which cup is being used for the draws*.

Blue cup	Red cup
Used if the die roll is 1, 2, or 3	Used if the die roll is 4, 5, or 6
Contents: 3 blue balls and 1 red ball	Contents: 3 red balls and 1 blue ball

Private Draws

Once a cup is determined by the roll of the die, we will empty the contents of that cup into an unmarked container. (The container is always the same, regardless of which cup is being used.) Then we will approach each of you and draw a ball from the container. The result of this draw will be your private information and should not be shared with other participants. *After each draw, we will return the ball to the container before making the next private draw so the contents of the container are always the same when we make a private draw.* Each person will have one private draw, with the ball being replaced after each draw.

The Voting Process

After each person has seen a private draw, we will begin the voting process. We will approach each of you to ask for your vote: Vote "B" if you think the blue cup was emptied into the unmarked container or "R" if you think the red cup was emptied into the unmarked container. After everyone has voted, we will announce the total number of "R" and "B" votes and the monitor will announce the color of the cup that was actually emptied into the unmarked container.

Your Payoff

Your money payoff for the period depends on the cup that was actually used and the "group decision. The group decision is red if at least 10 of the 12 people vote "R." Otherwise, if three or more people vote "B," the group decision is blue.

Your dollar payoffs are summarized in the table below. Any correct decision earns each member of the group a $4 payoff. A correct group decision is one that matches the cup actually used. If the group decision is blue and the red cup was actually used, each member of the group earns a $2 payoff. Finally, there are no money payoffs if the group decision is red and the cup used for the draws was actually blue.

	Cup used is blue	Cup used is red
Group decision is blue	Your payoff is $4	Your payoff is $2
Group decision is red	Your payoff is $0	Your payoff is $4

Decision Sheet

This part of the experiment will consist of ten periods. The results for each period will be recorded on a separate row on the decision sheet that follows. The period numbers are listed on the left side of each row. Next to the period number is a blank that should be used to record the draw (blue or red) that you see when we come to your desk. Write b (for blue) or r (for red) in column (0) at the time the draw is made. Column 1 contains spaces to record your vote and the total number of blue and red votes, which will be announced at the end of each period. Once you see your draw, you should write your vote (B or R) in the column labeled "your vote." At the end of each period, the monitor will announce the group decision and the color of the cup that was actually used. Record the group decision (blue or red) in column (2) and the color of the cup actually used for the draws in column (3). Recall that if at least ten of the twelve people voted "R," and the red cup was actually used, then each of you earns $4. However, if at least ten of the twelve people voted "R" and the blue cup was actually used, then each of you earns nothing. If fewer than ten

people vote "R," the group decision is blue, and you each earn $4 if the blue cup was actually used or $2 if the red cup was actually used. Notice that the payoff for an incorrect group decision of blue is higher than the payoff for an incorrect group decision of red. You should record your earnings for the period in column (4) and keep track of your cumulative earnings for all periods in column (5).

Before we begin the periods that determine your earnings, we will go through one practice period. In this practice period, the monitor will throw the die that determines which cup will be used, and you will each see a draw from that cup. However, unlike in the periods that determine your earnings, you will observe the throw of the die, your draw will not be private, and you will not be asked to vote in this practice period.

At this time the monitor will throw the die that determines which cup is to be used. Remember that the blue cup is used if the throw is 1, 2, or 3, and the red cup is used if the throw is 4, 5, or 6. Now we will come to the desk of each person and show them a private draw from the unmarked container. If this were not a practice period, this person would record the color of the ball (b or r) in column (0). Recall that each person will have one private draw with the ball being replaced after each draw. After each person has seen a private draw, each person should record a vote, B or R, in the column labeled "your vote." Then we will come to each desk and tally the total number of B and R votes.

Are there any questions before we begin the periods that determine your earnings? Please do not talk with anyone during the experiment. We will insist that everyone remain silent until the end of the last period. If we observe you communicating with anyone else during the experiment, we will pay you your cumulative earnings at that point and ask you to leave without completing the experiment.

At this time, the monitor will throw the die that determines which cup is to be used. Remember that the blue cup is used if the throw is 1, 2, or 3, and the red cup is used if the throw is 4, 5, or 6. Now we will bring the container to each person's desk and draw a ball from the unmarked container. After you see a private draw, record the color of the ball (b or r) in column (0), and then we will return the ball to the unmarked container before approaching the next person.

Part II (Was Distributed After All Ten Periods of Part I Were Completed)

The group decision will be determined differently for the remaining periods of the experiment. The group decision is red if all of the 12 people vote "R." Otherwise, if one or more people vote "B," the group decision is blue. Notice that we require a unanimous vote to make red the group decision, but if any one person votes "B," then the group decision is blue. The contents of the cups and the payoffs will remain the same as summarized on your new Decision Sheet.

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Trading Portfolios: The Stability of Coalition Governments

Betul Demirkaya and Norman Schofield

1 Introduction

In many parliamentary systems, it is quite often the case that a single party fails to win the majority of the seats and, consequently, governments are formed by two or more parties. The interrelated topics of the formation and the stability of coalition governments have been extensively studied both theoretically and empirically in the political science literature. Several studies address the questions of who enter coalition governments, and how ministries are distributed among the coalition partners. The answers to these questions fall along two lines: Spatial models focus on the ideological position of parties while portfolio allocation models treat ministries as benefits to be shared by the parties in the government.

The existing literature provides compelling arguments that explain the number and the characteristics of parties that form coalition governments as well as how they share ministries. Most studies assume, however, that all parties have similar emphasis on different policy areas. From previous work, we know that this assumption is not accurate. In particular, there are niche parties that are distinguished from the mainstream ones by the issues that they have on their agenda. Instead of placing themselves on the existing ideological spectrum, these parties emphasize one or a few issues that are not discussed by the mainstream parties (Meguid 2005). Since these parties appeal to their constituency on the basis of these issues, we would expect them to be more interested in the ministries that are related. For instance, the ministry of environment would be more valuable for an environmentalist party than it is for a mainstream party.

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In this paper, we explore the question of how the inclusion of a niche party influences the allocation of ministries in coalition governments. In particular, we ask whether niche parties have an advantage because of higher values that they place on certain ministries that the other parties are less interested in. Following the literature on portfolio allocation, we assume that parties try to maximize their payoffs from the ministries that they receive in the coalition. We allow the possibility that some parties value certain ministries more than other parties do. This is because parties would receive more payoff from the ministries related to the issues that are salient for their constituency. If a party is not concerned with a certain issue, it may be more willing to give up the related ministry. In what follows, we provide a simple model where two parties are dividing a portfolio of three ministries. We limit our attention to stable coalitions and compare the stable coalitions formed by two mainstream parties with those formed by a mainstream party and a niche party.

2 Literature

The questions regarding the composition of coalition governments relate to the size of the coalition and the characteristics of the parties in the coalition. In his seminal theoretical work on the size of coalitions, Riker (1962) argues that the number of parties in the coalition is determined by the minimum number of parties that is sufficient to form the coalition. The number of oversized coalitions that we observe gives us sufficient reason to doubt the completeness of Riker's argument, referred to as the size principle. The size principle was later complemented to incorporate the ideological position of parties. Accordingly, the expectation is minimum connected winning coalitions, that is, coalitions formed by parties that are next to each other on the ideological spectrum, and have sufficient number of seats to form the government. The implication of this argument is that we can observe oversized coalitions whenever a small party is placed ideologically between parties that have sufficient seats to form the government (Axelrod 1970). Another explanation for oversized coalitions is provided by Groseclose and Snyder (1996), who argue that minimal winning coalitions may be more costly than supermajority coalitions because in the latter, it is harder for the outsiders to form an alternative coalition. Volden and Carrubba (2004) empirically test the arguments on the size of coalitions and find out that oversized coalitions are more likely to be formed in ideologically diverse legislatures and when passing bills is hard. They explain this by the tendency of parties in the coalition to engage in logrolling. In our model, we will limit our attention to minimal winning coalitions; however, it is worth exploring how ministries are distributed if oversized coalitions are formed in future work.

Laver and Shepsle (1996) provide a spatial analysis of the stability of coalition governments, which brings together the questions of which parties enter coalition governments and how ministries are distributed among these parties. In their model, the relative position of parties in two policy dimensions is taken into consideration. The coalition is more likely to be stable when ministries are given to the parties that have the median position in the respective policy dimensions. In this model, parties

are not concerned only with maximizing the number of ministries that they receive from a coalition. Instead, they try to enter coalitions with parties closer to their ideological positions because they care about both policy dimensions. Therefore, parties that have the median position have a stronger hand in bargaining than extreme ones. In the extreme case, if the majority of the parties prefer to give all ministries to a certain party because of ideological proximity, this party, referred to as "very strong party" can form a minority government. Martin and Stevenson (2001) find empirical support for this argument that the ideological proximity of parties to other potential coalition partners makes it more likely that they enter a coalition. Along similar lines, Martin and Vanberg (2003) show that coalition negotiations take longer when parties are ideologically distant from each other. In this paper, we will set aside the ideological positions of coalition partners and focus on the weight that they place on different issues. Hence, the distinction we make between parties is not based on a placement of parties on a single ideological space but it is a matter of emphasis on different dimensions or issues.[1] Hence, our analysis is more akin to the models of portfolio allocation than on spatial models.

Gamson's (1961) theory of coalition formation underpins the extensive literature on the question of portfolio allocation in coalition governments. According to the main hypothesis of the theory, "any participant will expect others to demand from a coalition a share of the payoff proportional to the amount of resources which the contribute to a coalition." (p. 376) Therefore, any participant would prefer to form the "cheapest winning coalition," that is the coalition in which her share of the resources in the coalition is as large as possible. The application Gamson's theory to formation of coalition governments led to the following hypothesis, which was supported by several empirical studies.[2] The number of ministries allocated to each party is expected to be proportional to its seat share in the parliament. More recent work incorporated the importance of ministries into their analyses as well. Warwick and Druckman (2001) argue that the number of ministries is not sufficient to assess the relative payoffs of coalition partners but the salience of ministries is equally important. In their later work, they use an expert survey to evaluate the value of different ministries. When the payoffs of parties are weighed according to the importance of ministries, the proportionality hypothesis continues to hold (Warwick and Druckman 2006). Warwick and Druckman's contribution is important in pointing out the variance in the salience of ministries; however, they assume that the weights placed on ministries will be the same across parties. The main contribution of our model is to relax this assumption and discuss its effects on portfolio allocation.

The hypothesis on proportionality has been important in shaping the literature on portfolio allocation. It is important to note, however, that the hypothesis states the demands of the coalition partners rather than the distribution of payoffs as a result of a bargaining process. As it does not take into account the relative bargaining power of players, it contradicts with the main results of theoretical literature on

[1] This is along the lines of Meguid's (2005) definition of niche parties.

[2] See, for example, Browne and Franklin (1973) and Schofield and Laver (1985).

bargaining. In the alternating offer bargaining model of Baron and Ferejohn (1989), the player that is recognized as the proposer receives a payoff that is significantly larger than her share of votes. Based on this model, Snyder et al. (2005) point out that in an alternating offer bargaining model where recognition probability is proportional to voting weight, the expected payoff for players with small voting weight is disproportionately larger. These models imply that the formateur would have received a disproportionate share of the ministries in coalition governments.

In order to bridge the gap between the well-supported empirical regularity based on Gamson's hypothesis and the theoretical expectation of Baron and Ferejohn model, Morelli (1999) offers a model of demand competition. In this model, bargaining takes place as a sequence of demands made by all the players, and the order of play is determined by the proposer. Unlike the Baron and Ferejohn model, the proposer does not receive a disproportionate share of payoffs in the demand competition model. The distribution of payoffs in equilibrium is in fact very similar to the Gamson's hypothesis with an important difference. What determines the distribution of payoffs is not the vote share of the players per se but their bargaining power defined in terms of the number of winning coalitions that a party can participate. For example, consider a bargaining game in which the votes shares of the three players are 49, 49, and 2, and the decision is made with majority rule. Since none of the players has the majority and any two players can form a coalition, all three players have equal bargaining power. Thus this model questions the use of seat share in the parliament as the explanatory variable for portfolio allocation.[3]

In another recent attempt at accounting for the discrepancies between theoretical and empirical literature on coalition formation, Bassi (2013) models the recognition of the proposer as an endogenous process. In her model, parties bargain over being the formatter before they negotiate over portfolios. As a result, the formateur loses her advantage in the distribution of ministries because she needs the support of other parties to be recognized as the formateur. When the preferences of parties over ministries are the same, this model leads to the same distribution of resources as Gamson's hypothesis. When some parties value some ministries more than others, the proportionality is not perfect because proportional distributions may not be Pareto-efficient. Bassi's model is important in incorporating the fact that different parties emphasize different policy areas in the study of formation of coalition governments. In this paper, we also place emphasis on this fact; however, the focus of our model is on the stability of coalition governments.

While there is ample empirical support for the proportionality hypothesis, many studies also point out to its restrictions. In particular, it was argued that small parties may acquire a disproportionate number of ministries. Browne and Franklin (1973) find that while the proportionality holds for larger coalition partners, the situation for small coalition partners is different. When the number of parties in the coalition is small, small partners receive more than their seat share. This relationship is reversed

[3]For a comparison of Gamson's hypothesis, Baron and Ferejohn model, and demand competition model in an experimental setting see Frechette et al. (2005).

as the size of coalitions increases. Schofield and Laver's (1985) analysis shows that Gamson's hypothesis is a good predictor in countries such as Austrian and Germany where there are fewer parties in the political system, and where governments are formed on the basis of ideology and last longer. Similarly, Verzichelli (2008) shows that disproportionality is observed in fragmented political systems. He also points out that the number of the ministries is not fixed and may change over time depending on the negotiations among coalition partners. Ansolabehere et al. (2005) use a measure of bargaining power instead of seat shares to predict the allocation of ministries. They show that when bargaining power is used instead of seat share, there is a substantial advantage of being the formateur; however, this advantage is not as large as that would be predicted by the Baron and Ferejohn model. In addition, smaller parties have higher payoffs than predicted by the model.

3 Stability of Coalitions

The discussion on the stability of coalitions is not divorced from the one on the formation of coalitions. The setup for the stability concepts implicitly relies on a bargaining environment where the players can communicate with each other. The idea of stability is based on the satisfaction of all coalition partners with their payoffs from the coalition. If we expect a coalition to last, the players that are involved in the coalition should not be able to receive better payoffs elsewhere. The goal is to come up with the range of self-reinforcing coalitions in the absence of an outside enforcement mechanism. From the perspective of political parties, it is more reasonable to enter into coalitions that will last given that there is nothing that precludes their partners to leave the coalition and cooperate with other parties. Hence, it is reasonable to expect some stability and the notions of stability that will be discussed below would be helpful in making predictions about the coalitions that are more likely to be formed.

Aumann and Maschler (1964) introduce the notion of M_1 bargaining set to identify the set of stable coalitions that may result from bargaining. The basic idea behind this notion is the following: A coalition member that is not satisfied with her payoff from the coalition may threaten her individual coalition partners with getting into a coalition in which she can receive a higher payoff and give enough payoff to all members of the new coalition. This threat will not be very strong if the threatened coalition partner can also come up with an alternative coalition in which she can maintain her payoff from the original coalition and give enough payoff to all the members of the new coalition. A coalition will be stable only if it is safe from all the strong threats by each member of the coalition against each other member. M_1 bargaining set was proved to be nonempty for cooperative games (Peleg 1963). While M_1 bargaining set proved to be a useful notion to think about stability of coalition governments, Schofield (1978) points out that it includes counterintuitive outcomes where the payoffs are distributed inequitably. Therefore, he defines another solution concept M_2, which is a subset of M_1 bargaining set.

The difference of the M_2 bargaining set is that it includes coalitions in which not only individuals but groups in the coalition are safe from threats. This narrower set excludes those coalitions with unequal distribution of payoffs among coalition members. The formal definitions of M_1-*stable* and M_2-*stable* coalitions are below:

Let (M, x) be a winning coalition defined by a set M of players and a vector x of payoffs assigned to each player. Let x_i denote the payoff that player i receives from coalition (M, x). Assume $x_i = 0$ for all $i \notin M$, and $x_i \geq 0$ for all $i \in M$.

Definition 1 Let j and k be players in coalition M.

An *objection* by player j against individual k with respect to coalition (M, x) is a winning coalition (N, y) such that

$k \notin N$
$y_j > x_j$
$y_i \geq x_i$ for all $i \in N$

A *counter objection* by player k against player j's objection is a winning coalition (P, z) such that

$j \notin P$
$z_k \geq x_k$
$z_i \geq y_i$ for all $i \in P$

Definition 2 Let $K \subset M$ be a group of players in coalition M such that $j \notin K$.

An *objection* by player j against group K with respect to coalition (M, x) is a winning coalition (N, y) such that

$i \notin N$ for all $i \in K$
$y_j > x_j$
$y_i \geq x_i$ for all $i \in N$

A *counter objection* by group K against player j's objection is a winning coalition (P, z) such that

$j \notin P$
$z_i \geq x_i$ for all $i \in K$
$z_i \geq y_i$ for all $i \in P$

Definition 3

A coalition (M, x) is M_1-*stable* if to any objection against an individual k, the individual k can respond with a counter objection.
A coalition (M, x) is M_2-*stable* if to any objection against a group K, the group K can respond with a counter objection.

M_2 bargaining set produced useful results that substantiate the discussions on portfolio allocation. It will be helpful to discuss these results separately for two different types of games. In games with transferable value, the minimal winning coalition has a value, which is then distributed among coalition partners. As the number of partners increases the total value of the coalition increases at a decreasing rate. In these games, if the M_2 bargaining set exists, it only includes symmetric

(equal) distribution of payoffs (Schofield 1978). In log rolling games, each player receives positive payoff from her favorite bill, and negative payoff from any other bill. There are no players that have the same bill as their favorite bills. In these games, the M_2 bargaining set exists and it only includes those coalitions where each partner in the coalition gets the bill she wants and the outsiders get nothing (Schofield 1980). These findings provide theoretical justification for Riker's size principle. Empirical tests show that bargaining set provides a good predictor of portfolio allocation in fragmented political systems, in which the proportionality hypothesis fails (Schofield and Laver 1985).

The problem of portfolio allocation that we are interested in this paper is different from the transferable value games. The total value of the coalition is not determined only by the number of the parties included in the coalition. When the players assign different values to ministries, a coalition with the same players may have a different total value depending on how the ministries are allocated to the players. Hence, the pie to be divided in the question is not uniform but some players value certain slices more than other players do. Obviously, in order to maximize the total value of the coalition, the ministries should be given to the parties that value them the most. In this case, if there is a party that values a ministry that is not valued a lot by the other parties, we may expect it to be a desirable coalition partner because it would be cheaper to include that party in the coalition.

4 Model

There are three parties—A, B, and C—that can form a coalition government. Each party has one vote and forming a coalition requires two votes. The cabinet consists of three ministries. Each party assigns a value to each ministry. The values assigned to ministries are denoted by the vector $v_i = (v_{i1}, v_{i2}, v_{i3})$ where v_{ij} refers to the value that party i assigns to ministry j. We standardize the total value of having all three ministries to 100 for each of the parties, that is, $v_{ij} + v_{ij} + v_{ij} = 100$ for all i. Each coalition is an allocation of the three ministries to the parties in the coalition. We assume that any party in the coalition will get at least one ministry[4] and we denote coalitions by an ordered triple that shows which ministries are allocated to which parties. For example, AAB refers to a coalition where party A gets the first two ministries, and party B gets the third ministry. Party i's payoff from coalition M, denoted by $u_i(M)$, is the sum of values the party assigns to the ministries that it gets under that coalition. For example, $u_A(AAB) = v_{A1} + v_{A2}$.

We apply the solution concept of M_2-*stability* in a portfolio allocation problem, in which we allow players to value ministries differently. In particular, we are

[4]It is trivial to show that any coalition where one of the parties does not get any ministries is not stable.

interested in the question of which two-party coalitions are M_2-*stable* in the following two cases[5]:

Case 1: All three parties have the same preferences about the ministries, that is, $v_A = v_B = v_C = (a, b, c)$. Without loss of generality, we assume that $a > b > c > 0$. Hence, we allow each party to assign different values to different ministries; however, the relative value of the ministries is the same for all three parties.

Case 2: Two of the parties—A and B—have the same preferences but the third party—C—has different preferences. We have two different vectors to denote the preferences of parties: $v_A = v_B = (a, b, c)$ where $a > b > c > 0$, and $v_C = (x, y, z)$ where $x, y, z > 0$. We can think of parties A and B as mainstream parties and Party C as a niche party that has a different assessment of the salience of policy issues.

Proposition 1 *In Case 1 with the same value vectors for all parties, a two-party coalition is M_2 stable if and only if one party takes the most-valued ministry and the other party takes the other two ministries. For example, the stable coalitions formed by parties A and B are ABB and BAA.*

In the baseline case, where all parties have the same preferences, we observe a relatively equitable distribution of payoffs, which is in line with the findings of Schofield (1978). The obstacle against a completely equitable distribution is the fact that the number and the value of ministries are fixed. The stable coalition has the distribution that is as equal as possible given this restriction. A formateur party that wants to form a stable coalition government has to give up either its favorite ministry or the other two ministries to its coalition partner. In that case, the coalition partner cannot come up with a threat of a coalition with an outsider in which it would both be able to get a better payoff and provide the outsider an offer that cannot be matched by the formateur. Otherwise, the coalition partner may threaten with forming a coalition with the third party giving that party the most-valued ministry.

Proposition 2 *In Case 2, where Party C has a different value vector,*

M_2 stable coalitions formed by Party A and Party B are ABB and BAA.
M_2 stable coalitions formed by Party A and Party C are
ACC
CAA if $x > y$ and $x > z$
CAC if either of the following conditions hold
$y \geq x + z$
$a \geq b + c$ and $y \geq x$
CCA if $z \geq x + y$

In the case where one of the parties has preferences that are different from the other two parties, the stable coalitions formed by the parties with the same

[5]Note that for two-party coalitions the definitions of M_1 stable and M_2 stable will be the same because an objection can be made against only one party.

preferences are exactly the same as the baseline case. Similar to the baseline case, the formateur can always match the offer made by its coalition partner to the outsider party when the payoff distribution is relatively equal. Otherwise, the coalition partner can always threaten to form a coalition that gives both itself and the outsider more than what was/could be offered by the formateur.

The difference between the baseline case and the second case can be seen in the stable coalitions in which the party with the different preferences participates. When we look at the possible stable coalitions between Party A and Party C we see that more options are available. When we consider coalitions in options (c) and (d) with their respective conditions, however, we note that those coalitions are not Pareto optimum, that is, parties could divide the ministries in a way that would make both parties better off. If Party C values the second ministry more than the first ministry, coalition ACC, which is M_2 stable, would be a better outcome than CAC for both parties. Similarly, if Party C values the third ministry more than the first two ministries, ACC would be a better outcome for both parties.

When we limit out attention to the Pareto optimum coalitions, we see obvious parallels between the stable coalitions formed by mainstream parties and those that include the niche party. The coalition ACC, where Party A gets its favorite ministry, is always stable. The coalition CAA, however, is only stable if the first ministry is the favorite ministry of Party C as well. In other words, if one of the mainstream parties wants to get into a stable coalition with the niche party which emphasizes an issue different from the mainstream party, the only option the mainstream party has is to take its favorite ministry and give up the other two ministries. Otherwise, the niche party can threaten with getting into a coalition with the other mainstream party where the niche party gets its favorite ministry.

In order to think about the implications of the propositions for the payoffs of different parties, we think of the situation where one of the parties is the formateur and gets to choose between the stable coalitions that it can form. First, the advantage of being the formateur is weakly greater for Party C. When Party A and Party C have the same favorite ministry, their options are the same. They either take the first ministry, which is the favorite ministry of both, or they take the second and the third ministries. When Party C has a different favorite ministry, its only option is to give its partner the first ministry. This option means, however, that Party C gets its favorite ministry and an additional ministry. Second, when Party C is not the formateur, it is a weakly less desirable coalition partner. When Party A and Party C have the same favorite ministry, Party A would be indifferent between A and C. When Party C has a different favorite ministry, CAA is not an option anymore; therefore, Party A would prefer Party B if Party A's utility from taking the second and the third ministries is higher than the utility from taking the first ministry. The following example illustrates these implications.

Example Consider the case where parties assign the following values to the ministries.

$$v_A = v_B = (45, 35, 20) \text{ and } v_C = (35, 45, 20)$$

If Party A is the formateur, it gets to choose among coalitions ABB, ACC, and BAA. If Party C is the formateur, it gets to choose between coalitions ACC and BCC. The utilities that the two parties get from each of these options are the following:

$$u_A(ABB) = u_A(ACC) = 45$$
$$u_A(BAA) = 55$$
$$u_C(ACC) = u_C(BCC) = 65$$

Now we can compare the situation of parties when they can choose the coalition that they want to form. Although Party A seems to have more options to choose from, we see that Party C can get higher utility because its options involve taking the second ministry, which is its favorite ministry, as well as the third. When Party C is not the formateur, however, it can find itself at as disadvantage because it would be a less desirable coalition partner. Compare parties B and C in this example. When Party A is the formateur, it would prefer Party B as the coalition partner because its utility from coalition BAA is higher than its utility from coalition ACC, which is the only stable coalition that parties A and C can form.

This is contrary to our expectation that Party C would have an advantage in coalition bargaining because it would be "cheaper" to buy. This happens because ACA is not a stable option although it is the coalition with the highest total value. Party C can object to ACA with coalition BCC against Party A cannot have any counter objection. Hence, having a different preference is both the strength and the weakness of Party C in coalition bargaining. When Party C has a favorite ministry that is different from the other two parties, it gets to keep it in addition to another ministry. Precisely because ACC is the only stable coalition that Party A can form with Party C, Party C becomes a less desirable coalition partner. In a way Party C cannot commit to not asking for more.

5 Conclusion

The literature on coalition governments has come a long way in explaining the size of coalitions, the characteristics of coalition partners as well as the distribution of ministries among them. The predictors for the portfolio allocation that were widely discussed are the seat share and the ideological position of the parties. Another important factor that influences the bargaining power and the decisions of the parties is their preferences over ministries. The general assumption in portfolio allocation studies is that all parties want to maximize the number of ministries that they have. Even when the salience of ministries was considered, it was usually assumed that the desirable ministries were the same for all the parties in question. In this paper, we relax this assumption, and ask whether niche parties that are likely to place more emphasis on certain ministries than mainstream parties would have an advantage in bargaining over portfolios.

In answering our question, we use the notion of stability because it takes into account the options that parties have, and identifies the coalitions that would be self-reinforcing. We set up a simple problem of division of three ministries among two coalition partners, and compare the payoffs received by mainstream and niche parties in the stable coalitions. The payoffs in the coalitions are fairly equitable in coalitions formed by two mainstream parties. In this case, the only stable coalitions formed by two mainstream parties are those in which one of the parties receives the most-valued ministry and the other party gets the other two ministries. When a coalition is formed between a mainstream party and a niche party, however, the latter has a slight advantage. In this case, the only stable coalition is the one in which each party receives its most-valued ministry, and the niche party receives the third ministry. Hence, it is possible for the niche party to form stable coalitions with larger payoffs; however, this may end up being a disadvantage as the niche party may be considered as a less desirable coalition partner.

While our model provides an attempt to answer a question that was not widely discussed in the literature, there is a lot of room for future research. First, the model can be extended to more than three ministries to see whether the results would be similar. Second, parties with different seat shares can be incorporated in the model. This is particularly important since niche parties usually have smaller seat shares in the parliaments.

Appendix

Proof of Proposition 1 Consider the coalition *ABB*. To any objection that Party A can make, Party B can respond by making the same offer to Party C, and vice versa. Consider the coalition *ABA*. Party B can object with *BCC* against which Party A does not have any counter objection. Consider the coalition *AAB*. Party B can object with *CBC* against which Party A does not have any counter objection. The cases for coalitions *BAA*, *BAB*, and *BBA* are symmetrical.

Proof of Proposition 2 The proof for the stable coalitions formed by parties A and B is the same as the proof for Proposition 1.

For the stable coalitions formed by parties A and C:

1. [(a)]
2. Consider the coalition *ACC*. To any objection that Party A can make, Party C can respond by the counter objection *BCC*. To any objection that Party C can make, Party A can respond by making the same offer to Party B.
3. Consider the coalition *CAA*. To any objection that Party A can make, Party B can respond by the counter objection *CBB*. To any objection by Party C, where Party C gets two ministries, Party A can respond by making the same offer to Party B. If $x < y$, however, Party C can also object with coalition *BCB* against which Party A has no counter objection. Similarly, if $z < y$, party C can object with coalition *BBC* against which Party A has no counter objection.

4. Consider the coalition *CAC*. To any objection that Party C can make, Party A can respond by making the same offer to Party B. If Party A objects with *ABB*, Party C can respond by the counter objection *BCC*; however, for this counter objection to be possible we should have $a \geq b + c$ and $y \geq x$. Alternatively, Party C can respond by the counter objection *BCB* if $y \geq x + z$. If Party A objects with *BAA*, Party C can respond by the counter objection *BCC*. However, for this counter objection to be valid, we should have $y > x$, which is an easier condition than the ones listed in the Proposition. Finally, if Party A objects with *ABA* or *AAB*, Party C can respond by the counter objection *CBC*.
5. Consider the coalition *CCA*. To any objection that Party C can make, Party A can respond with the counter objection *BBA*. If Party A objects with *BAB*, Party C can respond by the counter objection *BBC*; however, for this counter objection to be possible we should have $z \geq x + y$. The conditions for responding to other possible objections by Party A are easier to satisfy. Party C can respond to objection *ABB* with *BBC* if $z \geq x + y$ or with *BCC* if $a \geq b + c$ or $z \geq x$. It can respond to objections *ABA* with *BCC* if $z \geq x$. Finally, it can respond to objection *AAB* with counter objection *CCB*.
6. Consider the coalitions *ACA* and *AAC*. Party C can object with *BCC* against which Party A cannot have any counter objection.

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A Median Activist Theorem for Two-Stage Spatial Models

Daniel M. Kselman

1 Introduction

Beginning with Downs (1957), the spatial model of electoral competition has been a staple of formal political theory. Downs demonstrated that, given a series of restricting assumptions (e.g. full turnout, single-peaked preferences, one-dimensional competition, etc.), candidates in two-party elections will, in equilibrium, adopt the *median voter's* most-preferred policy position as a campaign platform. This seminal result has spurred subsequent authors to better understand the conditions under which Nash Equilibria might be characterized by more dispersed, or extreme, campaign platforms (e.g. Davis and Hinich 1966; Davis et al. 1972; Wittman 1983; Calvert 1985; Cox 1987, 1990; Roemer 1994, 2001; Schofield 2006). One key field in this subsequent research has focused on *primary elections* as an important centrifugal force in democratic politics. Authors in this field have developed *two-stage* models in which candidates must first compete in an intra-party election; and then, if victorious in this first stage, move to a general election contest against a

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candidate from the competing party (e.g. Aaronson and Ordeshook 1972; Coleman 1972; Owen and Grofman 2006; Adams and Merrill 2008; Serra 2011).

Although a highly diverse set of papers full of distinct insights, this body of work shares two basic conclusions: (a) primary elections force candidates to cater to core party activists, and (b) in so doing they generate campaign platforms which diverge significantly from the median voter's ideal point. However there in fact exists a good deal of variance across both time and space in the extent to which primary elections induce candidates to cater to parties' core supporters. For example, Hirano et al. (2010) demonstrate that primary elections need not be associated with extremism in legislative roll-call voting; and McGhee et al. (2014) demonstrate that the relative openness of primary elections has little effect on candidate extremism.

In this paper, I present an amendment to the traditional candidate utility function in which candidates attach different payoffs to the outcome {Win Nomination, Lose Election} as compared to simply losing their primary (which implies by definition "not winning" the general election...). With this new utility function in hand, I then develop a *median activist theorem* which identifies a sufficient condition for candidates to adopt their core supporters' most-preferred position as a campaign platform. As it turns out, when this condition is not met there exist Nash Equilibrium outcomes to the game in which candidates from both parties can avoid being constrained to electorally non-viable positions by their core activists.

This paper takes an initial step in specifying the sufficient conditions for median-activist equilibria. The more ambitious task of exhaustively solving the model, and developing clear predictions as to the conditions under which primaries generate party system dispersion, is left for a larger paper currently in draft form (Kselman 2014). That said, I address the framework's broader implications in the current paper's concluding discussion. The following section presents the model's basic structure, and Sect. 3 then derives the aforementioned median activist theorem. Section 4 concludes. All proofs are presented in an accompanying theoretical appendix.

2 Actors, Action Sets, and Utility Functions

Two political parties L and R must choose a single candidate for a general election, and then run against one another in a general election.[1] Exactly two candidates will compete within each party for the nomination, labeled $L1$ and $L2$ ($R1$ and

[1]The language in this descriptive section follows fairly closely that in Kselman (2014), the larger paper which solves the current model more exhaustively.

$R2$) in party L (R). Consider the following utility function for candidate $C \in \{L1, L2, R1, R2\}$:

$$U_C = \begin{cases} 0 & \text{if} \quad \textit{lose primary} \\ n & \text{if} \quad \textit{win primary, lose general} \\ g & \text{if} \quad \textit{win primary, win general} \end{cases}. \tag{1}$$

I will assume throughout that $g > n, 0$, i.e. that candidates' most-preferred outcome is to win both the intra-party contest and the general election; and I will fix the size of n and g to be equal for all four candidates.

Electoral competition takes place in a single spatial dimension $x = [0\,1]$. All voters have a most-preferred policy position, or *ideal point*, in this dimension labeled $x_i \in [0\,1]$. Voter ideal points can be described by the continuous probability density function $f(x)$. The *median voter's* ideal point x_m is thus defined implicitly by the expression $\int_0^{x_m} f(x)\,dx = \frac{1}{2}$. In the game's 1st stage all four nomination candidates announce policy positions x_C. In the game's 2nd stage parties hold internal elections in which intra-party voters must choose between their parties' two potential nominees. Define x_P as the policy position of the candidate who emerges victorious from party P's primary election ($P \in \{L, R\}$). In the game's 3rd stage a general election is held in which all voters must choose between x_L and x_R. Both primary and general elections will be decided by plurality rule. Since only two individuals compete in all contests, a winning primary candidate must gain the votes of just over 50 % of his or her party's internal selectorate, while a winning general election candidate must gain the votes of just over 50 % of all voters. I will assume throughout that candidate platforms are fixed once they announce a platform in stage 1, and that the policy platform of the general election's winning candidate is implemented.[2]

Assume that primary voters in party L (R) have ideal points $x_i < x_m$ ($x_i > x_m$). Define $\underline{x}_P$ and $\overline{x}_P$ as the primary voters in P with the lowest and highest ideal points respectively, and let $f_P(x)$ be the continuous probability density functions which describe the distribution of primary voters over the support set $[\underline{x}_P, \overline{x}_P]$. In turn, define $x_{P,m}$ as the ideal point of the *median activist* in P, implicitly obtained with the expression $\int_{\underline{x}_P}^{x_{P,m}} f_P(x)\,dx = \frac{1}{2}$. For a left-party candidate $C \in \{L1, L2\}$, define $q_{c|x_R}$ as the probability that C would win the general election, given that x_R is party R's general election platform. Consider the following utility function of a

[2] While this is consistent with past two-stage models, interesting extensions would allow candidates to alter their policy between the primary and the general elections, or between the election and the policy implementation stage.

primary voter in party L for candidate C, given some general election platform x_R (a qualitatively identical expression applies for activists in R):

$$u_i\left(C \mid x_R\right) = \left\{ \begin{array}{c} \left\{q_{c|x_R} \cdot \left[-(x_i - x_C)^2\right]\right\} + \left\{\left(1 - q_{c|x_R}\right) \cdot \left[-(x_i - x_R)^2\right]\right\} \\ + \left\{\alpha_i \cdot \left[-(x_i - x_C)^2\right]\right\} \end{array} \right\}. \tag{2}$$

Note first that in the event that candidate C wins the general election, the policy x_C is implemented, while in the event that R wins the policy x_R is implemented (I use quadratic loss functions to model spatial preferences). In turn, the first two terms in (2) represents the expected utility over a lottery between x_C and party x_R. The second term in (2) corresponds to i's "sincere" or "purist" interest in choosing a candidate who mirrors her policy position regardless of electability (hence the absence of $q_{c|x_R}$). In past two-stage models, primary voters were assumed to be motivated by *either* policy *or* "representation"; a further innovation of this paper to include both terms in the primary voter utility function. The further a candidate's platform choice from i's ideal point, the less ideologically satisfied i will be with the platform (hence the use of a standard loss function). The variable α_i captures the emphasis that i puts on choosing an ideologically representative candidate, holding considerations of electoral viable constant. Equation (2) can be rewritten as:

$$u_i\left(C \mid x_R\right) = -\left\{\left(q_{c|x_R} + \alpha_i\right) \cdot (x_i - x_C)^2\right\} - \left\{\left(1 - q_{c|x_R}\right) \cdot (x_i - x_R)^2\right\}. \tag{3}$$

2.1 Voting Rules

In the general election non-party members will vote for the party whose platform x_P is closest to their most preferred policy position x_i. As for primary voters, it might be the case that concerns of representation persist to the general election. For example, those dissatisfied with their party's nominee might choose to *protest vote* for the opposing party, even if their own party's platform is closer to their ideal point (Kselman and Niou 2011). On the other hand, the selective and symbolic consequences of party membership might induce them to support their own party, even if the opposing party's platform is closer to their ideal point. Since arguments go both ways I will assume that, in the general election, party members also choose the party whose platform is located closest to their ideal point. This leads to the following median voter result:

Lemma 1 *For* $P, \sim P \in \{L, R\}$, P *wins the general election if* $|x_P - x_m| < |x_{\sim P} - x_m|$.

If one party platform is closer than the other to the median voter's ideal point, the closer party wins the general election. If both parties' platforms are equidistant from x_m, then each party wins with probability $\frac{1}{2}$.

The fact that platforms remain constant between the primary and general elections means that primary voters can calculate a candidate's probability of winning the general election. Given some platform x_R we know that for $C \in \{L1, L2\}$ the parameter $q_{C|x_R}$ assumes one of three values (once again, a qualitatively identical expression applies for primary voters in R):

$$q_{C|x_R} = \begin{cases} 0 & \text{if} \quad |x_C - x_m| > |x_R - x_m| \\ \frac{1}{2} & \text{if} \quad |x_C - x_m| = |x_R - x_m| \\ 1 & \text{if} \quad |x_C - x_m| < |x_R - x_m| \end{cases} . \tag{4}$$

Primary voters will choose the candidate which maximizes their expected utility. Given some policy x_R each primary voter in party L could substitute x_{L1} and x_{L2}, as well as the implied values of $q_{L1|x_R}$ and $q_{L2|x_R}$, into Eq. (2), and then choose the nomination candidate which yields higher utility.[3] Primary voters are thus in a strict sense non-strategic, as their vote choice is not a best response to the choice of other primary voters. However, their choice *is* strategic insofar as it takes into account general election viability.

If both x_{L1} and x_{L2} are closer to x_m than x_R, then both $q_{L1|x_R}$ and $q_{L2|x_R}$ will be equal to 1, and primary voters can choose solely based on concerns of representation (i.e. choose whichever candidate is closer to their ideal point). In other cases, it may be that one primary candidate would defeat x_R in an election but is fairly dissatisfying on "representational" grounds while the other candidate would lose the general election to x_R but is more satisfying in representational terms. The parameter α_i then exerts an important impact on primary voter choice. Note also that primary voters' most-preferred nomination candidate may depend on who wins the opposing party's primary. For example, if $L1$ ($R1$) chooses a more moderate stance than $L2$ ($R2$), left-leaning primary voters in L might prefer $L1$ if the opposing party's nominee is $R1$, but $L2$ if the opposing party's nominee $R2$. These voters would only be incentivized to choose a moderate candidate if the other party's nominee is also moderate. The following convergence result is thus essential for deriving clear equilibrium outcomes. While it has been implied in past papers, this paper's appendix contains an exhaustive proof.

Lemma 2 *In any pure strategy Nash Equilibrium, it must be the case that both* $x_{L1} = x_{L2}$ *and* $x_{R1} = x_{R2}$.

This Lemma restricts the set of possible pure strategy equilibria to those in which primary candidates from the same party adopt identical platforms, such that each wins the primary with probability $\frac{1}{2}$. The proof in Appendix 1 demonstrates that any strategy vector violating these conditions induces one of the game's four candidates to change their platform.

[3] If indifferent between their two nomination candidates, primary voters randomize; and if both primary candidates announce the same platform, each wins the nomination with probability $\frac{1}{2}$.

3 "Nomination-Seeking" Candidates

I define "nomination-seeking" candidates as those who attach some value to the outcome {Win Nominaiton, Lose General Election}, i.e. whose value of n is non-negligible. This preference-trait might be found, for example, in party systems where being the leader of one's party carries genuine professional and material benefits independent of those that come from holding office. It might also be true of candidates who seek to build a reputation by mounting a successful primary campaign, and competing in the general election. On the other hand, competing in a general election and losing may in fact imply certain reputational *costs*, and in the more extensive paper referred to earlier I consider cases in which $n < 0$. The empirical and theoretical determinants of the size of n should be the subject of future research.

I will define nomination-seeking candidates as those for whom $n > \frac{g}{3}$. To see where this threshold comes from, consider the game's payoffs when all of the four candidates choose the median voter's ideal point x_m as a platform. In this case each candidate wins his or her primary with probability $\frac{1}{2}$ (primary voters randomize); and conditional on winning the primary, subsequently wins the general election with probability $\frac{1}{2}$ (general election voters randomize). By the law of total provability, each thus receives $U_C = \left\{\frac{1}{2} \cdot 0 + \frac{1}{4} \cdot n + \frac{1}{4} \cdot g\right\} = \left\{\frac{n+g}{4}\right\}$. Compare this to n, the payoff to winning the nomination *without* winning the general election: the inequality $n > \left\{\frac{n+g}{4}\right\}$ can be rewritten as $n > \frac{g}{3}$. The criteria for nomination-seeking thus results from comparing the aforementioned lottery to the outcome {Win Nomination, Lose General Election}.

Given some platform x_R adopted by R's candidates, define $\hat{x}_{L,m}(x_R)$ as the *optimal platform* of L's median activist. This optimal platform always assume one of two values: $\hat{x}_{L,m}(x_R) \in \{x_{L,m}, (1 - x_R + \epsilon)\}$, where $\epsilon \to 0$ (Lemma 3 in the appendix). The median activist will always have as an optimal response to x_R either his or her own ideal point, or the platform which just barely defeats x_R in a general election with minimum "representational" sacrifice. If $x_{L,m} > (1 - x_R + \epsilon)$, then $\hat{x}_{L,m}(x_R) = x_{L,m}$, i.e. the median activist's ideal point itself would defeat x_R in a general election. If $x_{L,m} < (1 - x_R + \epsilon)$, then the median activist faces a potential conflict between his or her desire to choose adopt ideologically representative platforms and his or her interest in electoral viability. As such $\hat{x}_{L,m}(x_R)$ will depend in the size of $\alpha_{L,m}$. The platform $\hat{x}_{R,m}(x_L)$, defined as the optimal platform of R's median activist given some platform x_L, obeys the same properties. The current paper is the first, to my knowledge, to identify a set of conditions under which primary elections fail to tether candidates to their median activist's optimal platform.

As it turns out the "pivotalness" of median activists emerges only when $n > \frac{g}{3}$, i.e. when candidates are nomination-seeking. Denote Nash Equilibrium strategies x_L^* and x_R^*. I now present a *Median-Activist-Theorem* for nomination-seeking candidates.

Theorem 1 *As long as* $g > n > \frac{g}{3}$, *then in any pure strategy Nash Equilibrium* $x_L^* = \hat{x}_{L,m}(x_R)$ *and* $x_R^* = \hat{x}_{R,m}(x_L)$.

As long as candidates meet the nomination-seeking criterion, in any pure strategy Nash Equilibrium $L1$ and $L2$ will choose their median activist's most preferred platform given x_R, and vice versa. The result establishes a sufficient condition under which platforms will represent the two median activists' best responses to one another's policy choices. The proof of Theorem 1 depends on an important substantive assumption:

Assumption 1 $\alpha_i > 0$ *and is non-decreasing (or, alternatively, weakly increasing) in the extremism of activists' ideal points.*

The first element of Assumption 1, namely that $\alpha_i > 0$, is purely technical. It is straight-forward but tedious to show that all following results can be extended to cases in which some range of activists place *no* value on ideological purism. In contrast, Assumption 1's second element is substantive. It stipulates that, for example, for two activists in party L with ideal points x_i and $x_i^{'}$, if $x_i < x_i^{'}$ then $\alpha_i \geq \alpha_i^{'}$: "purism" (weakly) increases among more left-leaning party activists. It allows for a situation in which all activists from the same party have identical values of α. It excludes situations in which α_i varies either negatively or non-monotonically with activist extremism. The notion that those with more extremely held positions might be more dogged and less willing to compromise than moderates is not original to this paper, and appears in past research on primary elections (e.g. Abramowitz and Stone 1984, p. 51).

For the case in which $n > \frac{g}{3}$, Theorem 1 confirms the finding in past research that in any Nash Equilibrium primaries force candidates to choose their median activists' optimal policy (given their opponent's platform). On the other hand, as demonstrated in Kselman (2014), Theorem 1 need not imply party system dispersion, i.e. it does not imply that parties choose non-centrist positions in equilibrium. In fact, in some situations median activists' best response functions intersect precisely when all candidates adopt the median voter's ideal point. This is most likely to be the case when: (a) party members attach some non-negligible value to incumbency for its own sake, and (b) the median activist in both parties is fairly centrist. Centrism among party selectorates thus leads to a self-propelling dynamic by which both parties end up adopting the median voter's ideal point as a campaign platform, and winning with probability $\frac{1}{2}$.

The same paper (Kselman 2014) demonstrates that *Median-Activist Equilibria*, i.e. those in which both parties adopt their median-activists' ideal points as campaign platform, are most likely when one party's median-activist is much closer to the median voter than the party's. In such situations, the more "extreme" of the two median activists must ask him or herself: "Am I willing to suffer a significant loss in symbolic "ideological" satisfaction for the sake of winning an election, and implementing a fairly centrist policy." As long as α_i is fairly high, the answer will be "No", and the Nash Equilibrium will occur at the median activists' respective ideal points. In turn, the weight that the more extreme activist places on representation for its own sake becomes a crucial parameter.

To summarize: in the case of nomination-seeking candidates with $n > \frac{g}{3}$, primaries only lead to dispersed equilibria when party cadres are located asymmetrically around the median voter's ideal point, and when the more extreme party's cadre tends to be fairly dogged.

4 Conclusion

Once we move to the realm of "office-seeking" candidates, for whom $n < \frac{g}{3}$, the model's results diverge even further from those of past two-stage spatial models. In many situations, candidates may attach little to no value to the outcome {Win Nomination, Lose General Election}. Indeed, losing a general election may carry with it reputational costs that make $n < 0$, such that candidates would prefer to lose the primary altogether if they attach low probability to eventually winning the general election. Consider the aforementioned example, in which all four candidates choose the median voter's ideal point x_c as a campaign platform. As already noted, in this situation each receives an expected payoff of $\frac{n+g}{4}$. The optimal deviation from this platform would be to defect to the ideal point of the median activist in one's own party, thus winning (losing) the primary (general election) with certainty. As long as $n < \frac{g}{3}$ this deviation is strictly dominated by the choice to stay put. As such, the strategy vector at which all four candidates choose the median activist's ideal point is a Nash Equilibrium.

As it turns out, when candidates are office-seeking there are often a multiplicity of equilibria to the game. First of all, along with the median voter outcome, there always exists a range of centrist *Balancing Equilibria* in which candidates from both parties adopt platforms located symmetrically around the median voter's ideal point. These Balancing Equilibria are stable due to the fact that any deviation to the median activist's ideal point is strictly dominated, and any more centrist deviation leads to the loss of internal party support, i.e. loss of the primary election. Furthermore, these Balancing Equilibria often coexist with *Median-Activist Equilibria* in which all candidates adopt the ideal point of their respective parties' median activist as a platform. The coexistence of centrist Balancing Equilibria and more dispersed Median-Activist Equilibria is, once again, most likely when one party's primary voters are significantly more extreme than the other party's primary voters, i.e. when party cadres are asymmetrically located around the median voter's ideal point.

Taken together, these results suggest a way forward for future empirical research on primary elections. In particular, they identify two important criteria which should help predict the conditions under which primaries should in fact have their putative centrifugal impact. Firstly, this should be especially true in contexts where winning the nomination carries some tangible or symbolic benefits in and of itself, i.e. independent of the eventual general election outcome. Second of all, the centrifugal impact of primary elections should be especially pronounced in situations where party cadres are located asymmetrically around the median voter's ideal point, i.e. when one party's selectorate is more extreme than the other party's primary selectorate. This latter is counterintuitive, insofar as one might think that primaries

lead to extremism when both parties' internal selectorates are fairly radical. As demonstrated in Kselman (2014), this is in fact not the case: if party members in *both* the left and the right party are fairly radical, this ignites a series of small deviations which lead to one of two things in equilibrium: instability (the absence of Nash Equilibria) or Centrism (median-voter outcomes). Thus, the asymmetry of party cadres (and not their dual radicalism) should in fact be a key determinant of primaries' centrifugal pull.

Theoretical Appendix

1 Preliminary Results

Proof of Lemma 1 If $|x_L - x_m| < |x_R - x_m|$, then the median voter chooses L. Since all voters choose according to spatial proximity in the general election, the electorate's preferences are single-peaked. This in turn implies that either: (a) all voters with ideal points $x_i < x_m$ also choose P, or (b) all voters with ideal points $x_i > x_m$ also choose P. In turn, since the contest is determined by plurality rule, P wins. QED

Proof of Lemma 2 Begin with a strategy vector at which $x_{L2} < x_{L1} < x_m < x_{R1} < x_{R2}$, and in which no two candidates are *equidistant* from the median voter's ideal point. Given that no two platforms are equidistant from x_m, there are six possible strategic scenarios associated with a strategy vector where $x_{L2} < x_{L1} < x_m < x_{R1} < x_{R2}$:

a) $(x_m - x_{L1}), (x_m - x_{L2}) < (x_{R1} - x_m), (x_{R2} - x_m)$, i.e. both of party L's candidates would win a general election contest against either of party R's candidates.
b) $(x_m - x_{L1}), (x_m - x_{L2}) > (x_{R1} - x_m), (x_{R2} - x_m)$, i.e. both of party L's candidates would lose a general election contest against either of party R's candidates.
c) $(x_m - x_{L1}) < (x_{R1} - x_m), (x_{R2} - x_m)$ but $(x_m - x_{L2}) > (x_{R1} - x_m), (x_{R2} - x_m)$, i.e. candidate $L1$ ($L2$) would defeat (lose to) both $R1$ and $R2$ in a general election contest.
d) $(x_m - x_{L1}), (x_m - x_{L2}) > (x_{R1} - x_m)$ but $(x_m - x_{L1}), (x_m - x_{L2}) < (x_{R2} - x_m)$, i.e. candidate $R1$ ($R2$) would defeat (lose to) both $L1$ and $L2$ in a general election contest.
e) $(x_m - x_{L1}) < (x_{R1} - x_m), (x_{R2} - x_m)$, and $(x_m - x_{L2}) < (x_{R2} - x_m)$, and $(x_m - x_{L2}) > (x_{R1} - x_m)$, i.e. candidate $L1$ would defeat both $R1$ and $R2$ in a general election contest, but candidate $L2$ would defeat (lose to) candidate $R2$ ($R1$) in a general election contest.
f) $(x_m - x_{L2}) > (x_{R1} - x_m), (x_{R2} - x_m)$, and $(x_m - x_{L1}) < (x_{R2} - x_m)$, and $(x_m - x_{L1}) > (x_{R1} - x_m)$, i.e. candidate $L2$ would lose both $R1$ and $R2$ in a general election contest, but candidate $L1$ would defeat (lose to) candidate $R2$ ($R1$) in a general election contest.

These six scenarios exhaustively describe the possible strategic configurations when $x_{L2} < x_{L1} < x_m < x_{R1} < x_{R2}$ and no two candidates are equidistant from the median voter's ideal point. I now demonstrate that none of these six scenarios can constitute a Nash Equilibrium.

* In scenario (a) primary voters in party L know they will win the election regardless of which candidate emerges victorious in the opposing party's primary, and are thus free to choose the primary candidate whose platform is closest to their ideal point, i.e. the candidate who maximizes their utility from "representation".

- If $x_{L,m} \in \left[0, \frac{x_{L1}+x_{L2}}{2}\right)$, then $|x_{L2} - x_{L,m}| < |x_{L1} - x_{L,m}|$ and L's median activist will choose $L2$. Since preferences for representation are single-peaked, candidate $L2$ thus wins the primary, and then by construction the general election. Candidate $L1$ thus has the incentive to deviate to a position slightly closer to $x_{L,m}$ than x_{L2}, so as to take over from $L2$ the position of winning both the primary and the general election.[4]
- If $x_{L,m} \in \left(\frac{x_{L1}+x_{L2}}{2}, x_m\right)$, then $|x_{L2} - x_{L,m}| > |x_{L1} - x_{L,m}|$, and by the same reasoning candidate $L2$ will have the incentive to deviate.
- If $x_{L,m} = \frac{x_{L1}+x_{L2}}{2}$, then the two primary candidates' platforms are equidistant from (i.e. symmetric around) $x_{L,m}$, and each wins g with probability one-half: primary voters to the left (right) of $x_{L,m}$ choose $L2$ ($L1$) and the median activist randomizes. In turn, both primary candidates will have the incentive to deviate by moving slightly closer to $x_{L,m}$ so as to receive g with certainty.
- As such, scenario (a) cannot constitute a Nash Equilibrium. Note that party R's two candidates face a strategically identical situation in scenario (b) to that faced by party L's two candidates in scenario (a). As such, scenario (b) also cannot be a Nash Equilibrium. QED

* In scenario (c) primary voters in party L know that, regardless of which candidate emerges victorious in party R, candidate $L1$ would win the general election and candidate $L2$ would lose the general election. There are two possible situations:

- If $x_{L,m} \in \left[\frac{x_{L1}+x_{L2}}{2}, x_m\right)$, then L's median activist will face no conflict between electoral viability and representation, and will choose $L1$. By single-peakedness, all primary voters to the right of the party median will also choose $L1$, who thus wins the primary and then by construction the general election. Candidate $L2$ thus has the incentive to deviate to a position slightly closer to $x_{L,m}$ than x_{L1}, so as to take over from L the position of winning both the primary and the general election.[5]
- If $x_{L,m} \in \left[0, \frac{x_{L1}+x_{L2}}{2}\right)$, then by definition $x_{L1} > x_{L,m}$ (since by construction $x_{L2} < x_{L1}$). In turn, $L2$ would have an optimal deviation to any point in the range

[4] If $x_{L2} = x_{L,m}$, then $L1$ has the incentive to deviate and also choose $x_{L,m}$ so as to have a 50 % chance of receiving g, since all primary voters will simply randomize when $x_{L1} = x_{L2}$.

[5] If $x_{L1} = x_{L,m}$, then $L2$ has the incentive to deviate and also choose $x_{L,m}$ so as to have a 50 % chance of receiving g, since all primary voters will simply randomize when $x_{L1} = x_{L2}$.

$((1 - x_{R1}), x_{L1})$: by moving to any point in this range, $L2$ would join $L1$ in being able to defeat both $R1$ and $R2$ in the general election, and would be preferred on representational grounds by the median activist. By single-peakedness, she would also be preferred on representational grounds by all primary voters to the left of the median activist. This deviation would thus allow $L2$ to win the primary and general election with certainty.

- As such, scenario (c) cannot constitute a Nash Equilibrium. Note that party R's two candidates face a strategically identical situation in scenario (d) to that faced by party L's two candidates in scenario (c). As such, scenario (d) also cannot be a Nash Equilibrium. QED

* In scenario (e) candidate $L1$ would defeat both $R1$ and $R2$ in a general election, but candidate $L2$ would defeat only $R2$ in a general election. The proof proceeds identically to the proceeding analysis of scenario (c). There are two possible situations:

- If $x_{L,m} \in \left[\frac{x_{L1}+x_{L2}}{2}, x_m\right)$, then L's median activist will face no conflict between electoral viability and representation, and will choose $L1$. By single-peakedness, all primary voters to the right of the party median will also choose $L1$, who thus wins the primary and then by construction the general election. Candidate $L2$ thus has the incentive to deviate to a position slightly closer to $x_{L,m}$ than x_{L1}, so as to take over from L the position of winning both the primary and the general election.[6]
- If $x_{L,m} \in \left[0, \frac{x_{L1}+x_{L2}}{2}\right)$, then by definition $x_{L1} > x_{L,m}$ (since by construction $x_{L2} < x_{L1}$). In turn, $L2$ would have an optimal deviation to any point in the range $((1 - x_{R1}), x_{L1})$: by moving to any point in this range, $L2$ would join $L1$ in being able to defeat both $R1$ and $R2$ in the general election, and would be preferred on representational grounds by the median activist. By single-peakedness, she would also be preferred on representational grounds by all primary voters to the left of the median activist. This deviation would thus allow $L2$ to win the primary and general election with certainty.
- As such, scenario (e) cannot constitute a Nash Equilibrium. Note that party R's two candidates face a strategically identical situation in scenario (f) to that faced by party L's two candidates in scenario (e). As such, scenario (f) also cannot be a Nash Equilibrium. QED

This establishes that any strategy vector at which $x_{L2} < x_{L1} < x_m < x_{R1} < x_{R2}$, and in which no two candidates are *equidistant* from the median voter's ideal point, can be a Nash Equilibrium. Using identical reasoning, one can easily extend these proofs to situations in which one or more candidates are equidistant from the median voter's ideal point, and to situations in which one party's candidates differentiate while the other party's do not. These extensions are omitted for

[6] If $x_{L1} = x_{L,m}$, then $L2$ has the incentive to deviate and also choose $x_{L,m}$ so as to have a 50 % chance of receiving g, since all primary voters will simply randomize when $x_{L1} = x_{L2}$.

reasons of redundancy. This establishes that, if the game has a pure strategy Nash equilibrium, it must be the case that $x_{L1} = x_{L2}$ and $x_{R1} = x_{R2}$. QED

2 Nomination-Seeking Candidates

Lemma 1 *As long as $n > 0$, in equilibrium, candidates in party $L(R)$ will never choose a platform in the range $[0, x_{L,m})$ $((x_{R,m}, 1])$.*

Lemma 2 *As long as $n > 0$, in equilibrium, candidates in party $L(R)$ will never choose platforms $x_L > x_m (x_R < x_m)$.*

Proof of Lemma 1 Consider the problem from the perspective of candidates $L1$ and $L2$. When $x_L < x_{L,m}$ there are three possibilities: either $|x_{L,m} - x_m| < |x_R - x_m|$, $|x_{L,m} - x_m| > |x_R - x_m|$, or $|x_{L,m} - x_m| = |x_R - x_m|$. If the first, then both candidates in L receive $\frac{g}{2}$, and could move to some platform in the range $(x_L, x_{L,m}]$ and receive g with certainty, since both the median activist and all primary voters to the right of the median activist would prefer the deviating candidate on representational grounds. If the second, then both candidates in L receive $\frac{n}{2}$, and could move to some platform in the range $(x_L, x_{L,m}]$ and receive n with certainty, since both the median activist and all primary voters to the right of the median activist would prefer the deviating candidate on representational grounds. If the third, then both candidates in L receive $\frac{n+g}{4}$, and could move to some platform in the range $(x_L, x_{L,m}]$ and receive g with certainty, since both the median activist and all primary voters to the right of the median activist would prefer the deviating candidate on representational grounds. The proof of Lemma 2 is identical, and omitted. QED

Lemma 3 $\hat{x}_{L,m}(x_R) \in \{x_{L,m}, (1 - x_R + \epsilon)\}$

Proof of Lemma 3 If $x_{L,m} > (1 - x_R)$, then (trivially…) the median activist in L can choose his or her own ideal point, win the election with their most-preferred policy, and suffer no loss in ideological purity. If $x_{L,m} = (1 - x_R)$, then the median activist can choose $(1 - x_R + \epsilon)$ where $\epsilon \to 0$, and win the election with a policy which is only infinitesimally different from his or her ideal point, and only suffer an infinitesimal cost in ideological purity.[7] Any platform in the ranges $[0, (1 - x_R + \epsilon)]$ and $((1 - x_R + \epsilon), x_m]$ will be strictly less-preferred by the median activist than $1 - x_R + \epsilon$.

If $x_{L,m} < (1 - x_R)$, then the median activist's best response depends on the size of $\alpha_{L,m}$. Define $\overline{\alpha}_{L,m}$ as the *critical value* for representation-seeking which leaves the median activist perfectly indifferent between the platforms $x_{L,m}$ and $(1 - x_R + \epsilon)$: if $\alpha_{L,m} > \overline{\alpha}_{L,m}$, the median activist prefers the former, and vice versa. A simple

[7] Technically no single "best response" exists, since ϵ can be made infinitely small, thus creating an "open-set" problem. This technicality has no bearing on the following results.

expected utility comparison employing equation (3) from the text demonstrates that:

$$\overline{\alpha}_{L,m} = \left\{ \frac{(x_{L,m} - x_R)^2}{(1 - x_{L,m} - x_R)^2} - 1 \right\} . \tag{5}$$

If $\alpha_{L,m} < \overline{\alpha}_{L,m}$, then the median activist's optimal response will be $(1 - x_R + \epsilon)$: she prefers winning the election with the minimum sacrifice of ideological purism possible to choosing her own ideal point and forfeiting the election R. Any platform between this response and x_m represents an unnecessary sacrifice of ideological purism, and any platform between $x_{L,m}$ forfeits the election to R, which is suboptimal if $\alpha_{L,m} < \overline{\alpha}_{L,m}$.

If $\alpha_{L,m} > \overline{\alpha}_{L,m}$, then the median activist's optimal response will be $x_{L,m}$: she prefers forfeiting the election R and choosing her own ideal point, thus making no sacrifice of ideological purism. Any platform between $x_{L,m}$ and $(1 - x_R + \epsilon)$ represents an unnecessary sacrifice of ideological purism without winning the election, and any platform between $(1 - x_R + \epsilon)$ and the median voter's ideal point x_m wins the election, but since $\alpha_{L,m} > \overline{\alpha}_{L,m}$ this is suboptimal. An identical analysis applies to $\hat{x}_{R,m}(x_L)$. QED

Proof of Theorem 1 Without loss of generality consider the problem from the perspective of candidates $L1$ and $L2$.

Case 1: $x_{L,m} > (1 - x_R)$

Given some platform x_R adopted by party R, if $x_{L,m} > (1 - x_R)$, then the median activist's optimal response will be her ideal point (Lemma 3). At any platform $x_L > x_{L,m}$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{g}{2}$, since they both win the nomination with 50 % probability, and since by construction they would defeat x_R in the general election. In turn each could deviate to the platform $x_{L,m}$ and receive g with certainty: at this platform they would still defeat x_R in a general election, and would secure the median activist's support, along with that of all primary voters to the left of $x_{L,m}$, and thus win the nomination with certainty.

At any platform $x_L < x_{L,m}$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{g}{2}$ if $x_L > (1 - x_R)$, of $\frac{n}{2}$ if $x_L < (1 - x_R)$, and of $\frac{n+g}{4}$ if $x_L = (1 - x_R)$. In turn each could deviate to the platform $x_{L,m}$ and receive g with certainty: at this platform they would defeat R in a general election, and would secure the median activist's support, along with that of all primary voters to the right of $x_{L,m}$, and thus win the nomination with certainty.

Case 2: $x_{L,m} = (1 - x_R)$

The median activist's best response to any platform x_R such that $x_{L,m} = (1 - x_R)$ will be $\hat{x}_{L,m}(x_R) = (1 - x_R + \epsilon)$ (Lemma 3).

At any platform $x_L > (1 - x_R + \epsilon)$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{g}{2}$, since they both win the nomination with 50 % probability, and since by construction they would defeat x_R in the general election. In turn each could deviate to the platform $(1 - x_R + \epsilon)$ and receive g with certainty: at this platform they would still defeat x_R in a general election, and would secure the

median activist's support, along with that of all primary voters to the left of $x_{L,m}$, and thus win the nomination with certainty.

At any platform $x_L \leq x_{L,m}$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{n}{2}$ if $x_L < x_{L,m}$, and of $\frac{n+g}{4}$ if $x_L = x_{L,m}$. In turn each could deviate to the platform $(1 - x_R + \epsilon)$ and receive g with certainty: at this platform they would defeat R in a general election, and would secure the median activist's support, along with that of all primary voters to the right of $x_{L,m}$, and thus win the nomination with certainty.

Case 3: $x_{L,m} < (1 - x_R)$

Recalling that $\epsilon \rightarrow 0$, the point $(\frac{x_{L,m}+1-x_R}{2})$ is the "indifference" point (i.e. midpoint) between $x_{L,m}$ and $(1 - x_R + \epsilon)$. Trivially, any primary voter in L with ideal point $x_i \geq (\frac{x_{L,m}+1-x_R}{2})$ will prefer the platform $(1 - x_R + \epsilon)$ on grounds of both representation and viability, since they are closer in space to said platform. Primary voters with ideal points $x_i < (\frac{x_{L,m}+1-x_R}{2})$ face a conflict between representation-seeking and policy-seeking. Define $\overline{\alpha}_i$ as the *critical value* for representation-seeking which leaves such a primary voter perfectly indifferent between the platforms $x_{L,m}$ and $(1 - x_R + \epsilon)$: if $\alpha_i > \overline{\alpha}_i$, they prefer the former, and vice versa. A simple expected utility comparison employing equation (3) from the text demonstrates that:

$$\overline{\alpha}_i = \left\{ \frac{(1 - x_i - x_R)^2 - (x_i - x_R)^2}{(x_i - x_{L,m})^2 - (1 - x_i - x_R)^2} \right\} . \tag{6}$$

Substituting $x_{L,m}$ for x_i in (6) and rearranging yields (5).

Lemma 4 *Over the range* $\left[0, \frac{x_{L,m}+1-x_R}{2}\right)$ *the critical value* $\overline{\alpha}$ *is increasing in* x_i $(\frac{\Delta\overline{\alpha}}{\Delta x_i} > 0)$ *and* $\overline{\alpha}_i \rightarrow \infty$ *as* $x_i \rightarrow \frac{x_{L,m}+1-x_R}{2}$.

Lemma 4 tells us that this critical value increases asymptotically up to the midpoint $\left\{\frac{x_{L,m}+1-x_R}{2}\right\}$. I omit the somewhat tedious proof, which employs the quotient rule to extract the derivative of (6) with respect to x_i and then demonstrates that, over the specified range, this derivative must be greater than 0.

The intuition behind Lemma 4 is quite simple: primary voters who are fairly indifferent between the policies $x_{L,m}$ and $(1 - x_R + \epsilon)$ are only willing to forfeit the election to x_R and choose $x_{L,m}$ if the parameter α_i is very large. Conversely, the further a primary voter is from $(1 - x_R + \epsilon)$, the greater the greater is the cost (in terms of ideological purity) of choosing $(1 - x_R + \epsilon)$, and the more likely he or she will be willing to forfeit the election to party R and choose $x_{L,m}$. With Lemma 1 and Assumption 1 in hand, we can prove Theorem 1 for case 3, i.e. situations in which $x_{L,m} < (1 - x_R)$.

Case 3a: $x_{L,m} < (1 - x_R)$ and $\alpha_{L,m} < \overline{\alpha}_{L,m}$

If $x_{L,m} < (1 - x_R)$ and $\alpha_{L,m} < \overline{\alpha}_{L,m}$ then the median activist's best response is $\hat{x}_{L,m}(x_R) = (1 - x_R) + \epsilon$.

At any platform $x_L > (1 - x_R) + \epsilon$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{g}{2}$, since they both win the nomination with 50 % probability, and since by construction L's candidate would defeat x_R in the general election. In turn each could deviate to the platform $(1 - x_R) + \epsilon$ and receive g with certainty: at this platform they would still defeat R in a general election, but would secure the median activist's support, along with that of all primary voters to the left of $x_{L,m}$ (by single-peakedness of preferences for representation), and thus win the nomination with certainty.

At any platform $x_{L,m} \leq x_L \leq (1 - x_R)$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{n}{2}$ if $x_L < (1 - x_R)$, and of $\frac{n+g}{4}$ if $x_L = (1 - x_R)$. In turn, they could deviate to the position $(1 - x_R) + \epsilon$ and secure the median activist's support, since by construction $\alpha_{L,m} < \overline{\alpha}_{L,m}$. As well, the deviating candidate would also secure the support of all primary voters to the right of $x_{L,m}$. To see this, note first that any primary voters in the range $\left[x_{L,m} \frac{x_{L,m}+1-x_R}{2}\right)$ support the deviating candidate by Assumption 1 and Lemma 2: these primary voters have values of $\alpha_i \leq \alpha_{L,m}$ (Assumption 1), and have critical values of $\overline{\alpha}_i > \overline{\alpha}_{L,m}$ (Lemma 2). As such, if the condition for preferring $(1 - x_R) + \epsilon$ to $x_{L,m}$ is met for the median activist, it is also met for all primary voters with ideal points in $\left[x_{L,m} \frac{x_{L,m}+1-x_R}{2}\right)$. Secondly, any primary voters in the range $\left[\frac{x_{L,m}+1-x_R}{2}, \overline{x}_L\right]$ support the deviating candidate because they prefer her position on grounds of both representation and electoral viability. Thus a deviation to $(1 - x_R) + \epsilon$ would secure the nomination, and would then allow the deviating candidate to win the general election and receive g with certainty.

At any platform $x_L < x_{L,m}$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{n}{2}$. In turn each could deviate to the platform $(1 - x_R) + \epsilon$ and receive g with certainty: at this platform they would defeat R in a general election, but would secure the median activist's support, along with that of all primary voters to the right of $x_{L,m}$ (by single-peakedness of preferences for representation), and thus win the nomination with certainty. This concludes the proof that, if $x_{L,m} < (1 - x_R)$ and $\alpha_{L,m} < \overline{\alpha}_{L,m}$, no policy other than the median activist's best response $\hat{x}_{L,m}(x_R) = (1 - x_R) + \epsilon$ can be a Nash Equilibrium.

Case 3b: $x_{L,m} < (1 - x_R)$ and $\alpha_{L,m} = \overline{\alpha}_{L,m}$

If $x_{L,m} < (1 - x_R)$ and $\alpha_{L,m} = \overline{\alpha}_{L,m}$, then the median activist is indifferent between the policies $(1 - x_R) + \epsilon$ and $x_{L,m}$.

The proof that any platform other than one of these two cannot be a Nash Equilibrium is identical to that above for case 3a.

As well, if $x_L = x_{L,m}$, both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{n}{2}$, since they both win the nomination with 50 % probability, and since by construction L's candidate would lose to x_R in the general election. In turn

each could deviate to the platform $(1 - x_R) + \epsilon$ and receive g with certainty: at this platform they would secure the median activist's support, along with that of all primary voters to the right of $x_{L,m}$ (see analysis of case 3a), and thus win the nomination with certainty. As a result, the only possible Nash Equilibrium in case 3b is $x_L^* = (1 - x_R) + \epsilon$.

Case 3c: $x_{L,m} < (1 - x_R)$ and $\alpha_{L,m} > \overline{\alpha}_{L,m}$

If $x_{L,m} < (1 - x_R)$ and $\alpha_{L,m} > \overline{\alpha}_{L,m}$, then the median activist's best response is $\hat{x}_{L,m}(x_R) = x_{L,m}$.

At any platform $x_L > (1 - x_R)$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{g}{2}$, since they both win the nomination with 50 % probability, and since by construction L's candidate would defeat x_R in the general election. In turn each could deviate to a platform in the range $[(1 - x_R) + \epsilon, x_L)$ and receive g with certainty: at this platform they would still defeat R in a general election, but would secure the median activist's support, along with that of all primary voters to the left of $x_{L,m}$ (by single-peakedness of preferences for representation), and thus win the nomination with certainty.

At any platform $x_{L,m} < x_L < (1 - x_R)$ both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{n}{2}$, since they both win the nomination with 50 % probability, and since by construction L's candidate would lose to x_R in the general election. If $n > 0$, then either candidate could deviate to $x_{L,m}$ and win n with certainty (by single-peakedness of preferences for representation); if $n < 0$, then either candidate could deviate to a position in the range $(x_L, (1 - x_R) + \epsilon)$ and lose n with certainty: by the single-peakedness of preferences for representation she would lose the support of both the median activist and all primary voters to the "left" of the median activist.

At any platform $x_L < x_{L,m}$, then both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{n}{2}$, since they both win the nomination with 50 % probability, and since by construction L's candidate would lose to x_R in the general election. If $n > 0$, then either candidate could deviate to $x_{L,m}$ and win n with certainty (by single-peakedness of preferences for representation); if $n < 0$ then either candidate could deviate to a position "left" of x_L and lose n with certainty: by the single-peakedness of preferences for representation she would lose the support of both the median activist and all primary voters to the "right" of the median activist.

If $\alpha_{L,m} > \overline{\alpha}_{L,m}$ and $x_L = (1 - x_R)$, then both candidates $L1$ and $L2$ would receive an expected payoff of $\frac{n+g}{4}$ (see footnote 4). In turn, they could deviate to the position $x_{L,m}$ and secure the median activist's support, since by construction $\alpha_{L,m} > \overline{\alpha}_{L,m}$. As well, the deviating candidate would also secure the support of all primary voters to the "left" of $x_{L,m}$: by Assumption 1 these primary voters have values of $\alpha_i \geq \alpha_{L,m}$, and by Lemma 2 these primary voters have critical values of $\overline{\alpha}_i < \overline{\alpha}_{L,m}$. As such, if the condition for preferring $x_{L,m}$ to $1 - x_R$ is met for the median activist, it is also met for all primary voters to her left. Thus a deviation to $x_{L,m}$ would allow the deviating candidate to secure the nomination, and then by construction lose the general election, thus receiving n with certainty. This deviation will be optimal as long as $n > \frac{n+g}{4}$, which can be simplified to $n > \frac{g}{3}$, which was

the condition for "nomination-seeking" established at the outset of Sect. 3 in the text.

Theorem 1: Summary

The preceding analysis establishes that, as long as $n > \frac{g}{3}$, in any Nash Equilibrium candidates from party L *must* choose their median-activist's best response to x_R. An identical analysis applies to candidates in party R. This concludes the proof of Theorem 1, that as long as $n > \frac{g}{3}$ any Nash Equilibrium must involve candidates from both parties choosing their median activists' mutual best responses. QED

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No Polarization in Spite of Primaries: A Median Voter Theorem with Competitive Nominations

Gilles Serra

1 Primaries and Policy Divergence

Do primaries create polarization? It has long been argued that competing inside a political party for its nomination might induce candidates to take extremist positions to get the approval of the partisan ideologues in charge of selecting them. This would counteract, it is claimed, the incentives for these candidates to converge toward centrist policies that would get them elected. According to this logic, while the general election between parties creates the incentive for candidates to converge toward the median voter, the primary elections within parties create the opposite incentive to diverge toward extremist party activists. Should this mechanism be true, moderate voters would be facing an unfortunate cost from primary elections: a loss in the representativeness of candidates running for office.

These claims are worth investigating rigorously, not least given the importance that primaries have acquired around the world. They are already prevalent in the USA, where they have seen a spectacular increase in recent decades. The number of states holding presidential primaries went from 16 in 1968 to 43 in 1996 (Morton 2006). Actually in America, primaries are not confined to presidential elections but are also mandated in a large number of states for congressional and gubernatorial races. Primaries have also expanded noticeably in Latin America in the past two decades.[1] The use of primaries in this region has recently attracted

[1] As documented by Carey and Polga-Hecimovich (2006), Kemahlioglu et al. (2009), and Aragón (2013, 2014).

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the attention of scholars specializing in Argentina,[2] Chile,[3] and Mexico.[4] Scholars studying other regions around the world have also begun documenting the adoption of competitive nomination processes in Australia,[5] Ghana,[6] Iceland,[7] Romania,[8] Spain,[9] and Sweden.[10]

Much of the existing literature has studied the effects that primary elections may have on the behavior of candidates and parties, in particular their choice of policy platforms. Scholars have often presumed that primaries cause these platforms to diverge. In particular, primaries have been cited by several authors as a possible explanation for the rise in partisan polarization in the U.S. Congress in the last three decades. In addition to scholars, this view is frequently expressed by pundits and the media.[11] While this view has partly been based on intuition and anecdotal observation, a few statistical studies have also provided support.[12] Following up on these common empirical hypotheses, a number of theoretical papers have been developed predicting this presumed effect of primaries on polarization.[13]

Yet, there are grounds to doubt such a direct connection between primaries and polarization. Despite the previous arguments, some recent empirical research has found a weak or inexistent effect of primaries on the policies implemented by elected officials. Notably, Hirano et al. (2010) find little to no effect of primaries on polarization in the U.S. Congress. They find no evidence that the introduction of primaries is associated with more polarized roll call voting records in Congress; and insignificant evidence that fear of primary competition induces legislators to take more extreme roll call voting positions. In reviewing the literature, these authors considered previous empirical evidence connecting primaries and the polarization of elected officials to be "rather modest." Using different data, Peress (2013) coincides in refuting the hypothesis that primaries have a strong polarizing effect. He finds that the extremism of primary electorates in each district does not have a statistically significant effect on candidates' positions on policy. In sum, the existing evidence is ambiguous about whether primaries increase polarization or not. This chapter suggests a possible interpretation for the conflicting empirical results. My

[2] Jones (2012).

[3] Field and Siavelis (2009) and Hinojosa (2012).

[4] Baldez (2008), Hinojosa (2012), and Bruhn (2013, 2014).

[5] Abjorensen et al. (2012).

[6] Ichino and Nathan (2012) and Ichino and Nathan (2013).

[7] Indriðason and Sigurjónsdóttir (2014).

[8] Gherghina (2013).

[9] Field and Siavelis (2009).

[10] Folke et al. (2013).

[11] For example Schumer (2014) in the New York Times.

[12] For notable examples see Gerber and Morton (1998) and Burden (2001, 2004).

[13] Adams and Merrill (2008), Padró i Miquel and Snowberg (2012), Amorós et al. (2013), Casas (2013), Hummel (2013), and Adams and Merrill (2014).

interpretation is that primaries are not sufficient to create polarization by themselves. Rather, for candidates to diverge from the center, other additional conditions would need to interact with primaries.

In light of this empirical controversy, my chapter investigates theoretically the effect that we should expect from primary elections. In a simple model with only essential elements, I investigate if competition within parties to get the nomination should be expected to increase the ideological distance between parties in the election. To be concrete, I analyze the consequences of adding a nomination stage to the well-known spatial voting model developed by Downs (1957). The basic assumptions of this benchmark model are well established and have been used for decades in numerous models. Policy is understood as a line representing the left-right political spectrum; two candidates who are ambitious and care only about winning office compete with each other by announcing platforms in the policy dimension; whatever candidate wins the election will implement the platform she promised; voters are located according to some distribution along the political spectrum; and a median voter exists which both candidates have clearly identified. The canonical result in this literature is that, in general, there exists a unique equilibrium whereby both candidates are predicted to converge fully to the median voter's ideal policy.

The main goal of this paper is studying whether this median-voter result still holds after adding a nomination process within two parties that candidates need to go through before competing in the general election. In short, to the benchmark Downsian model I add two political parties that candidates need to compete in before being able to run for office. These two parties will have opposite ideologies, meaning they have ideal policies on opposite sides of the median voter, one preferring right-wing policies and the other preferring left-wing policies. Additionally, I will assume that neither party cares about winning the election *per se*, but rather they care only about the policy implemented by the candidate who wins the election. Once a candidate promises a policy to her party, this promise will become binding for the rest of the election. These assumptions are stacking the deck in favor of obtaining a polarizing effect from primaries.

In line with the most recent empirical literature, however, I do not find that primaries significantly increase polarization. In fact, in this model they do not increase polarization at all, which contradicts the traditional view. The main theorem finds that all candidates still converge completely to the median voter's ideal point. The reason is the rationality of parties: even if they have extremist ideal points, parties understand the importance of being flexible in their nomination decisions by choosing someone moderate who can prevent the other party from winning. As the model will demonstrate, fear of letting the other party's platform become policy drives each party to nominate centrist candidates who can win the election.

The paper proceeds as follows. After briefly reviewing the existing literature, I lay out the elements for a basic model adding primary elections to the Downsian framework. Then I state the main results. The theorem in this paper states that a unique equilibrium exists, in which all candidates in both parties converge fully to the median voter's ideal policy. After describing the dynamics in the election to build

intuition, I conclude with a brief discussion of the relevance for future theoretical and empirical research on this topic. The appendix contains the proofs of all results.

2 Previous Theoretical Literature on Candidate Selection

Reflecting an increasing interest in recent years, a number of formal models have been written about primary elections, nomination processes, and candidate-selection methods. Several consequences of democratizing the candidate selection method have been modeled. The effects of primaries studied by scholars include revealing information that was unobservable[14]; increasing the valence of nominees[15]; unifying party factions in dispute[16]; inducing more citizens to enter the race as candidates[17]; and improving the effort and expertise of policymaking.[18] Another strand of the literature has explored the origin of primary elections by asking when and why political parties would democratize their nomination process.[19]

A frequent concern of this literature has been whether primary elections create polarization by inducing candidates to adopt extremist policy platforms. Most previous models find such divergence one way or another.[20] A few find that primaries may in fact lead to less polarization than other likely methods.[21] But to my knowledge, there is no previous model with full-blown primary elections that do not lead to any polarization whatsoever.

3 Structure of the Election

3.1 Timing

The election is modeled as a three-stage game between voters, parties and candidates. The three stages correspond to the *platform announcement by candidates*, the

[14] Adams and Merrill (2008), Castanheira et al. (2010), Serra (2011), Evrenk et al. (2013), Mutlu-Eren (2013), Serra (2013), Adams and Merrill (2014), and Kselman (2014).

[15] Adams and Merrill (2008), Serra (2011), Casas (2013), Evrenk et al. (2013), Hummel (2013), Mutlu-Eren (2013), Serra (2013), Adams and Merrill (2014), and Kselman (2014).

[16] Hortala-Vallve and Mueller (2009) and Mutlu-Eren (2013).

[17] Casas (2013) and Hummel (2013).

[18] Crutzen (2013) and Buisseret and Wantchekon (2014).

[19] Hortala-Vallve and Mueller (2009), Serra (2011), Snyder and Ting (2011), Zudenkova (2012), and Serra (2013).

[20] Adams and Merrill (2008), Hirano et al. (2009), Padró i Miquel and Snowberg (2012), Amorós et al. (2013), Casas (2013), Hirano et al. (2013), Hummel (2013), and Adams and Merrill (2014).

[21] Jackson et al. (2007) and Serra (2011, 2013).

nomination and the *general election,* in this order. The goal of this election is to decide a policy to be implemented. Each policy platform is represented by a point x in the policy space $\mathbb{R}$, where $\mathbb{R}$ is the real line. There are two parties, labeled R for the right-wing party and L for the left-wing party. Each party needs to nominate a candidate for office among those who are competing inside the party, often called *precandidates*. There are four such precandidates, which are labeled r_1, r_2 for those in party R and l_1 and l_2 for those in party L. The only distinguishable characteristic of each candidate is the policy platform she adopts. Indeed, throughout the paper I will make no distinction between a candidate and her platform, referring to r_1, r_2, l_1, l_2,when talking about the candidates' platforms or the candidates themselves.

In the first stage, the four candidates announce their platforms simultaneously. A candidate's strategy consists in announcing a policy platform in $\mathbb{R}$. We denote a profile of candidate strategies by S_c, with $S_c = (l_1, l_2, r_1, r_2)$. The platform that a candidate adopts is the policy she would implement if she was elected, and it represents a binding commitment.

In the second stage, for given a set of platforms announcements (l_1, l_2, r_1, r_2), party L must choose a candidate l_i and party R must choose a candidate r_j to compete against each other in the general election. Both parties observe (l_1, l_2, r_1, r_2); then party L nominates either l_1 or l_2 while R nominates either r_1 or r_2. Both parties nominate their candidates simultaneously. We denote by S_L the strategy of L and by S_R the strategy of R. A party's strategy consists of a complete plan of action contingent on every possible situation in which it might be called upon to act. In the present context this implies specifying an action for each possible configuration of platforms that it may observe. Since every set of candidate platforms (l_1, l_2, r_1, r_2) forms a subgame of this game, a strategy for a party specifies a nomination for each of those configurations.

Lastly, in the third stage, voters elect a candidate for office from one of the parties. We will assume that a median voter exists whose decision is pivotal. This being the basic structure of the election, here are details about the preferences of voters, parties and candidates.

3.2 Voters' Preferences

We will assume voters' preferences to be single-peaked and quadratic with ideal points in $\mathbb{R}$. A median voter exists whose preferences are decisive.[22] We call the median voter M and we normalize her ideal point to zero. M's utility function is given by

$$U_M(x) = -x^2.$$

[22]All the results would hold for any symmetric and single-peaked utility function for voters. The quadratic is used as an illustration.

Given such preferences, the behavior of voters is trivial: they will always vote for the party whose candidate has a platform closest to their ideal points. Given that M is pivotal, the party whose candidate announced a platform closest to her ideal point will win the election. In other words, the party closest to zero will win. If the platforms of parties yield the same utility to M, then she will randomize her vote such that either party will win the election with equal probability. So, for example, if party R and party L were equidistant from zero, they would tie having each a $\frac{1}{2}$ probability of winning.

3.3 Parties' Preferences

Parties L and R care about the policy implemented by the elected official. In other words, they are *policy-motivated* meaning that they have ideal points over policy.[23] Here I will abstract from explicitly modeling the thousands, sometimes millions, of party sympathizers that attend a primary election. Instead, I will treat each party as unitary actor, meaning that it possesses a unique ideal point and will make strategic decisions based on this ideal point. One possible interpretation for treating a party as having a unique ideal point is assuming that primary elections have a median party member with such ideal point. Indeed, in parallel research I have proved that, as long as all primary voters have single-peaked preferences, they will behave as a group exactly as their median member would behave alone.[24] A corollary of this result is that parties can be treated as unitary actors behaving strategically based on the ideal point of their median member.

I will assume the ideal points of both parties to be on opposite sides of the median voter, such that we genuinely have a left-wing party and a right-wing party. For concreteness, I will assume that R's ideal point is 1 while L's ideal point is -1. Both parties have single-peaked and quadratic preferences.[25] Their utility functions are given by

$$U_R(x) = -(1-x)^2$$
$$U_L(x) = -(-1-x)^2.$$

Both parties are rational and forward looking, meaning they will try anticipating the other player's reactions. Using jargon we say that parties are *strategic* rather than *sincere*. As a consequence, a party will not blindly nominate the candidate closest to its ideal point. On the contrary, a party will often be willing to nominate moderate

[23] This follows the tradition of Wittman (1973) and Calvert (1985).

[24] This unpublished proof is available upon request.

[25] All the results would hold for any strictly concave utility function for parties. They would also hold if the parties' ideal points were not equidistant from the median voter.

candidates if they have a higher chance of winning the election. In essence, each party must find the candidate that best balances its desire for a partisan platform with its fear of letting the other party win. Finally, if both hopefuls in the primary adopt identical platforms becoming indistinguishable, the party is forced to randomize equally between them.

3.4 Candidates' Preferences

All candidates are office-motivated. They have a unique goal: to maximize their probability of being elected. In particular, the candidates do not derive utility from the policy implemented, or from winning the nomination per se without winning the election. Not caring about policy per se gives each candidate the freedom to announce any platform best suiting her goal of winning the nomination to later win the election. She will do so rationally, meaning she will take into account the reactions of other players. In particular, all candidates will try outguessing one another such that platform announcements form a Nash equilibrium between the four of them. They are also forward looking, meaning that they will calculate the consequences of their announcements down the line, when it is the parties' turn to nominate a candidate, and then the voters' turn to elect a party. This structure implies that candidates will try balancing their need to please their parties who have extremist ideal points, with the subsequent need, if they are nominated, to appeal to the median voter who has a centrist ideal point. They must find this balance recalling that whatever platform they announce in the primary will remain her platform in the general election as well.

One immediate implication is that rational candidates would only consider adopting platforms in the following intervals. Candidates r_1 and r_2 in party R will restrict themselves to the interval $[0, 1]$, while candidates l_1 and l_2 in party L will restrict themselves to the interval $[-1, 0]$. This assertion can be easily proved as any announcement outside these intervals is a weakly dominated strategy for candidates. For expediency, I will simply assume this result instead of proving it explicitly.

3.5 Equilibrium Concept

Our best prediction for the election result is an equilibrium of this game. We thus need to solve for all the equilibrium strategies of candidates, parties and voters. The game is solved by backward induction, and the type of equilibrium that we are looking for is *subgame-perfect Nash equilibrium* (SPNE). An SPNE must induce a Nash Equilibrium (NE) in every subgame of the game, and therefore we need to find strategies S_c^*, S_L^* and S_R^* that induce an NE at every stage of the election. We will only consider pure strategies that are not weakly dominated.

Special focus will be placed on the location of the platforms that candidates will choose. We are particularly interested in exploring whether *complete convergence* or *large divergences* can be sustained in equilibrium. Will candidates adopt extremist platforms pandering to their parties, or will they announce centrist policies catering to the median voter? Will parties nominate moderate candidates to win the election, or will they prefer partisans close to their ideal points? The following section provides answers in the context of this basic model.

4 The Effect of Nominations on Polarization

4.1 Main Result

We can now state a theorem about the effect of competitive nominations on polarization. In this model there is no effect at all. Complete convergence is the only equilibrium, such that all candidates adopt centrist platforms before the nominations take place. The proof of this theorem comes in the appendix.

Theorem *In this election, there exists a unique outcome that can be sustained in a subgame-perfect equilibrium. In this outcome, all the candidates converge to the median voter's ideal point such that* $r_1 = r_2 = l_1 = l_2 = 0$. *Party L randomizes between* l_1 *and* l_2. *Party R randomizes between* r_1 *and* r_2. *Voters randomize between party L and party R. And the policy implemented is* 0, *the ideal point of the median voter.*

This theorem is a generalization to primary elections of the classic median voter theorem. In this new context, all hopefuls are expected to adopt centrist platforms to compete both in the primaries and the general election.[26]

This result is far from trivial given the centrifugal forces that exist in the game. As I will discuss below, there exist significant incentives for parties to request partisan platforms from their candidates. What the theorem above shows is that such centrifugal forces are more than compensated by centripetal forces incentivizing those same parties to converge to the center. It should be noted that this result does not depend on specific functional forms but will actually hold for very general preferences.[27] Although the formal proof comes in the appendix, I give an intuitive proof in the following lines to gain insight into this type of elections.

[26]It must be noted that other models of primary elections, some of them withe quite different assumptions, reach similar conclusions. See for example Proposition 2 of Kselman (2014) which finds convergence as a corner solution.

[27]As I mentioned above, the exact same result would be obtained with any strictly concave utility function for parties and voters. Complete convergence can also be proved to be the only possible outcome with strictly risk loving parties. And the parties' ideal points could take any value on opposite sides of the median voter.

4.2 Election Dynamics

Insight can come from analyzing the different forces in this election. In particular, it is worth understanding all the options that players in this game had, and why none of these options was an equilibrium save for the ones described in the theorem. Throughout the analysis, bare in mind that candidates only have one shot at announcing a platform, which is before the primary election. As is standard in the literature, I am assuming that such announcements become a binding commitment for each candidate, meaning that a promise in the primary campaign will have to be maintained in the general election, and will have to be kept upon winning the election.[28]

Knowing this, each candidate will think strategically about the best platform to adopt, trying to anticipate the platforms that other candidates will announce as well as the subsequent reactions of parties and voters. Our best prediction for the behavior of players in this game is a subgame perfect equilibrium, that is, a set of decisions where all players are correctly anticipating each other. To find these equilibria, we need to analyze all the possible combinations of strategies to discard those not forming an equilibrium, namely those where at least one player could benefit from unilaterally changing her decision. In particular, we must analyze all the possible configurations of four platforms, two in the left-wing party and two in the right-wing party, to see whether rational candidates could conceivably announce them. Broadly, there are four possible configurations where candidates could be located.[29]

- **Configuration 1**: $0 \leq r_1 < r_2 < -l_1 < -l_2 \leq 1$
  - Profitable deviation: $r_1 \rightarrow r_2 + \varepsilon$
  - Is it an equilibrium? No

In this configuration, all candidates have announced platforms with different levels of extremism, both left-wing candidates being more extremist than the right-wing candidates. If candidates were considering this configuration, there would be a strong *centrifugal* force in the election incentivizing candidates to move even further away from the median voter. To see this, consider the incentives of candidate r_1. Should this become the actual configuration of platforms, party R would be sure to win the election with either of its candidates r_1 or r_2. It could thus safely nominate the candidate closest to its ideal point, r_2, and still win the election. In this case, the centrifugal incentives would dominate inside party R such that the

[28] We are thus discarding the possibility of flip-flopping during the election season. One way to justify this assumption is that, in this election, flip-flopping would hurt the candidate's credibility so much that it would never be an optimal strategy.

[29] This is not an exhaustive list of all the possible configurations. In this section, I only analyze the cases that build an interesting intuition. The proof in the appendix gives the exhaustive list of configurations and determines whether each of them is an equilibrium or not.

most moderate candidate r_1 would lose the nomination in favor of the relatively more partisan candidate r_2. Being rational and forward looking, r_1 would want to avoid this outcome by moving towards its party's ideal point in order to steal the nomination from r_2. All things equal, r_1 would benefit from adopting a platform $r_2 + \varepsilon$ where ε is a small positive number, such that her platform is larger than r_2 to be more appealing to R, while still being more moderate than l_1 in the eyes of the median voter. Given that r_1 has this profitable unilateral deviation, this configuration cannot be an equilibrium.

- **Configuration 2**: $0 < r_1 < -l_1 < r_2 < -l_2 \leq 1$
  - Profitable deviation: $l_2 \to r_1 - \varepsilon$
  - Is it an equilibrium? No

This configuration would create *centripetal* forces in the election, meaning that candidates would have an incentive to become more moderate than they were planning. To see this, consider how nominations would play out in parties L and R. In principle, party L would find candidate l_2 most attractive as she is located close the its ideal point. This is the candidate that party L would nominate if it was sincere instead of strategic. However, we postulated that both parties are rational hence anticipating each other's strategies. If party L was planning to nominate l_2, R's best response would be to nominate r_2, but then L's best response would be to nominate l_1, in which case R's best response would be to nominate r_1. Hence both parties will "race towards the center". With rational parties, the two moderate precandidates will be nominated at the expense of the two partisan ones. What incentives does this create for candidate l_2? Given that she would lose the nomination given this configuration of announcements by the other candidates, she would prefer to adopt a drastically more moderate platform, namely $r_1 - \varepsilon$ where ε is a small positive number. If she did so, competition with R would force L to nominate her in order to win the election. This incentive for the most partisan candidate to become the most moderate one illustrates the strong centripetal force in this election, and discards this configuration as a possible equilibrium.

- **Configuration 3**: $0 < r_1 = r_2 = -l_1 = -l_2 \leq 1$
  - Profitable deviation: $r_1 \to r_1 - \varepsilon$
  - Is it an equilibrium? No

In this configuration all candidates would be equally partisan. A possibility for this configuration to arise is a negotiated agreement between candidates, whereby they all agree to locate at the same distance from the median voter to make her indifferent. The advantage of such an agreement is giving each candidate a chance at winning the election. Parties would face identical precandidates such that R would not be able to distinguish between r_1 and r_2, and L would not be able to distinguish between l_1 and l_2. Parties would not really have a substantive choice, so they would simply randomize between their precandidates giving them an equal chance to be nominated. After the nominations, both parties will have candidates whose platforms are on opposite sides but exactly equidistant from the median voter, hence

tying in the election with an equal chance of winning. Candidates would thus have been successful at granting each other an equal probability of winning the election. If no candidate deviated from this agreement, each one would have a probability of $\frac{1}{4}$ of wining the election, corresponding to $\frac{1}{2}$ probability of being nominated times $\frac{1}{2}$ probability of winning the election conditional on being nominated. Unfortunately for them, such an agreement would not be honored. In fact each one has an incentive to renege on her promise by announcing a more moderate platform. If r_1, for example, decided to deviate unilaterally to a slightly more moderate platform, she would give party R the opportunity to nominate her to subsequently win the election with certainty. This incentive to deviate unilaterally shows that such an agreement between candidates cannot be sustained as an equilibrium.

- **Configuration 4**: $0 = r_1 = r_2 = l_1 = l_2$
  - Profitable deviation: None
  - Is it an equilibrium? Yes

In this configuration, all the candidates have converged fully to the median voter. Neither party has a choice for the nomination given that all precandidates are indistinguishable. Party R has no choice but to randomize between r_1 and r_2, while party L has no choice but to randomize between l_1 and l_2. Following the primaries, the median voter will face parties with identical platforms, and will hence randomize between the two. The policy implemented after the election will be 0, the ideal point of M. If no candidate deviates from this configuration, each candidate has a probability of $\frac{1}{4}$ of wining the election, corresponding to $\frac{1}{2}$ probability to be nominated times $\frac{1}{2}$ probability to win the election conditional on being nominated. If any candidate, say r_2, deviated unilaterally to become slightly more partisan, she would either loose the nomination, or win the nomination but lose the election, making here worse off than having a $\frac{1}{4}$ of actually winning. Therefore, there is no profitable deviation for any of the candidates. This represents an equilibrium, the only one in this election.

5 Discussion

It is commonly assumed that primaries motivate hopefuls to diverge away from moderate positions. The conventional wisdom is that while candidates would prefer to adopt centrist platforms helping them win the general election, in fact they need to design partisan platforms to win their primary election first. However the empirical evidence is mixed: while some early studies have supported this view,[30] recent research has found the connection between the ideological extremism of primary

[30]Gerber and Morton (1998) and Burden (2001, 2004).

electorates and the partisanship of elected officials to be weak or null.[31] Further investigation on the effect of nominations on polarization is thus warranted, both theoretically and empirically.

To obtain theoretical predictions about nomination processes, a sensible step is analyzing them in the context of the well established model of spatial elections. Such was the goal of this chapter, which developed a general model studying the fundamental elements of primary elections in the Downsian framework. To the standard model introduced in Downs (1957), this paper has added two parties with ideological preferences where candidates need to compete to be nominated before running in the general election. Notably, I assumed that neither party cares about winning the election for the sake of winning it—they only care about influencing the policy platform that will be chosen by voters. These assumptions should capture the alleged centrifugal effects of nomination processes, if any.

As it turns out, in this setting, complete convergence of parties and candidates is still the only equilibrium. Surprisingly, all hopefuls will adopt centrist platforms to compete both in the primaries and the general election, with the consequence that no divergence whatsoever arises. This outcome is driven by the competition between parties: while neither one derives any direct payoff from being in office, they do care indirectly about winning to prevent the other party from setting an unfavorable policy. As postulated in the theorem above, the rational desire to prevent the rival's platform from winning is enough to induce both parties to converge to the center.[32]

One possible interpretation for these results is that primaries do not have a universal but rather a conditional effect on polarization. Only if certain conditions are present will they increase it, while they might have a weak or null effect in the absence of those conditions. This chapter illustrates that a bare-bones model including only essential elements of nominations will predict a full convergence of platforms in spite of significant incentives to diverge. So the theorem proved in this chapter is a "median voter result" in the sense of predicting that candidates in both parties will be promising to implement the exact policy preferred by the median voter in the electorate. However, it is still possible that including additional features to the nomination process would trigger divergence. As mentioned before, there exist a number of formal results in the literature predicting that primaries will lead to polarization. What my results suggest is that other factors must be interacting with primaries in those models to produce such polarization. Future research should endeavor to disentangle these factors. Primaries by themselves

[31] Hirano et al. (2010) and Peress (2013).

[32] I should note how reminiscent this result is to the one found by Calvert (1985). In his seminal model with two policy-motivated parties with extremist ideal points, he famously proved that both parties will completely converge to the median voter's ideal point. The logic of his result is similar to the one here, and thus my model can be thought of as a generalization of Calvert (1985) to a situation where a nomination process is added in each party. The fact that a convergence to the median still holds in my model illustrates what Calvert called the "robustness" of the spatial voting model.

might not be sufficient to induce high levels of partisanship, but they may have this effect if they interact with other institutional features.

Appendix

Without loss of generality, the configurations in Table 1, along with their symmetric counterparts, are an exhaustive list of all the possible configurations of platforms that candidates may adopt. All cases are mutually exclusive.

With this list in mind, I proceed to prove the theorem in this paper.

Proof The game must be solved by backwards induction. The procedure will be the following: we start by solving the game at its last stage—the general election—and we find the median voter's strategy profile S_v^* that forms a NE in every situation in

Table 1

Configuration 1	$0 = r_1 = r_2 = -l_1 = -l_2$
Configuration 2	$0 < r_1 = r_2 = -l_1 = -l_2$
Configuration 3	$0 = r_1 = r_2 = -l_1 < -l_2$
Configuration 4	$0 < r_1 = r_2 = -l_1 < -l_2$
Configuration 5	$0 = r_1 = r_2 < -l_1 = -l_2$
Configuration 6	$0 < r_1 = r_2 < -l_1 = -l_2$
Configuration 7	$0 = r_1 < r_2 = -l_1 = -l_2$
Configuration 8	$0 < r_1 < r_2 = -l_1 = -l_2$
Configuration 9	$0 = r_1 = r_2 < -l_1 < -l_2$
Configuration 10	$0 < r_1 = r_2 < -l_1 < -l_2$
Configuration 11	$0 = r_1 < r_2 = -l_1 < -l_2$
Configuration 12	$0 < r_1 < r_2 = -l_1 < -l_2$
Configuration 13	$0 = r_1 < r_2 < -l_1 = -l_2$
Configuration 14	$0 < r_1 < r_2 < -l_1 = -l_2$
Configuration 15	$0 = r_1 < r_2 < -l_1 < -l_2$
Configuration 16	$0 < r_1 < r_2 < -l_1 < -l_2$
Configuration 17	$0 = r_1 = -l_1 < r_2 = -l_2$
Configuration 18	$0 < r_1 = -l_1 < r_2 = -l_2$
Configuration 19	$0 = r_1 = -l_1 < r_2 < -l_2$
Configuration 20	$0 < r_1 = -l_1 < r_2 < -l_2$
Configuration 21	$0 = r_1 < -l_1 < r_2 = -l_2$
Configuration 22	$0 < r_1 < -l_1 < r_2 = -l_2$
Configuration 23	$0 = r_1 < -l_1 < r_2 < -l_2$
Configuration 24	$0 < r_1 < -l_1 < r_2 < -l_2$
Configuration 25	$0 = -l_1 < r_1 = r_2 < -l_2$
Configuration 26	$0 < -l_1 < r_1 = r_2 < -l_2$
Configuration 27	$0 = -l_1 < r_1 < r_2 < -l_2$
Configuration 28	$0 < -l_1 < r_1 < r_2 < -l_2$

which she might be called upon to act. Given S_v^*, we consider the reduced game at the second stage—the nominations by each party—and we find the strategies S_L^* and S_R^* that form a NE for the parties in every possible subgame in which they might be called upon to act. Finally, for each S_v^*, S_L^* and S_R^*, we consider the reduced game at its first stage—the platform adoption—and we find all the strategies S_c^* that form a NE for the candidates. At this stage (the platform adoption), we know that a NE of the reduced game will be a SPNE of the game as a whole.

Third Stage

First we prove that sincere voting is a weakly dominant strategy for voters. When casting her vote, a voter is either pivotal or not. If she is pivotal, then voting other than sincerely will make her worse off (or no better off if she is indifferent between both parties). If her vote is not pivotal then any strategy leads to the same outcome. Therefore, sincere voting is never worse and sometimes better than not voting sincerely. Sincere voting weakly dominates every other strategy for voters. Since we have assumed that a player will never choose a weakly dominated strategy, all voters will vote sincerely. Given that the preferences of voters are symmetric and single peaked, the electorate will behave according to the preferences of the median voter. There are two possible subgames: either $r_i = -l_j$ or $r_i \neq -l_j$. In the latter case, the candidate closer to zero will win the election. In the former case, there is a tie between the candidates, and the median voter will decide by flipping a coin.

Second Stage

Without loss of generality, the configurations in Table 2, along with their symmetric counterparts, are an exhaustive list of all the possible subgames that parties may face, along with their corresponding NE (considering only the NE in pure strategies and non-weakly dominated strategies). In this list, the pair of strategies (l_i, r_j) refers to the decision of party L to nominate l_i in conjunction with the decision of party R to nominate r_j. The strategy "*randomize*" stands for the decision of the party to randomize equally between its two candidates.

To be part of a SPNE, any strategy profile S_L^* and S_R^* must induce these NE in the corresponding subgames. Note that subgames 3, 9, 10, 15 and 16 allow two NE in pure strategies, while all the other subgames allow a unique NE. To illustrate how this table was derived, I will prove the NE in subgame 3. Party R does not have a real choice since both of its candidates have adopted indistinguishable platforms. Its unique available strategy is to randomize between r_1 and r_2. On the other hand, party L has a choice between $l_1 = 0$ and $l_2 > 0$. If L nominates l_1 it will tie with R and the policy implemented will be 0 for sure. If L nominates l_2 it will lose against R and the policy implemented will be 0 for sure. Hence, both nominations lead to the same policy outcome and give L the same utility. Therefore, L is indifferent between l_1 and l_2 and the Nash equilibria are (l_1, randomize) and (l_2, randomize). Analysis of the other 27 subgames follows a similar logic.

Table 2

		Nash equilibria
Subgame 1	$0 = r_1 = r_2 = -l_1 = -l_2$	(randomize, randomize)
Subgame 2	$0 < r_1 = r_2 = -l_1 = -l_2$	(randomize, randomize)
Subgame 3	$0 = r_1 = r_2 = -l_1 < -l_2$	(l_1, randomize) and (l_2, randomize)
Subgame 4	$0 < r_1 = r_2 = -l_1 < -l_2$	(l_1, randomize)
Subgame 5	$0 = r_1 = r_2 < -l_1 = -l_2$	(randomize, randomize)
Subgame 6	$0 < r_1 = r_2 < -l_1 = -l_2$	(randomize, randomize)
Subgame 7	$0 = r_1 < r_2 = -l_1 = -l_2$	(randomize, r_1)
Subgame 8	$0 < r_1 < r_2 = -l_1 = -l_2$	(randomize, r_1)
Subgame 9	$0 = r_1 = r_2 < -l_1 < -l_2$	(l_1, randomize) and (l_2, randomize)
Subgame 10	$0 < r_1 = r_2 < -l_1 < -l_2$	(l_1, randomize) and (l_2, randomize)
Subgame 11	$0 = r_1 < r_2 = -l_1 < -l_2$	(l_1, r_1)
Subgame 12	$0 < r_1 < r_2 = -l_1 < -l_2$	(l_1, r_1)
Subgame 13	$0 = r_1 < r_2 < -l_1 = -l_2$	(randomize, r_2)
Subgame 14	$0 < r_1 < r_2 < -l_1 = -l_2$	(randomize, r_2)
Subgame 15	$0 = r_1 < r_2 < -l_1 < -l_2$	(l_1, r_2) and (l_2, r_2)
Subgame 16	$0 < r_1 < r_2 < -l_1 < -l_2$	(l_1, r_2) and (l_2, r_2)
Subgame 17	$0 = r_1 = -l_1 < r_2 = -l_2$	(l_1, r_1)
Subgame 18	$0 < r_1 = -l_1 < r_2 = -l_2$	(l_1, r_1)
Subgame 19	$0 = r_1 = -l_1 < r_2 < -l_2$	(l_1, r_2)
Subgame 20	$0 < r_1 = -l_1 < r_2 < -l_2$	(l_1, r_1)
Subgame 21	$0 = r_1 < -l_1 < r_2 = -l_2$	(l_1, r_1)
Subgame 22	$0 < r_1 < -l_1 < r_2 = -l_2$	(l_1, r_1)
Subgame 23	$0 = r_1 < -l_1 < r_2 < -l_2$	(l_1, r_1)
Subgame 24	$0 < r_1 < -l_1 < r_2 < -l_2$	(l_1, r_1)
Subgame 25	$0 = -l_1 < r_1 = r_2 < -l_2$	(l_1, randomize)
Subgame 26	$0 < -l_1 < r_1 = r_2 < -l_2$	(l_1, randomize)
Subgame 27	$0 = -l_1 < r_1 < r_2 < -l_2$	(l_1, r_2)
Subgame 28	$0 < -l_1 < r_1 < r_2 < -l_2$	(l_1, r_2)

First Stage

Without loss of generality, the configurations in Table 3, along with their symmetric counterparts, are an exhaustive list of all the possible configurations of platforms that candidates may adopt, along with a profitable deviation, if any. Below, ε is some small positive number.

I will prove why configuration 1 is a NE for the candidates. Suppose none of the candidates deviated. Then parties would face subgame 1, and we can see from Table 2 that each party randomizes between their candidates. Each candidate has a probability of $\frac{1}{4}$ of winning the election ($\frac{1}{2}$ probability to be nominated times $\frac{1}{2}$ probability to win the election conditional on being nominated). Suppose, on the other hand, that one of the candidates deviated *unilaterally*. Then parties would face subgame 3 or its symmetrical counterpart, and we can see that the candidate

Table 3

		Profitable deviation	NE
Configuration 1	$0 = r_1 = r_2 = -l_1 = -l_2$	None	Yes
Configuration 2	$0 < r_1 = r_2 = -l_1 = -l_2$	$r_1 \to 0$	No
Configuration 3	$0 = r_1 = r_2 = -l_1 < -l_2$	$l_2 \to l_1$	No
Configuration 4	$0 < r_1 = r_2 = -l_1 < -l_2$	$l_2 \to l_1$	No
Configuration 5	$0 = r_1 = r_2 < -l_1 = -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 6	$0 < r_1 = r_2 < -l_1 = -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 7	$0 = r_1 < r_2 = -l_1 = -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 8	$0 < r_1 < r_2 = -l_1 = -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 9	$0 = r_1 = r_2 < -l_1 < -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 10	$0 < r_1 = r_2 < -l_1 < -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 11	$0 = r_1 < r_2 = -l_1 < -l_2$	$l_1 \to 0$	No
Configuration 12	$0 < r_1 < r_2 = -l_1 < -l_2$	$l_1 \to 0$	No
Configuration 13	$0 = r_1 < r_2 < -l_1 = -l_2$	$l_1 \to 0$	No
Configuration 14	$0 < r_1 < r_2 < -l_1 = -l_2$	$l_1 \to 0$	No
Configuration 15	$0 = r_1 < r_2 < -l_1 < -l_2$	$l_1 \to 0$	No
Configuration 16	$0 < r_1 < r_2 < -l_1 < -l_2$	$l_1 \to 0$	No
Configuration 17	$0 = r_1 = -l_1 < r_2 = -l_2$	$r_2 \to r_1$	No
Configuration 18	$0 < r_1 = -l_1 < r_2 = -l_2$	$r_2 \to r_1$	No
Configuration 19	$0 = r_1 = -l_1 < r_2 < -l_2$	$r_2 \to r_1$	No
Configuration 20	$0 < r_1 = -l_1 < r_2 < -l_2$	$r_2 \to r_1$	No
Configuration 21	$0 = r_1 < -l_1 < r_2 = -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 22	$0 < r_1 < -l_1 < r_2 = -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 23	$0 = r_1 < -l_1 < r_2 < -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 24	$0 < r_1 < -l_1 < r_2 < -l_2$	$r_2 \to r_1 + \varepsilon$	No
Configuration 25	$0 = -l_1 < r_1 = r_2 < -l_2$	$l_2 \to l_1 - \varepsilon$	No
Configuration 26	$0 < -l_1 < r_1 = r_2 < -l_2$	$l_2 \to l_1 - \varepsilon$	No
Configuration 27	$0 = -l_1 < r_1 < r_2 < -l_2$	$l_2 \to l_1 - \varepsilon$	No
Configuration 28	$0 < -l_1 < r_1 < r_2 < -l_2$	$l_2 \to l_1 - \varepsilon$	No

who deviated would either lose the nomination or win the nomination but lose the election for sure, depending on which of the two equilibria in subgame 3 was selected. Such a deviation is therefore not profitable, and the configuration is a NE.

Now I prove why configuration 2 is not a NE. Suppose none of the candidates deviated. Then the parties would face subgame 2, and we can see from Table 2 that each party randomizes between their candidates. Each candidate has a probability of $\frac{1}{4}$ of winning the election. Suppose, on the other hand, that one of the candidates, say r_1, deviated *unilaterally* to zero. Parties would face subgame 7 and r_1 would win both the nomination and the election. Since this is a profitable deviation for r_1 this configuration is not a NE.

In a similar way it can be proved that configurations 3 to 28 are not NE (see the profitable deviations in each case). Thus configuration 1 is the unique NE of the reduced game, and it is the unique strategy profile of candidates that can be part of a

SPNE. Therefore in any strategy profile S_c^*, S_L^* and S_R^*, S_v^* that forms a SPNE, the outcome will be the same: candidates adopt the platforms in configuration 1, which are $0 = r_1 = r_2 = -l_1 = -l_2$, parties have no choice but to select the strategies (randomize, randomize), and voters have no choice but to randomize between the two parties. This is exactly what the theorem says. □

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Downsian Competition with Assembly Democracy

María del Pino Ramos-Sosa and M. Socorro Puy

1 Introduction

In the last decade, small groups of citizens all over Europe and in the USA have spread their protests in demand for more civil participation in the process of policy decision making. In Spain, the so-called 15-M inspired in the Arab Spring and in the USA the Occupy Wall Street (OWS) are examples of social movements that are protesting against the current democratic systems. On the one hand, internet networks have facilitated the coordination in the action of these groups that have become stronger. On the other hand, the size of these groups does not seem to threaten, up to now, the stability of the current political systems neither in the USA nor in the European continent. While the media has widely covered the protests of these groups, politicians and the members of traditional political parties do not have attended these demands so far.

The social movements mentioned above do not agree with the power that political parties have acquired in representative democratic systems. They defend either independent candidates which are not tied by party discipline, or more direct participation of the citizens in the process of policy decision making.

In addition, there is a recent phenomenon in current western democracies by which the autonomy of states has reduced due to the development of supranational

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political institutions such as United Nations, European Union, IMF, NATO, among others (Held 1991; Dahl 1994). Many countries in Europe and in the American continent have reduced their decision making power whereas supranational institutions have increased their competencies. As a consequence, citizens find that the process of policy decision-making is increasingly moving out of their scope. This has generated an extra discontent over the traditional parties which have shown no clear opposition against the process of delegating state power. The pressure of the civil society to recover the state autonomy has become more intense (this is the case of many protests in European countries such as Greece, Italy, Portugal, Belgium, Spain and others across the Atlantic, Canada and USA).[1]

As a response to these protests, there is a number of new political parties in many European countries which incorporate, in their policy platforms, the proposals of these social movements. A key aspect of these parties' manifesto is the promotion of new forms of participatory democracy. The impact of these new parties will have to be tested in the ballot boxes. So far, however, they have shown to be quite successful. This was evidenced in the last 2014 European Elections in which political parties such as "Movimento 5 Stelle" obtained 17 seats out of 73 in Italy, and "Podemos," a 3-month-old party in Spain, gained five seats in the European Parliament, being the fourth-largest representation for Spain.[2]

In this paper, we propose a stylized model which tries to deduce the effects derived from the political competition between traditional parties and new parties which promote participatory democracy. Whereas Matsusaka (2005) suggests that assembly democracies has dwindled in importance, we find that, in the last decade, the media has taken the protests of social movements to the front page and voters are showing an increasing and non-negligible interest for alternative forms of democracy among which assembly democracy is one of them.

According to representative democracy, citizens vote to elect their representatives on whom they delegate political decisions. Representative democracy is the most widespread form of democracy. The essence of representative democracy is the competition among candidates which, in most cases, are affiliated to different political parties. Either a plurality system or a proportional system can lead to one or more representatives holding the ultimate power of policy decision making. In every legislature, citizens elect their representatives with their ballot and political accountability is guaranteed by the representatives' incentives to be reelected. Representative democracy is viewed as one of the most effective mechanisms to achieve political stability. This political stability, however, can be threatened when citizens perceive that the interests of the representatives are moving in opposite directions to their own interests (Kalt and Zupan 1984; Peltzman 1984). As claimed by Budge (2001a,b): "Representative democracies are deficient in many respects, all of which fundamentally stem from the limited role they allow citizens in

[1] See http://www.cbsnews.com/2718-201_162-1290/occupy-wall-street-protests/ for a media coverage of these protests.

[2] http://www.nytimes.com/2014/05/29/world/europe/spanish-upstart-party-said-it-could-and-did-now-the-hard-part-begins.html?_r=0.

government. Most decisions are imposed on those affected without consulting them".[3]

Assembly democracy is a form of direct democracy in which citizens in an assembly directly vote on initiatives. This type of democracy, that can be traced back to the Greek city of Athens, has scarcely been put into practice in our days. The most well-known experience is in Switzerland, in which popular assemblies in each of the cantons approve citizens' initiatives by popular vote. Assembly democracy is not exclusive of Switzerland, but also the towns of the states of New England in the USA, are governed by periodic meetings that discuss and vote their main issues (the term town corresponds to municipalities in other places).[4] There is no "pure" form of direct democracy as in both, Switzerland and New England, popular assemblies coexist with representative democracy at higher levels of government. Opponents to direct democracy claim that this procedure generates delays, conflicts, and even tyranny of the majority among others.

In this paper, we propose a theoretical exercise which combines elements from both, direct and representative democracy. Our simplified model tries to resemble as much as possible the well-known downsian model of political competition (Downs 1957; Hotelling 1929). We consider a unidimensional policy space in which voters endowed with single-peaked preferences are identified with an ideal policy. A political party defends the principles of representative democracy (Party A) and another, defends assembly democracy (Party B). The degree of social protest against the traditional political party is introduced in the form of a valence characteristic. The two parties face each other at a general election that is solved by majority voting rule. Party A is a pure office-seeking political party that selects a platform as to defeat its counterpart. Party B cannot commit to certain platforms given that the party manifesto contains those proposals decided in a pre-electoral assembly. In the case of winning the elections, Party B will implement the platform decided in a post-electoral assembly. Both assemblies, the pre-electoral and the post-electoral, we consider, are open to all who wish to take part.

At the pre-electoral assembly of Party B, citizens can launch and defend proposals. We follow the citizen-candidate approach as a rationale to deduce the endogenous location of the proposals at the pre-electoral assembly (Besley and Coate 1997; Osborne and Slivinski 1996). According to this approach, every configuration of proposals at the pre-electoral assembly should be sustained as a Nash equilibrium outcome in which none of the citizens who have launched a proposal at the assembly can benefit from dropping it out, and no other citizen who has not launched a proposal can benefit from presenting one. For the sake of simplicity, we just consider pre-electoral assemblies in which just two proposals are launched. Party A selects a platform as to maximize its chances of winning the elections given the common belief on the assembly outcome.

We consider that voters, when casting their ballots at the general election, do evaluate Party B in terms of the proposals launched at the pre-electoral assembly.

[3] See also Buchanan and Tullock (1962).

[4] There are other experiences of direct democracy in Italy (see Putnam et al. 1993).

As a result, voters evaluate Party B in terms of a lottery that assigns probabilities to the assembly-equilibrium proposals. That is, from the point of view of voters, Party B gathers certain degree of ambiguity (in line with Shepsle 1972; Alesina and Cukierman 1990), whereas Party A is characterized by having a single policy.

Our results suggest that the assembly proposals (of Party B) should be sufficiently moderated as to defeat a traditional party (Party A). Interestingly, competition does not always result in a policy at the median voter's ideal point (similar result to Romer and Rosenthal 1979). We find that extremist assembly parties induce the traditional party to locate at the median policy position, whereas centrist assembly parties move the traditional party away from the median, just in the opposite direction of the assembly's median.

Ours is not the first contribution analyzing the impact of direct democracy. Matsusaka (2005) describes the practice and theory of direct democracy through referenda in some of the states of USA, and shows that allowing the general public to participate in lawmaking seems to improve the performance of government. In the same line, Gerber (1996) compares states where referenda are available with those in which direct democracy is not available. She shows that the threat of a ballot proposition can cause the elected official to choose policies that more closely reflects the median's voter ideal policy. Maskin and Tirole (2004) highlight some of the negative side effects of direct democracy. They show that this may lead to a worse outcome due to the citizens' lack of access to the expert opinion that is just available to legislators.

Our proposal can also be related to the literature on endogenous selection of electoral rules. Barbera and Jackson (2004) explore this issue from a self-stable type of criteria and more closely related, Aghion et al. (2004) analyze how much society chooses to delegate power to its leaders. According to their approach, different constitutions establish the share of votes needed to block a leader, and this determines the level of "insulation" of a leader. In our simplified framework, voters face two options: delegation of power to a leader, or total insulation of the leader (i.e., assembly democracy). We show that leaders in our framework are constrained in their decision by the expected proposals at the assembly, that is, the assembly also has a relevant role in controlling political leaders.

The rest of the paper is organized as follows. In Sect. 2 we introduce the formal model. Section 3 provides the results for the case of full attendance at the assembly. Section 4 analyzes the case in which not all the citizens are expected to attend the assembly. Finally, Sect. 5 contains some concluding remarks.

2 Model

A general election is going to be held, in which voters will elect one out of two political parties. The two competing political parties are denoted by Party A and Party B. These parties differ in the constitutional structure they support. Party A defends representative democracy and Party B defends assembly democracy.

Let $[0, 1]$ be the unidimensional policy space.[5] The continuum of voters have symmetric single-peaked preferences over the policy space. The ideal policies of voters are distributed over $[0, 1]$ according to a strictly increasing distribution function F. Let $x_i \in [0, 1]$ be the ideal policy of voter i and let $x_M \in [0, 1]$ be the ideal policy of the median voter in the population. Preferences of voters over policies are represented by the following von Neumann–Morgenstern utility

$$u_i(x) = -|x - x_i|,$$

where the absolute distance between the ideal point and the policy x measures the disutility for the agent.

The two political parties competing to win the elections are denoted by $j \in \{A, B\}$. Party A is a traditional party that offers a single policy $x_A \in [0, 1]$. Party B, on the contrary, represents a party whose decisions are taken in an assembly. Each party is associated with a characteristic $\beta_A, \beta_B > 0$, where β_A represents the social preference for a traditional structured political party and β_B represents the social preference for a new party which defends the participation of the civil society. Let $\Delta\beta = \beta_B - \beta_A$ be the difference in advantage between the two parties, which we interpret as a measure of the *degree of social protest* against the traditional parties. We assume that both parties are uncertain about the difference in the advantage $\Delta\beta$ and they both consider that the value of $\Delta\beta$ is distributed according to a strictly positive density function.

Party B defends a new form of democracy in which their primary decision-making body is an assembly open to all who wish to take part. This is, in fact, in the spirit of the global Occupy Movements. We consider that this party runs two assemblies, one before the general elections in which all those who wish to, can launch policy proposals, and another just after the elections in which all those who want to participate, vote over the pre-assembly proposals. The pre-electoral assembly aims at collecting information about those policy proposals with options to defeat any other proposal in a plurality vote election. The fact that the assembly party organizes two assemblies is inspired by the anecdotal evidence of the Spanish new left-wing party called "Podemos." For the first time participating in an election (European Parliament Elections), the party has organized its program around many assemblies, from which we outline the pre-electoral and the post-electoral assemblies. Besides, the Italian party "Movimento 5 Stelle" also organizes online referendums to take both pre-electoral and post-electoral decisions.

The timing of the proposed electoral game unfold as follows:

Stage 1: Party B organizes the pre-electoral assembly where all who wish to take part can launch a proposal. Let X_B be the set of proposals made at the assembly.

Stage 2: Party A decides its political platform $x_A \in [0, 1]$.

[5] All the results also hold if instead of taking $[0, 1]$, we take the real line as the policy space.

Stage 3: General elections are held.
Stage 4: If Party A wins, platform x_A is implemented. If Party B wins, there is a post-electoral assembly in which all who wish to take part vote over X_B and the policy obtaining more votes is implemented.

Observe that the proposals of Party B come from an assembly whereas the platform of Party A comes from the strategic decision of the members of Party A. In this way, there is an important difference between the two parties given that Party B limits its power to organizing the assembly and executing its decision. We next describe in more detail the stages of the electoral game.

Stage 1: The pre-electoral assembly

In Stage 1, citizens have the option of launching a proposal at the pre-electoral assembly. These proposals are defended by Party B during the electoral campaign and in the case of Party B winning the general election, the post-electoral assembly will select one of them.

Let $e_i \in \{0,1\}$ be citizen i's strategy where $e_i = 0$ means that agent i is not launching a proposal and $e_i = 1$ means that the citizen is launching a proposal. A profile of strategies e describes the strategy for each of the citizens. If a citizen makes a proposal, we consider that she cannot misrepresent her preferences so that the proposed policy is her ideal policy. Let $X_B = \{x_B^1, \ldots, x_B^m\}$ be the set of proposals such that each proposal x_B^i is the ideal policy of the citizen i who has launched it at the assembly. We assume that launching a proposal has a small cost $c > 0$. In this way, a citizen has only incentives to launch a proposal when either this has some chances of being selected at the post-electoral assembly or when this can affect the policy that will be finally implemented if Party B wins the elections.

For each profile of entry strategies e, the *expected voting outcome* at the post-electoral assembly is represented by a lottery $L(e) = \{X_B, p\}$ where X_B is the set of proposals and $p = (p_1, \ldots, p_m)$ with $p_i \geqslant 0$ is the expected probability of each proposal being selected at the post-electoral assembly. For example, if there are two proposals $\{x_B^1, x_B^2\}$ and $L(e) = \{\{x_B^1, x_B^2\}, (1,0)\}$, then x_B^1 is expected to win. However, if there are two proposals and $L(e) = \{\{x_B^1, x_B^2\}, (\frac{1}{2}, \frac{1}{2})\}$, the two proposals are expected to tie. Thus, $L(e)$ is a lottery that represents the expected voting outcome at the post-electoral assembly. The expected voting outcome is common knowledge.

Let e_{-i} be the entry strategies for all citizens except for i. We say that a profile of entry strategies e^* is a *pre-assembly equilibrium* if in expected utility terms,

$$Eu_i(L(e^*)) - ce_i^* \geq Eu_i(L(e_i', e_{-i}^*)) - ce_i' \text{ for all } i \text{ and all } e_i' \in \{0,1\}.$$

Hence, a pre-assembly equilibrium requires that, on the one hand, no citizen strictly improves launching a new proposal and, on the other hand, no candidate strictly benefits from dropping her proposal. Note that the pre-assembly equilibrium is a Nash equilibrium. For the sake of simplicity, we just consider pre-assembly equilibria in which just two proposals are launched.

Stage 2: Party A's election of platform

Party A is a pure office-seeking political party. This party selects a platform x_A as to win the general elections. Given the proposals of the pre-electoral assembly and its expected voting outcome, preferences of Party A are represented by:

$$v(x_A, L(e)) = \begin{cases} 1 \text{ if a strict majority of voters prefers } x_A \text{ over } L(e), \\ 0 \text{ otherwise.} \end{cases} \quad (1)$$

The members of Party A are uncertain about the degree of social protest of the electorate. Therefore, they do not know whether they gather some advantage with respect to Party B. Their optimal decision, that we denote by x_A^*, maximizes their expected probability of winning:

$$x_A^* \in \arg\max Ev(x_A, L(e)).$$

Stage 3: General election

Given β_A and β_B, the platform of Party A and the expected voting outcome at the assembly $L(e)$, the optimal decision of a voter is the following:

$$\begin{array}{ll} \text{vote for Party A when} & \beta_A - u_i(x_A) > \beta_B - Eu_i(L(e)) \\ \text{vote for Party B when} & \beta_A - u_i(x_A) < \beta_B - Eu_i(L(e)) \\ \text{abstain from voting when} & \beta_A - u_i(x_A) = \beta_B - Eu_i(L(e)). \end{array} \quad (2)$$

Stage 4: Electoral outcome

If Party A wins, then the implemented policy is x_A. If Party B wins, then the post-electoral assembly takes place and, by plurality rule, one of the proposals in X_B is selected. Ties are broken at random.

Next, we introduce the equilibrium concept that accounts for the strategic behavior of Party A to select its platform, and for the strategic decision of the citizens to launch proposals at the pre-electoral assembly.

Definition A political equilibrium is a policy for Party A, x_A^*, and a lottery representing the expected voting outcome at the assembly, $L(e^*) = \{X_B, p\}$, such that:

(i) e^* is a pre-assembly equilibrium and
(ii) given $L(e^*)$, *policy* x_A^* maximizes Party A's expected probability of winning.

Note that, given a pre-assembly equilibrium, the probability with which each pre-assembly proposal can be selected is directly derived from sincere voting behavior at the post-electoral assembly.[6]

[6]A similar analysis could be made in which participants at the post-electoral assembly vote strategically. None of our results rest on the sincere voting assumption.

3 The Assembly with Full Attendance

We follow the citizen-candidate model proposed by Osborne and Slivinski (1996) in order to define how endogenous political platforms can be proposed at the assembly. Osborne and Slivinski (1996) consider a continuum of citizens with single-peaked preferences over the set of policy positions. Citizens can choose to enter or not and if they enter, they propose their ideal policy. After the citizens have made their entry decision, they vote over the proposals and under plurality rule one of them is selected. These authors do neither refer to an assembly, nor they consider that citizens belong to a political party. However, the result (in their Proposition 2) can be directly applied to our setting given that the entry stage in their model resembles our pre-electoral assembly stage. Their Proposition 2 can be rewritten as:

Lemma 1 *In every pre-assembly equilibrium with two proposals, these must be located symmetrically around the position of the median voter, i.e.* $x_B^1 = x_M - \varepsilon$ *and* $x_B^2 = x_M + \varepsilon$, *where* $\varepsilon \in (c, \overline{\varepsilon})$ *and the winning probabilities must coincide* $p_1 = p_2$.

Thus, in every pre-assembly equilibrium with two proposals, these should gather an equal probability of winning. The upper bound $\overline{\varepsilon}$ is defined as to avoid the entrance of a third proposal in between the two others. Thus, $\overline{\varepsilon}$ depends upon the distribution of voters and this is defined as to guarantee that for all $\varepsilon < \overline{\varepsilon}$, there is no citizen that proposing a policy in the interval $[x_M - \varepsilon, x_M + \varepsilon]$ can either defeat one of the policies x_B^1, x_B^2 at the post-electoral assembly, or can give the victory at the post-electoral assembly to one of the policies x_B^1 or x_B^2 that she prefers.[7]

At Stage 3, given a pre-assembly equilibrium with two proposals, the optimal decision of the voters with ideal policy $x_i \in [0, x_M - \varepsilon]$ and in the case that $x_A > x_M - \varepsilon$ is such that:

$$\begin{array}{l} \text{when } \Delta\beta < x_M - x_A \text{ they vote for Party A} \\ \text{when } \Delta\beta = x_M - x_A \text{ they abstain from voting} \\ \text{when } \Delta\beta > x_M - x_A \text{ they vote for Party B,} \end{array} \tag{3}$$

where $\Delta\beta = \beta_B - \beta_A$.

When $x_i \in [x_M + \varepsilon, 1]$ and in the case that $x_A < x_M + \varepsilon$ we have that:

$$\begin{array}{l} \text{when } \Delta\beta < x_A - x_M \text{ they vote for Party A} \\ \text{when } \Delta\beta = x_A - x_M \text{ they abstain from voting} \\ \text{when } \Delta\beta > x_A - x_M \text{ they vote for Party B,} \end{array} \tag{4}$$

where $\Delta\beta = \beta_B - \beta_A$.

[7]Following Osborne and Slivinsky, this basically implies that there is no policy position in the interval $[x_M - \varepsilon, x_M + \varepsilon]$ such that either it is strictly preferred by more than $1/3$ of the electorate or that it can facilitate the victory of the closest proposal for the voter announcing this policy position.

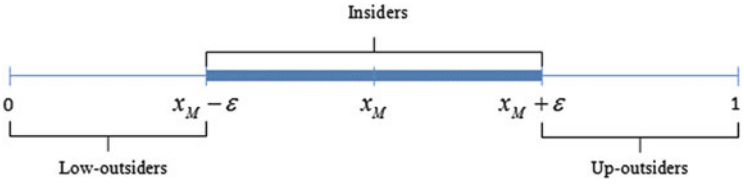

Fig. 1 Location of the *low-outsiders*, the *insiders*, and the *up-outsiders* with respect to the assembly

We refer to those voters whose ideal policy satisfies that $x_i \in [0, x_M - \varepsilon]$ as *low-outsiders* and to those for whom $x_i \in [x_M + \varepsilon, 1]$ as *up-outsiders*. We refer to the *insiders* as those voters such that $x_i \in (x_M - \varepsilon, x_M + \varepsilon)$.

Regarding the insiders, $Eu_i(L(e^*)) = \beta_B - \varepsilon$. Let $d_i = |x_i - x_A|$, then,

$$\begin{array}{l} \text{those insiders such that } \Delta\beta < \varepsilon - d_i \text{ vote for Party A.} \\ \text{those insiders such that } \Delta\beta > \varepsilon - d_i \text{ vote for Party B.} \end{array} \tag{5}$$

There is no abstention among insiders given that the probability for an agent to satisfy $d_i = \varepsilon - \Delta\beta$ is negligible. Figure 1 represents the provided classification of voters.

Next, we derive the electoral result at the general election depending on the degree of social protest of the society, $\Delta\beta$. We describe which degree of discontent is favorable for Party B to win the elections.

Proposition 1 *In every political equilibrium with two proposals at the pre-electoral assembly, Party B wins the elections if and only if* $\Delta\beta \geq \frac{\varepsilon}{2}$.

Proof First, we show that if $\Delta\beta \geq \frac{\varepsilon}{2}$, then Party B always wins. We consider that $\Delta\beta = \frac{\varepsilon}{2}$.

If $x_A \in [0, x_M - \varepsilon]$, according to (4), the up-outsiders vote for Party B and by (5), for those insiders such that $x_i \in \left(x_M - \frac{\varepsilon}{2}, x_M + \varepsilon\right)$ we have $d_i > \frac{\varepsilon}{2}$, which implies that they also vote for Party B. Thus, Party B obtains a strict majority of votes. By a symmetric type of argument, if $x_A \in [x_M + \varepsilon, 1]$, Party B wins.

If $x_A \in \left(x_M - \varepsilon, x_M - \frac{\varepsilon}{2}\right)$, by (4), the up-outsiders vote for Party B and by (5), for those insiders such that $x_i \in [x_M, x_M + \varepsilon)$ we have $d_i > \frac{\varepsilon}{2}$, which implies that they vote for Party B. Thus, Party B obtains a strict majority of votes. By a symmetric type of argument, if $x_A \in \left(x_M + \frac{\varepsilon}{2}, x_M + \varepsilon\right)$, Party B wins.

If $x_A \in \left(x_M - \frac{\varepsilon}{2}, x_M\right]$, by (3) and (4) all the outsiders vote for Party B. Thus, Party A only obtains the vote of the insiders such that $d_i < \frac{\varepsilon}{2}$, However, in every pre-assembly equilibrium, no subinterval of size ε in between $(x_M - \varepsilon, x_M + \varepsilon)$ can contain more than $\frac{1}{3}$ of the votes and the rest of insiders vote for Party B.[8]

[8] Observe that for every $x_i \in (x_M - \varepsilon, x_M + \varepsilon)$, the size of the interval, according to sincere voting in the citizen candidate approach, is given by $\frac{x_i - [x_M - \varepsilon]}{2} + \frac{x_M + \varepsilon - x_i}{2} = \varepsilon$.

Thus, Party B obtains a strict majority of votes. By a symmetric type of argument, if $x_A \in \left[x_M, x_M + \frac{\varepsilon}{2}\right)$, Party B wins.

In the last case, when $x_A = x_M - \frac{\varepsilon}{2}$ by (3), the low-outsiders abstain from voting. However, by (4) the up-outsiders vote for Party B and among the insiders, by (5), those with $x_i \in (x_M, x_M + \varepsilon]$ vote for Party B. Thus, even though Party B may not obtain a strict majority, Party A cannot obtain more than $\frac{1}{3}$ of the votes by the above argument and Party B wins. By a symmetric type of argument, if $x_A = x_M + \frac{\varepsilon}{2}$, Party B wins.

Given that Party B wins when $\Delta\beta = \frac{\varepsilon}{2}$, it also wins when $\Delta\beta > \frac{\varepsilon}{2}$.

Second, we show that when $\Delta\beta < \frac{\varepsilon}{2}$, Party B is defeated.

Suppose that $x_A = x_M - \frac{\varepsilon}{2}$ and let $\Delta\beta = \frac{\varepsilon}{2} - \gamma$ with $\gamma \to 0$. Then, by (3), the low-outsiders vote for Party A and by (5), those insiders such that $x_i \in (x_M - \varepsilon, x_M]$ also vote for Party A. Thus, Party A obtains a strict majority. Given that Party A wins when $\Delta\beta = \frac{\varepsilon}{2} - \gamma$, it also wins locating at $x_A = x_M - \frac{\varepsilon}{2}$ for every other case where $\Delta\beta \in \left[0, \frac{\varepsilon}{2}\right)$. □

This result gives a clear prediction of the party winning at the general election as a function of the degree of social protest. If the degree of social protest is sufficiently high, we show Party A must locate in one of the insiders positions as this will guarantee the votes of two different fractions of the electorate, some insiders and some outsiders. When $\Delta\beta \geq \frac{\varepsilon}{2}$, regardless of the location of Party A, there are no options for Party A to obtain a majority of votes.

Figure 2 shows that the smaller the value of the parameter that defines the proposals of the assembly ε, the higher the chances of Party B to win at the general

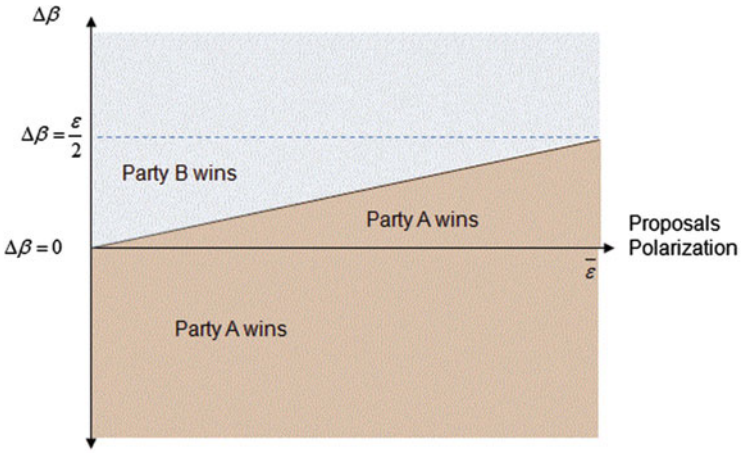

Fig. 2 An illustration of Proposition 1

election.[9] In the horizontal axis we represent the values of ε to which we refer as the degree of polarization within the assembly. We say that the assembly proposals are moderated when ε takes a small value. In the vertical axis we represent the degree of social protest. Thus, we can interpret the first result in Proposition 1 as one showing that the more moderated is the assembly, the higher the probability of the assembly party to win at the general election. Polarization of the assembly, on the other hand, reduces the set of values $\Delta\beta$ for which the assembly party can win at the general elections.

So far, we have paid attention to describing which party can win at the general election. Next, we describe the equilibrium location of Party A. In Proposition 1, we showed that Party A can only win by supporting certain political positions. We next show that only two symmetric locations will be optimally selected by Party A in every political equilibrium.

Proposition 2 *In every political equilibrium with two proposals at the pre-electoral assembly, Party A sets its political platform either at* $x_A = x_M - \frac{\varepsilon}{2}$ *or at* $x_A = x_M + \frac{\varepsilon}{2}$.

Proof The objective function of Party A is defined by Expression (1) hence, Party A only derives benefits from winning the elections. By Proposition 1, Party A cannot win the elections when $\Delta\beta \geq \frac{\varepsilon}{2}$. In this case, Party A is indifferent between every policy position. We analyze the case where $\Delta\beta = \frac{\varepsilon}{2} - \delta$, with $\delta \to 0$. As shown in Proposition 1, $x_A = x_M - \frac{\varepsilon}{2}$ guarantees the victory of Party A in this case (similar reasoning for $x_A = x_M + \frac{\varepsilon}{2}$). We proceed by showing the following statements:

(i) extremist locations of Party A such that $x_A \in [0, x_M - \varepsilon]$ or $x_A \in [x_M + \varepsilon, 1]$ cannot guarantee the victory of Party A.
(ii) every other location $x_A \in (x_M - \varepsilon, x_M + \varepsilon)$ such that $x_A \neq x_M - \frac{\varepsilon}{2}$ or $x_A \neq x_M + \frac{\varepsilon}{2}$ cannot guarantee the victory of Party A.

First, we show (i). We consider that $x_A \in [0, x_M - \varepsilon]$. By (3), the low-outsiders vote for Party A. Among the insiders, by (5), those agents with $d_i > \frac{\varepsilon}{2} + \delta$ vote for Party B. Thus, those insiders such that $x_i \in \left(x_M - \frac{\varepsilon}{2} + \delta, x_M + \varepsilon\right)$ vote for Party B. By (4), the up-outsiders vote for Party B. Therefore, Party B obtains a strict majority and wins. By a symmetric type of argument, if $x_A \in [x_M + \varepsilon, 1]$, Party B wins.

Next, we show (ii). We distinguish two cases, when $x_A \in \left(x_M - \varepsilon, x_M - \frac{\varepsilon}{2}\right)$ and when $x_A \in \left(x_M - \frac{\varepsilon}{2}, x_M\right]$.

[9] We take $c \to 0$ so that Fig. 2 does not account for those values of $\varepsilon \to 0$ for which an equilibrium fails to exist.

First, we suppose that $x_A \in \left(x_M - \varepsilon, x_M - \frac{\varepsilon}{2}\right)$. If $x_i = x_M$, by (5), the median agent prefers Party B over Party A when

$$\Delta\beta > \varepsilon - (x_M - x_A) \tag{6}$$

Given that $x_M - x_A > \frac{\varepsilon}{2}$, we have that the second term of Expression 6 is smaller than $\frac{\varepsilon}{2}$. If we take $\Delta\beta = \frac{\varepsilon}{2} - \delta$ where $\delta \to 0$, we can always define δ sufficiently close to 0 such that $\frac{\varepsilon}{2} - \delta > \varepsilon - (x_M - x_A)$. Then, an agent located at $x_i = x_M$ votes for Party B as they do those agents located at $x_i \in (x_M, x_M + \varepsilon)$. Besides, by (4), the up-outsiders also vote for Party B.

Second, we suppose that $x_A \in \left(x_M - \frac{\varepsilon}{2}, x_M\right]$. By (3) and (4) and given that $\Delta\beta > |x_M - x_A|$ the outsiders vote for Party B. By (5), Party A only obtains the vote of those insiders such that $d_i < \frac{\varepsilon}{2} + \delta$. In other words, the votes of Party A are those contained in an interval of size $\varepsilon + 2\delta$. Given that in every interval of size ε, there is strictly less than 1/3 of the votes, for δ close to 0, Party A derives strictly less than 1/3 of the votes.

Thus, when $\Delta\beta = \frac{\varepsilon}{2} - \delta$ with $\delta \to 0$ there are only two policies that guarantee the victory of Party A ($x_A = x_M - \frac{\varepsilon}{2}$ and $x_A = x_M + \frac{\varepsilon}{2}$) besides, these two policies also guarantee the victory of Party A when $\Delta\beta < \frac{\varepsilon}{2} - \delta$. Then, this proves that these two policies are the only ones that maximize Party A's probability of winning. This completes the proof. □

We have shown that locating in a platform too close to the median voter does not allow Party A to defeat Party B. The main argument for this is that in order to obtain votes from insiders as well as from outsider voters, Party A must set its platform at one of the sides of the median voter. In particular, we find that when $\Delta\beta = \frac{\varepsilon}{2} - \delta$, with $\delta \to 0$, the only two locations that guarantee the victory of Party A are $x_A = x_M - \frac{\varepsilon}{2}$ and $x_A = x_M + \frac{\varepsilon}{2}$. Besides, for every other degree of social protest below $\Delta\beta = \frac{\varepsilon}{2} - \delta$, these locations also guarantee the victory of Party A.

Our analysis reveals that Party A must differentiate its policy from the median voter position to attract a majority of the electorate. In a similar vein, but in a different setting, Ansolabehere and Snyder (2000) and Groseclose (2001) show that when a candidate has an advantage over another, the weaker candidate moves away from the center.[10] In Fig. 3, we represent both winning strategies of Party A. The strategy $x_A = x_M - \frac{\varepsilon}{2}$ gives Party A the support of those voters located in the interval $[0, x_M]$ whereas the strategy $x_A = x_M + \frac{\varepsilon}{2}$ assures Party A the votes of those located in the interval $[x_M, 1]$.

[10]Observe that our result differs from the one of Shepsle (1972) who shows that when a party stands at the median, the other has incentives to take a lottery stand. See also Page (1976).

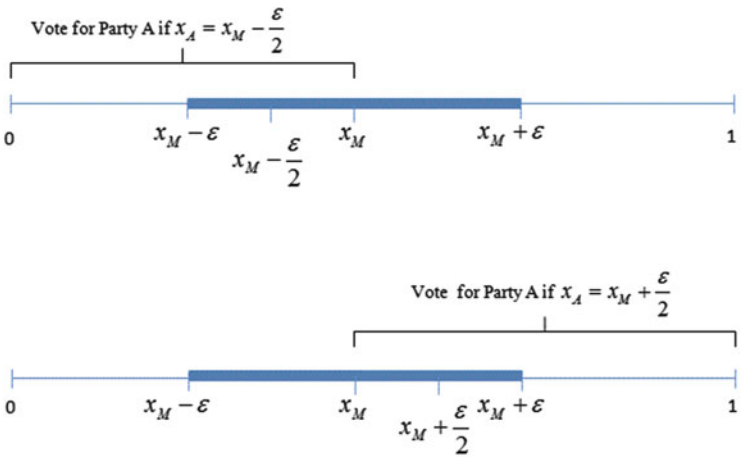

Fig. 3 An illustration of Proposition 2

4 The Assembly with Partial Attendance

In the previous section, we analyzed the case in which two policies symmetrically located around the median voter are proposed at the pre-electoral assembly. In addition, we took for granted that all the citizens attended the pre-electoral and the post-electoral assemblies of Party B.

Now, we want to consider a scenario where just a fraction of voters with close policy positions attend the assembly. We still maintain the pre-assembly equilibrium concept. Hence, the previous section is a particular case in which the median voter position of both the assembly and the electorate coincide. We define the *assembly* median voter position as x_M^a and from now on, x_M is the *electorate* median.

Following the pre-assembly equilibrium concept, in every political equilibrium with two expected proposals at the assembly, these are symmetrically located around the assembly median, i.e., $x_M^a - \varepsilon$ and $x_M^a + \varepsilon$, where $\varepsilon \in (c, \bar{\varepsilon})$ and the winning probabilities coincide $p_1 = p_2$.[11]

Next, we derive the electoral result at the general election depending on the location of the *assembly* median voter position x_M^a with respect to x_M. We distinguish two scenarios: a *centrist assembly*, which occurs when the electorate median voter is an *insider*, i.e. $x_M^a - \varepsilon < x_M < x_M^a + \varepsilon$; and a *non-centrist assembly*, which implies that the assembly is either to the left or to the right of the electorate median voter, i.e. $x_M \leq x_M^a - \varepsilon$ or $x_M \geq x_M^a - \varepsilon$. In each situation, we take into account the degree of social protest. Voting decisions as described by (3), (4) and (5) do not change except for substituting x_M by x_M^a.

[11] Where the bounds $(c, \bar{\varepsilon})$ should be recalculated accounting for the truncated distribution of voters that attend the assembly.

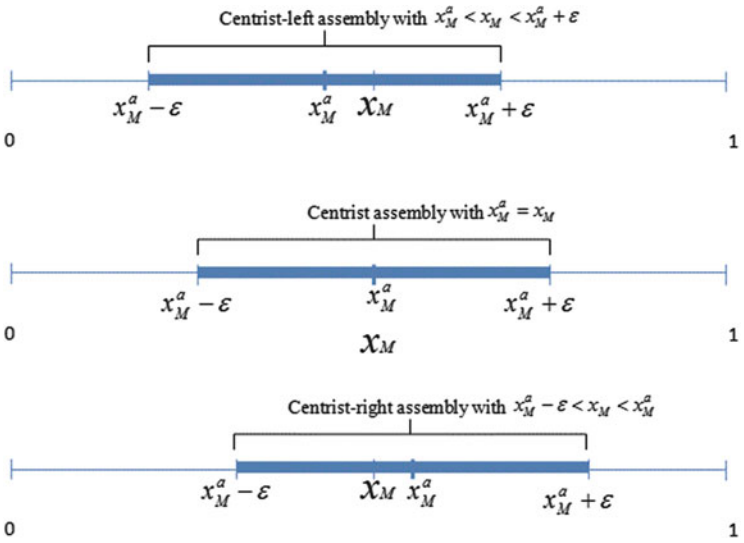

Fig. 4 Centrist assemblies' location with respect to x_M

4.1 The Centrist Assembly

We study the case where the electorate median voter x_M is among the bounds of the assembly, i.e. $x_M^a - \varepsilon < x_M < x_M^a + \varepsilon$. In Fig. 4, we show different locations of the centrist assembly with respect to x_M. The first case shows a centrist-left assembly where $x_M^a < x_M$. The second case shows a centrist assembly where both the assembly and the electorate median voter coincide. This case is similar to the one we have analyzed in the previous section. The last case shows a centrist-right assembly where $x_M < x_M^a$.

The party winning the elections in the case of a centrist assembly also depends on the degree of social protest. As we next show, the optimal position of the traditional party is not the electorate median but it is the midpoint between the electorate median and one out of the two proposals of the assembly.

Proposition 3 *Consider that the assembly median differs from the electorate median and that the assembly is centrist. Then, Party B wins the elections if and only if* $\Delta\beta \geq \frac{\varepsilon}{2} + \frac{\gamma}{2}$ *where* $\gamma = \left|x_M - x_M^a\right|$. *Besides, in every political equilibrium with two proposals at the pre-electoral assembly, Party A locates at:*

(i) $x_A = \frac{x_M + x_M^a + \varepsilon}{2}$ *in the case of a centrist-left assembly* $(x_M^a < x_M)$

(ii) $x_A = \frac{x_M + x_M^a - \varepsilon}{2}$ *in the case of a centrist-right assembly* $(x_M^a > x_M)$.

Proof Following Proposition 1, we know that there is a threshold value $\Delta\beta$ above which Party B always wins the elections. Besides, by Proposition 2, we know that just below the threshold there are two symmetric strategies for Party A that

guarantee its victory, these strategies clearly reduce to one when the assembly moves either to the right or to the left of the median. We calculate the corresponding threshold and the corresponding unique location of x_A in the case of a centrist-left assembly where $x_M^a < x_M$. When the assembly is centrist-left, Party A cannot achieve equal votes locating at symmetric positions around the electorate median. In fact, in this case, it is easier for Party A to achieve a majority of votes among those located to the right of the electorate median, that is, those voters in the interval $[x_M, 1]$. First, we study the agents with ideal policy $x_i = x_M$ and $x_i = x_M^a + \varepsilon$. For agent $x_i = x_M$, she votes for Party A when

$$x_A < -\Delta\beta + \varepsilon + x_M. \tag{7}$$

For agent $x_i = x_M^a + \varepsilon$, the utilities derived from voting Party A and Party B are $\beta_A - \left|x_M^a + \varepsilon - x_A\right|$ and $\beta_B - \varepsilon$, respectively. Then, she votes for Party A when $\beta_A - \left|x_M^a + \varepsilon - x_A\right| > \beta_B - \varepsilon$ which implies that:

$$x_A > \Delta\beta + x_M^a. \tag{8}$$

The values $\Delta\beta$ for which Party A can obtain the votes in the interval $[x_M, x_M^a + \varepsilon]$ is deduced from the above two equations and it yields $\Delta\beta < \frac{\varepsilon}{2} + \frac{\gamma}{2}$. Moreover, the only strategy that guarantees that Party A obtains all the votes in the interval $\left[x_M, x_M^a + \varepsilon\right]$ when $\Delta\beta = \frac{\varepsilon}{2} + \frac{\gamma}{2} - \delta$ where $\delta \to 0$ is deduced by substituting the value $\Delta\beta = \frac{\varepsilon}{2} + \frac{\gamma}{2}$ in Expression (7) or (8). We deduce that $x_A = \frac{x_M + \left(x_M^a + \varepsilon\right)}{2}$. By (4), this value of x_A also guarantees that the up-outsiders vote for Party A. Finally, if $x_A = \frac{x_M + \left(x_M^a + \varepsilon\right)}{2}$ guarantees the victory of Party A when $\Delta\beta = \frac{\varepsilon}{2} + \frac{\gamma}{2} - \delta$, it also guarantees the victory of Party A for smaller values of $\Delta\beta$. This implies that this strategy of Party A maximizes its expected probability of winning. The symmetric case in which there is a centrist-right assembly follows a similar reasoning. □

We find that when there is a centrist-right assembly and $\Delta\beta < \frac{\varepsilon}{2} + \frac{\gamma}{2}$ where $\gamma = x_M - x_M^a$, Party A locating at $x_A = \frac{x_M + \left(x_M^a - \varepsilon\right)}{2}$ obtains the support of those voters whose ideal policy is in the interval $\left(0, x_M^a - \varepsilon\right)$ plus a fraction of the voters which ideal policy is in the interval $\left(x_M^a - \varepsilon, x_M^a + \varepsilon\right)$. Symmetrically, when there is a centrist-left assembly and $\Delta\beta < \frac{\varepsilon}{2} + \frac{\gamma}{2}$ where $\gamma = x_M - x_M^a$, Party A wins the elections locating at $x_A = \frac{x_M + \left(x_M^a + \varepsilon\right)}{2}$ given that voters to the right of the electorate median vote for Party A.

4.2 The Non-centrist Assembly

We study the case in which the electorate median x_M is either to the left of the assembly $x_M \leq x_M^a - \varepsilon$ or to the right of the assembly $x_M \geq x_M^a + \varepsilon$.

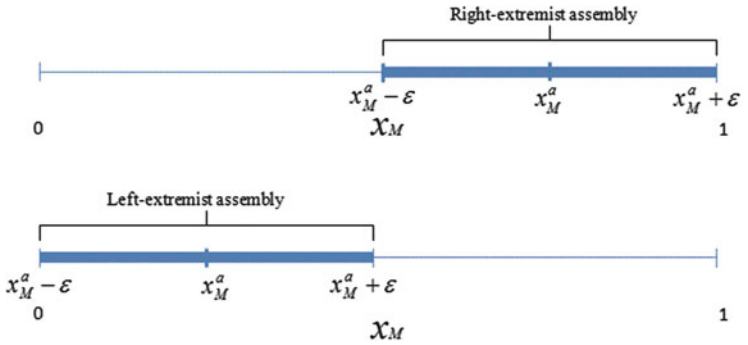

Fig. 5 Location of the non-centrist assemblies with respect to x_M

We can interpret the assembly in these cases as left-extremist or right-extremist. Figure 5 shows the intervals in which a right-extremist assembly and a left-extremist assembly can be located.

In both cases, we show that for every degree of social protest, Party A wins the elections and besides, its strategy consists of locating at the electorate median.

Proposition 4 *Consider that the assembly median differs from the electorate median and that the assembly is non-centrist. Then, Party B wins the elections if and only if* $\Delta\beta \geq \gamma$ *where* $\gamma = \left|x_M - x_M^a\right|$. *Besides, in every political equilibrium with two proposals at the pre-electoral assembly, Party A locates at* $x_A = x_M$.

Proof We calculate the greatest degree of social protest for which Party A can defeat Party B. Consider the case of a right-extremist assembly where $x_M < x_M^a$. The easiest way for Party A to win the elections is by obtaining the votes of those located to left of the policy space, that is those in the interval $[0, x_M]$. If voter $x_i = x_M$ votes for Party A, all the other voters in this interval also vote for Party A. In the best scenario for voter $x_i = x_M$, Party A locates at $x_A = x_M$. Following Expression (3), all the voters in $[0, x_M]$ vote for Party A when $\Delta\beta < x_M^a - x_A$ and substituting $x_A = x_M$ we obtain that $\Delta\beta < \gamma$. Besides, when $\Delta\beta = \gamma - \delta$ where $\delta \to 0$ there is no other value $x_A \neq x_M$ that guarantees a majority of votes for Party A. Thus, $x_A = x_M$ is the unique strategy of Party A that maximizes its expected probability of winning. Finally, if $\Delta\beta \geq \gamma$ the strategy $x_A = x_M$, cannot guarantee a majority of votes for Party A, and it is in fact Party B which wins with the votes of the agents in the interval $[x_M, 1]$. The case of a left-extremist assembly follows a similar reasoning. □

We have shown that for every $\Delta\beta < \gamma$ where $\gamma = \left|x_M - x_M^a\right|$, Party A can always guarantee a majority of voters locating at the electorate median. Thus, the electorate median is the policy that maximizes the expected probability of winning of Party A.

In Fig. 6, we summarize the obtained results regarding the optimal location of Party A as a function of the location of the assembly median voter along the policy

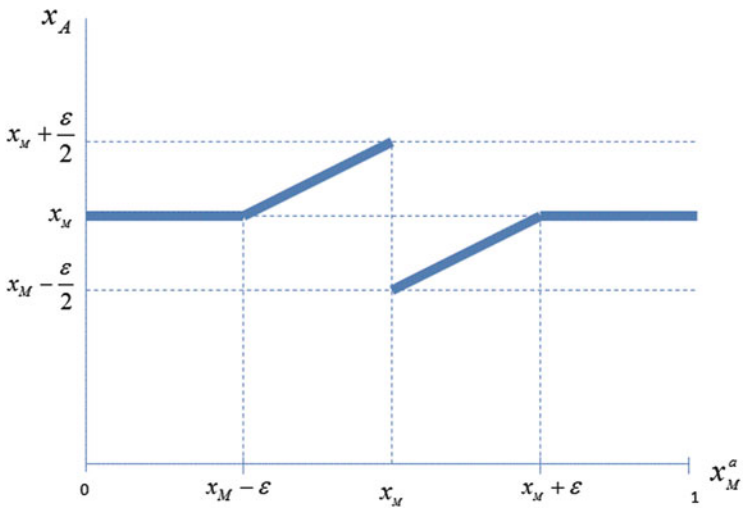

Fig. 6 Strategies of Party A with respect to the location of the assembly median voter x_M^a

space. Interestingly, the presence of an assembly party makes the traditional party to move along the policy space.

On the one hand, in the case of an extremist assembly, regardless of the ideology of the assembly, Party A moderates its policy and it locates at the median voter position, i.e. $x_A = x_M$. On the other hand, in the case of a centrist assembly, Party A locates either to the left or to the right of the median voter location, just in the opposite direction of the assembly median location. This is due to the fact that Party A needs to differentiate from the assembly proposals in order to attract not only centrist voters but also voters to one of the sides of the median. As we have shown, this is the type of strategy that guarantees the victory of Party A when the victory is possible.

5 Conclusions

In this paper, we have studied the consequences of political competition between a party implementing assembly democracy (Party B) and a traditional downsian party (Party A). We have introduced, in terms of a valence characteristic, the social preferences in favor or against new forms of democracy. Citizens when participating at the assembly are strategic and they want their proposals to achieve a majority at the assembly. Party A is a pure office-seeking party which selects its platform as to maximize its probability of winning the general election. We have compared different scenarios regarding the location of the assembly party.

We find that the more centrist the assembly party is, the more chances it has of winning the elections. Interestingly, we also find that the location of the assembly party induces Party A to locate at different platforms.

Surprisingly, due to the competition with an assembly party, when the assembly is centrist, the traditional party moves its platform away from the median voter location in order to attract a larger fraction of voters. In particular, we find that a centrist assembly party located to the left of the overall median, moves the traditional party to the right, whereas a centrist assembly party located to the right of the overall median, moves the traditional party to the left. The centrist assembly party, therefore, generates a centrifugal effect over the traditional party, which moves it in the opposite direction. However, when the assembly party is non-centrist (or extremist), we find that the traditional party moves towards the median of the electorate. In this case, the extremist assembly party leaves an empty center which can be occupied by a traditional party.

Our main message is that extremist assembly parties may have no effect regarding the location of a traditional office-seeking party, whereas moderated assembly parties have an impact by moving away from the median the traditional political party. In equilibrium, the traditional party moves in the opposite direction of the assembly proposals but within the bounds of the proposals made by the assembly. As a result, the assembly party generates divergence between the platforms of the parties which is in close contrast to the convergence prediction of the pure downsian model.

We have shown that new assembly parties may not only have a direct effect when winning the elections and taking the assembly as their policy making body, but also an indirect effect by affecting the policy of its competing parties. This is a testable prediction that is open to empirical scrutiny.

In this study, we only include the results for assemblies with two proposals. We leave the analysis with more than two proposals for further research.

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Rent Seeking and the Size of Parliamentary Majorities

Jan Klingelhöfer

1 Introduction

In standard models of elections it is assumed that voters care only which party wins an election, but not about the size of its majority. However, there are many reasons why voters should also be concerned about the size of the parliamentary majority of the winning party, an issue that seems to have been neglected in the formal political economics literature.

In my model, larger majorities can make government more efficient because the (prospective) prime minister can afford to lose the support of more of his own party's Members of Parliament (MPs) and can therefore be less open to their demands for rents and perks. Specifically, the majority leader has to offer satisfactory rent payments to the MPs of his party to ensure they do not vote with the opposition that can offer payments in return for votes to the majority MPs. This turns out to be more costly with a smaller majority, although the number of MPs that receive rents increases.

Voters in the model are rational and forward-looking and have an interest in reducing the rents and perks of the politicians. Because party leaders have their own policy preferences all policy announcements made before the elections take place are time-inconsistent as in Alesina (1988). Therefore, policy convergence as in standard Downsian models of elections in two-party systems (Downs 1957) does not occur.[1] Moreover, and in the following model of greater importance, voters also

[1] For a general overview of political economy models of elections, see Persson and Tabellini (2002).

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have an expressive motive for voting, they care not only about voting for the winner of the elections, but also whom they vote for.[2]

The subgame in which party leaders fight for the support of their MPs uses the ideas of Groseclose and Snyder (1996), who showed that supermajorities, majorities with more than the minimum necessary support, can be less costly than minimum winning majorities.[3] This is due to the fact that one of the two parties which try to achieve a majority in a vote in Parliament has to move first. The other party can observe these offers and then decide if it wants to make counter offers. That one of the parties has to move first and can then not change its offers anymore seems to be a rather arbitrary assumption in the original model of Groseclose and Snyder. However, in the postelection subgame presented here it seems plausible that the majority leader has to move first because he can be expected to lose not only the office of prime minister, but is in addition likely to lose the leadership of his party once his majority in Parliament is overturned. The opposition leader, on the other hand, can constantly try to convince majority MPs to switch sides.[4] I endogenize the size of the maximum supermajority by assuming that the majority leader of the party which wins the general elections can only offer rents to his own MPs and has no possibility to convince minority MPs to switch sides, so that his majority is restricted to at most the number of seats his party achieved in the general elections.

Voters are assumed to be able to predict what will happen after the general elections have taken place and to take this into account before deciding for whom they will vote. In equilibrium, the winner of the general elections will always become prime minister. However, a larger majority turns out to lead to lower rent payments to Government MPs. Voters who predict correctly who will win the elections have an incentive to vote for the prospective winner to decrease the cost of Government. This can lead to two equilibria in the general election with a majority for either of the two parties for given preferences of voters and party leaders and self-fulfilling prophecies about the election winner.

2 The Model

2.1 Parties

There are two parties, L and C, each of which has a leader who derives utility from holding the office of prime minister and from the policy that is finally implemented.

[2]For some discussion of expressive voting and behavior, see, for example, Hillman (2010) or Brennan and Hamlin (1998).

[3]The standard result that minimal coalitions or majorities are optimal is also known as Riker's "size principle" because it was introduced to the literature by Riker (1962).

[4]Only for simplification, I assume in the model section that after the election of the Prime Minister no more bribing attempts will be possible.

In addition to holding the office of prime minister the party leaders also derive utility from lower aggregate rent payments to the MPs. We can think of party leaders as having different policy preferences, and L can be interpreted as the left party and C as the conservative party, and this is the reason the voters have preferences over the parties and their leaders. Any policy announcements which are made before the elections take place have no influence on the election results because commitments to a policy platform are impossible. Consequently, platforms that are different from a politician's preferences are not credible because the voters know the true and exogenously given policy preferences of the party leaders.

The utility function of the leaders of the parties $j = L, C$ is:

$$U_j^l = \alpha I(PM_j) - R(m), \tag{1}$$

where $\alpha > 0$ gives the value attached to becoming prime minister. $I(PM_j)$ is an indicator function which equals 1 if the leader of party j becomes and stays prime minister and 0 otherwise. It represents the utility that a potential prime minister derives from office as well as the utility he derives from seeing his favorite policy implemented instead of the policy of the other candidate. $R(m)$ is the aggregate rent payment to Government MPs that depends in equilibrium on the size of the parliamentary majority m and will be explained in detail below.

2.2 Voters

There is an odd number of n voters, labeled $i = 1, 2, \ldots, n$ with utility function:

$$U_i^v = v_i(j) - R(m), \tag{2}$$

where $v_i(j)$ is the utility that voter i derives from voting for party j.[5] The voters are ordered by their ideological preferences from left to right, that is the difference in utility between voting for the left and voting for the conservative party is smaller for voters further to the left:

$$d_i \equiv v_i(l) - v_i(c) \geq d_j \equiv v_j(l) - v_j(c) \text{if and only if} i < j.$$

Voters would like to reduce the aggregate rents of the MPs because sooner or later expenditures have to be financed by either higher taxes or a lower provision of public goods. Every voter i elects exactly one Member of Parliament MP_i^j, either from Party L or from Party C. Consequently, voter i can be understood to be the median

[5]Implemented policy is likely to play a role for a voter's utility. However, only in elections that are decided by just one vote this can make a difference. Thus, I assume there is no utility from implemented policy to simplify the model without much loss of generality.

voter in constituency i. Let l be the number of voters who vote for party L and c be the number of voters who vote for party C.

2.3 MPs

MPs care only about maximizing their personal wealth. Their utility function is:

$$U_i^{MP} = w_i. \tag{3}$$

In case the MP belongs to the majority faction after the general election w_i is either equal to the majority leaders offer of rent r_i, or to the minority leaders offer of a bribe b_i, depending on which offer is accepted by the MP. In case the MP belongs to the minority faction $w_i = 0$ because by assumption payments are only made to members of the majority faction ($r_i = b_i = 0$).

2.4 After the General Elections

After the general election has taken place a subgame in which the minority leader can try to take over the majority from the election winning party by offering bribes to MPs of the majority faction begins. The majority faction is the faction of the party or group of parties that gets the majority of votes and therefore MPs in the general elections and its majority is of size $m = |l - c|$, the difference in votes achieved in the general elections and therefore by assumption also the difference in the size of the factions of the winning and the losing party in Parliament. The size of the majority faction is therefore $s = (m + n)/2$. To become (and stay) prime minister the majority leader needs to make sure that he does not lose his majority before the prime minister is elected by Parliament. To do so he must keep his MPs sufficiently satisfied with his leadership. The minority faction is supposed to have an exogenously given source of funds for bribes B. We do not necessarily have to think of B as money. Alternatively, it could be all kinds of perks that can be promised to the MPs, for example the guaranty to vote in favor of a pet project of an MP or tickets for the soccer world cup. I assume that the funds of the minority are limited and that:

$$B \leq \frac{2\alpha}{1+n}.$$

If the opposition can convince $(m + 1)/2$ or more MPs of the majority party join the minority before the Parliament decides about the next prime minister, the leader of the party which lost the general elections becomes prime minister despite his election defeat. The exact stages of the subgame are the following:

1. First the leader of the winning party decides how much rent r_i he offers to any of the $(n+m)/2$ MPs of his own party. His offer is binding in case an MP stays with the majority faction and moreover observable for the leader of the opposition.
2. In the second stage the leader of the minority can try to bribe MPs of the government and convince them to join the smaller faction. The maximum amount of funds the minority leader can spend on bribes is B, therefore:

$$\sum_{i \in \text{majority}} b_i \leq B, \text{and } b_i \geq 0 \text{ for all } i \in \text{majority}.$$

   The minority leader can decide about his offers after observing the rent offers of the other party leader in stage 1. The minority leader cannot commit to forgo any attempt of bribery before the leader of the winning party makes his rent offers.
3. The MPs of the majority party decide whether they accept the offer from the leader of the minority faction and join it or stay with the party that wins the general elections.
4. The prime minister is elected by simple majority in Parliament. Every MP is now committed to his party and votes for its leader as prime minister.
5. The newly elected prime minister implements his favorite policy.

The possible strategies of the different players are the following:

- The strategy of a voter i consists of a decision for what party to vote in the general elections.
- The strategy of an MP: An MP has only to make a decision in case he is elected into Parliament and belongs to the majority faction. Thus, an MP's strategy is a decision to switch or not to switch party in this case. The decision is conditional on the exact election results, the rent offers of the majority leader and the bribe offers of the minority leader to all elected MPs of the majority faction.
- The strategy of a party leader: For the case his party becomes the minority after the general elections he has to have a plan about the exact bribe offers to all elected majority MPs subject to the restriction that he cannot spend more money on rents than his available funds and dependent on the exact election outcome. For the case that he becomes majority leader he has a plan for rent offers to his own MPs depending on the exact election results and the exact bribe offers by the minority leader.

3 Analysis of the Model and Results

3.1 Equilibrium of the Post General Election Subgame

The standard way to find a Subgame Perfect Nash Equilibrium is to use backward induction. Therefore, I begin my analysis with the decision of the majority MPs after receiving the bribe offers from the opposition.

The majority MPs stay by assumption with the majority whenever they are indifferent between switching party and not switching party because both offers are equal. MP_i either belongs to the minority faction anyway, joins it if he was elected for the majority faction but receives a high enough bribe offer $b_i > r_i$, or stays with the majority if $b_i \leq r_i$. This follows directly from their utility function $U_i^{MP} = w_i$.

One stage earlier the minority leader has to decide about his bribe offers. If he pays bribes at all it will always be at least as advantageous as any alternative strategy for the minority to bribe the $(m + 1)/2$ MPs of the government who are willing to switch sides for the lowest offer of b_i, that is the ones with the lowest rent offers r_i from the majority leader.[6] Because the majority leader cannot make any counter offers there is no need for the minority leader to try to achieve a larger majority than the minimal winning majority of $(n+1)/2$ MPs. There is no disadvantage in bribing majority MPs at all because B does not show up in the minority leaders utility function. Nonetheless, I assume that the minority leader takes over the majority and bribes majority MPs in the most cost efficient way of offering $b_i = r_i + \epsilon$, with ϵ a small but positive real number, to the $(m + 1)/2$ majority MPs with the lowest rent offers r_i if his funds are sufficient to do so. The minority leader is assumed to abstain from bribing any majority MPs if it turns out to be impossible for him to achieve a majority in Parliament after observing the rent offers of the majority leader.

Given the above strategy of the minority leader the majority leader will calculate the minimum cost of aggregate rents R subject to staying in power and then either pay these rents and become prime minister or offer no rents at all or an insufficient amount and accept that the minority leader takes over if he pays the necessary bribes. B is assumed to be so small that the latter will never be the case in equilibrium. How can the aim of minimal rent payments subject to staying in power be achieved? The majority leader has to make it impossible for the minority to take over his majority. So he must convince at least $(n + 1)/2$ of his MPs to stay with the majority. If not the same amount of rent is offered to every single MP belonging to the majority the minority leader can always try to bribe the $(m + 1)/2$ receiving the lowest rent, therefore it must be optimal for the majority leader to offer the same rent to every single of his MPs to minimize the aggregate rent payments necessary to become prime minister.

Having established the fact that the majority will offer every single of its MPs the same rent if he wants to become prime minister we have to find the minimal necessary amount depending on n, m, and B. The opposition can offer at most $\frac{B}{(m+1)/2}$ to every MP it has to bribe if it gives the same amount to all of them and bribes the necessary number $(m + 1)/2$. Therefore, by giving $r^* = \frac{B}{(m+1)/2}$ in rents to every single one of its MPs the government can ensure that it will stay

[6] To simplify the model the bribes b_i do not show up in any utility function. However, if the minority cannot take over the Government by bribing majority MPs in the most cost-efficient way because it lacks the necessary funds to do so, it is obvious that more costly ways cannot be a feasible alternative.

in power with the minimum aggregate expenditure. Consequently, the minimum aggregate expenditure for rent payments to majority MPs if the majority leader wants to become prime minister is just the offer of r^* for each of his MPs times the size of his faction:

$$R(m,n,B) = r^*s = \frac{B}{(m+1)/2}(n+m)/2 = \frac{B(n+m)}{m+1}, \tag{4}$$

an expression that decreases in m for given $n > 1$ and B. Thus, the larger the majority of the winner of the general elections, the smaller the amount $R(m,n,B)$ he has to spend on rents for his MPs without losing his majority. $R(m,n,B)$ is the minimum total amount of aggregate rents that the majority leader has to offer to his MPs to become prime minister. Because the majority can never be smaller than $m = 1$, $R(m,n,B)$ can never be larger than $R(1,n,B) = \frac{B(n+1)}{2}$, what is by assumption smaller than α, the utility associated with being prime minister and the majority leader is always willing to give his MPs the rents they demand to make him prime minister. Consequently, the only equilibrium strategy of the majority leader is to pay the same amount of $r^* = \frac{B}{(m+1)/2}$ to all his MPs. Because we assumed above that the minority leader does only offer bribes in case he can successfully overtake the majority there will not be any bribe offers at all in equilibrium.[7] Therefore, none of the majority MPs will switch party and the prime minister of the party that wins the general elections becomes prime minister with exactly the majority in Parliament which he achieved in the general elections.

3.2 Equilibrium in the General Elections

We established that in any equilibrium the leader of the party who achieves the majority in the general elections will always become prime minister because this is the only Nash Equilibrium of the post election subgame. In addition, we also know that the costs of government $R(m,n,B)$ are decreasing in the majority m that the winning party achieves in the general elections. The voters face therefore a more difficult decision than in standard models. If they vote for the party they prefer ideologically, they increase the part of their utility that is directly derived from ideological preferences. However, in case their favorite party loses the elections nonetheless they increase their disutility from rent payments due to the reduced majority of the winning party. Therefore, voters with weak ideological preferences for one of the parties will vote against their political preferences to decrease the

[7]Because the rent payments in equilibrium reduce the utility of the minority leader he would actually be better off if he could commit not to attempt any briberies before the majority leader announces his rent offers. No rent payments to Government MPs would be necessary in this case.

amount of aggregate rents if the reduction in rents is large enough and they believe their preferred party will lose the general elections.

For simplicity, I focus on equilibria in which the z voters with largest preference for the left party L (voters $1, 2, \ldots z$) vote for it and all other voters vote for the right party C.[8] Let us consider the situation of a voter who knows that all voters to the left of her will vote left and all voters to the right of her will vote right. If voter z votes left she achieves the following utility:

$$U_z^v(l) = v_z(l) - R(|2z - n|).$$

If she votes right, she achieves:

$$U_z^v(c) = v_z(c) - R(|2(z-1) - n|).$$

And the difference is given by:

$$\Delta U_z = U_z^v(l) - U_z^v(c) = d_z - R(|2z - n|) + R(|2(z-1) - n|).$$

For an equilibrium with the first z voters voting left and the $n - z$ other voters voting right we need either $\Delta U_z \geq 0$ and $\Delta U_{z+1} \leq 0$ for some z or $\Delta U_1 \leq 0$ or $\Delta U_n \geq 0$. It is easy to see that no voter has a reason to deviate in the first case. Voters to the left of z would lose even more utility than voter z itself if they voted right and voters to the right of voter $z + 1$ would lose even more from voting for the left than voter $z + 1$. If $z < n/2$ the conservative party wins, otherwise the leader of the left party becomes prime minister. If $\Delta U_1 \leq 0$ everybody voting right is an equilibrium because not even the voter with the left-most preferences would like to deviate. If $\Delta U_n \geq 0$ everybody voting left is an equilibrium. The existence of at least one of these equilibria is guaranteed. If neither $\Delta U_1 \leq 0$ nor $\Delta U_n \geq 0$ we know that $\Delta U_1 > 0$ and $\Delta U_n < 0$. But then $\Delta U_z \geq 0$ and $\Delta U_{z+1} \leq 0$ must be true for at least one value of z.

However, there is no guarantee that there is only one equilibrium. To see this most easily let $d_z = 0$ for all voters. In this case voters care only about rents and $\Delta U_1 \leq 0$ and $\Delta U_n \geq 0$ are both true. The only equilibria that exists are all voters voting for the same party, either L or C.

As long as enough voters do not care much about the expressive value of their votes, there are two equilibria and both parties can win in equilibrium if they win the support of the voters whose main concern is to keep rents and perks for politicians small.

[8] Depending on parameter values there can be more equilibria. The reason is that m is discrete.

3.3 Median Voter

It is clear from the dual equilibria result that the party that is preferred ideologically by the median voter does not necessarily win the elections. However, a weaker median voter result still holds. There is always an equilibrium in which the party with the support of the median voter wins. To see this, assume that the median voter prefers the left party and the median voter and all voters with preferences to the left of the median vote for it. Then none of these voters who form a left majority has a reason to deviate independently of the voting behavior of the voters to the right of the median. Deviating would only decrease the first (ideological) part of their utility function and at best (if the majority was just one) not decrease the size of the majority of the winner of the general elections. A symmetric argument works when the median prefers the right party.

What might otherwise be interpreted as an unexplainable shock to the popularity of a party and a surprising landslide victory for the other one can be explained by rational voters who predict correctly which party is going to win. Voters read opinion pools, become supporters of the leading party, and increase thereby the lead of the winning party in the pools until only voters with extreme preferences still support the party that is going to lose the elections. It is also conceivable that a party which was in the past popular for its policies stays in power even when its ideology loses the support of the median voter because voters have no way to coordinate switching to support the other party. Voters can thus be stuck in the "bad" equilibrium.[9]

4 Conclusion

This paper shows two results. First, giving the minority leader the chance to try to bribe some MPs belonging to the majority factions leads to an interesting post-election subgame that endogenizes rent payments to Government MPs. These payments are decreasing in the size of the parliamentary majority of the Government. Consequently, this post-election fight for the support of a majority influences voters who correctly foresee what will happen after the election and therefore adjust their voting. The belief that a party will win an election can become self-fulfilling.

There seem to be many avenues for future research left open. I consider only the advantages that clear majorities in Parliament might have for voters. But there are also obvious disadvantages. It is, for example, conceivable that a weak government with a small majority and a weak position in Parliament has a better position in international negotiations when it can claim to have difficulties to find a majority in parliament for an international treaty. This could be foreseen by rational voters who

[9] If the supporters of the party that has not the support of the median voter, have stronger preferences for their party than the other voters this "bad" equilibrium can actually be welfare improving if voters care about the implemented policy.

might vote for the party they believe to be more likely to lose instead of voting for the party they believe to be more likely to win. Furthermore, it might be interesting to give the MPs some policy preferences. An interesting question is if the equilibrium selection in the case of two possible equilibria could be modelled explicitly, for example by incorporating opinion polls into the model. In addition, there might be the question of an optimal size of the legislature to make bribing more difficult.

Another question that remains is why we sometimes observe close elections although that leads to larger rent payments. The reason might be that voters are just not able to coordinate in real-world elections when there is a high level of uncertainty and the polls do not predict the winner clearly. For Italy, for example, weak governments seem to be a major obstacle to reforms and it is well known that prime ministers are struggling to achieve sufficient support from their own ranks and MPs might demand favors in return for voting with the government. However, because the outcome of the elections in Italy often remains sufficiently uncertain voters are not able to coordinate on a winner of the elections to reduce rent payments.

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A Comment on Choice Rules and Median Outcomes

Jon X. Eguia and Francesco Giovannoni

Consider an electoral system with multiple (exogenously given) candidates running for office over a one-dimensional policy space. More abstractly, consider a collective choice problem with ordered alternatives. We study one particular property of collective choice rules: whether the median alternative is chosen.

Merrill (1988) studies a very similar question: the percentage of elections in which, for different values of the parameters, the Condorcet winner is elected, but he conducts this analysis under sincere voting, or, alternatively, in a decision-theoretic framework. Nurmi (1987) compares the normative properties of various electoral rules, again under the assumptions of sincere voting. We pursue a game-theoretic approach with strategic voters and study the Nash equilibrium outcomes under different choice rules.

Apesteguia et al. (2011) similarly compare various decisions rules according to their welfare properties, finding that scoring rules are best for utilitarian aggregate welfare, minmax and maxmin utilities. Our focus is narrower: we seek to determine whether a rule picks the median candidate in a unidimensional policy space and whether or not the median is also the utilitarian optimum.

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1 The Model

Assume there is a set P of parties, where $P = \{1, ..., j, ...M\}$, and a set I of voters where $I = \{1, ..., i, ...N\}$ and $N \geq 3$ is odd.

Also assume that parties are distributed along a segment of length $M-1$ with party 1 at one end of the segment and party M at the other. Each party is one unit of length away from the next.

Each voter has single peaked preferences of the following kind:

$$u_i\left(x_k\right) = -\left|x_i^* - x_k\right|,$$

where both x_i^* (i's ideal point) and x_k belong to P.

Given the above assumptions, we can completely characterize the distribution of preferences by a distribution function R, where $R(j)$ is the number of voters whose ideal point is at $j \in P$. In the rest of the paper, we assume that for all j in P, $R(j)$ is strictly positive which, obviously, implies that $N \geq M$.

We consider three possible electoral formulas:

1. *Plurality rule* (PL): each voter casts a vote for exactly one party and the party with the most votes wins; no abstention is possible. If a tie occurs, each party tied for first place gets elected with equal probability.
2. *Approval voting* (AV): Each voter casts either one point or no points for each party (at least one point must be cast) and the party with most points wins. Ties are broken as under the plurality rule.
3. *Borda rule* (BR): each voter ranks all parties. The first party in the vote's ranking is given $M-1$ points, the second is given $M-2$ point, and so on, with the last party getting 0 points. The party with most total points from all voters wins and ties are broken as in plurality rule.

We use $e = \{\text{PL}, \text{AV}, \text{BR}\}$ to denote the electoral rule that applies in a particular election.

The above construction allows us to describe a game in normal form where I is the set of agents, P and the electoral rule e characterize the strategy space, while P and R characterize payoffs.

Thus, we define $\langle I, P, R, e\rangle$ as an electoral situation: an electoral situation is a normal form voting game. We will be interested in Nash equilibria in strategies that are not weakly dominated. We refer to these equilibria as UNE, for Undominated Nash Equilibria.

In particular, for any electoral rule e, we will be interested in the following properties:

1. An electoral rule e is median inducing (MI) if for all electoral situations, all UNE imply that the median party gets elected with probability one.[1]

[1]The median party is the party which is the ideal party of the median voter.

2. An electoral rule e is partly median inducing (PMI) if for all electoral situations, there is an UNE for which the median party gets elected with probability one.

Given the preferences defined in the model, the median party is the party c that maximizes the social welfare function:

$$\sum_{i=1}^{N} u_i = -\sum_{i=1}^{N} |x_i^* - c|.$$

2 Result

Proposition 1 *PL, BR, and AV are PMI, but none of them is median inducing.*

Proof

a) PL. If $M = 2$, the winning candidate is the one preferred by the median, in any configuration. If $M > 2$, the only weakly dominated strategy for each voter is to vote for the voter's least preferred candidate. Thus, there exists an equilibrium in which at least $(N + 1)/2$ voters vote for the candidate preferred by the median (either all those with ideal points to the right of the median, or all those with ideal points to the left of the median), and the candidate preferred by the median wins. Thus, the PL is PMI. But consider a case with $M = N = 3$, candidates located at 0, 1, and 2 and voters also at 0, 1, and 2. There is an equilibrium in undominated strategies in which each voter votes for the candidate located at the voter's ideal point. In this equilibrium, a nonmedian candidate wins with probability 2/3; hence, PL is not median inducing.

b) AV. The only strategies that are (weakly) dominated are those that do not give any point to the voter's ideal party and/or give a point to the least preferred party. Consider a case with $M = N = 3$, candidates located at 0, 1, and 2 and voters also at 0, 1, and 2, and in which each voter casts a vote only for her ideal candidate, so all three tie. This constitutes an UNE. So AV is not median inducing. We now show that AV is PMI, by showing that in a general electoral situation, there is always an equilibrium in which the median gets elected. Consider a general electoral situation $\langle I, P, R, \text{AV}\rangle$. We have two possibilities:

   1) Either 1 or M is the median. In this case letting each voter cast a vote only for her ideal candidate is an UNE in which the median is elected.
   2) If $1 < m < M$, then we know that m is not the least preferred party for anybody and we know that $M \geq 3$. The following are UNE strategies: everybody votes for both m and its own ideal point. This is an NE since from $M \geq 3$ we know that nobody has a positive incentive to deviate and no strategy used is dominated. This completes the proof for AV.

c) We finally turn to BR. To show that BR is not median inducing, consider the case with $M = N = 3$, candidates located at 0, 1, and 2 and voters also at 0, 1, and 2, and the following voter strategies:

   i) The voter whose ideal party is 1 gives 2 points to party 1 and 1 point to party 2.
   ii) The voter whose ideal party is 2 gives 2 points to party 2 and 1 point to party 3.
   iii) The voter whose ideal party is 3 gives 2 points to party 3 and 1 point to party 1.

This is an NE, each party gets 3 points and therefore each is elected with probability 1/3. None of the strategies used is weakly dominated: the strategy by the third voter is not dominated by giving points (0,1,2) to candidates (1,2,3) because if voters 1 and 2 vote (0,2,1), then by voting (1,0,2), voter 3 attains a vote outcome (1,4,4), while voting (0,1,2), she attains (0,5,3) and she prefers the former to the latter.

We now go on to prove that BR is PMI. If $M = 2$, BR coincides with PL and leads to a median-preferred outcome. If $M = 3$ and $1 < m < M$, the following strategy profile is an UNE. For a voter whose ideal party is p, there are 3 subcases:

i) If $d(p;1) < d(p;M)$, the voter gives $M-1$ points to m, $M-2$ points to 1, $M-3$ to 2, and so on ...
ii) If $d(p;1) > d(p;M)$, the voter gives $M-1$ points to m, $M-2$ to M, $M-3$ to $M-1$, and so on ...
iii) If $d(p;1) = d(p;M)$, the voter gives $M-1$ points to m, $M-2$ to $m+1$, $M-3$ to $m-1$, $M-4$ to $m+2$, $M-5$ to $m-2$, and so on ....

Given the above strategies, the most votes a party other than the median could get is $(N-1)(M-2)$, while the median would get $N(M-1)$ and a voter who wanted to deviate could do so by giving $M-1$ points to this other party and 0 points to the median. This would give $(N-1)(M-1)$ points to the median, and the other party would have $(N-2)(M-2)+(M-1) = (N-1)(M-1)-(N-2)$ and the latter would be greater than the former if $N \leq 2$ which is impossible.

Let m be either M or 1 and w.l.o.g. assume $m = 1$. The following is a profile of NE strategies:

i) All voters for which $d(1;p) < d(M;p)$, give $M-1$ points to 1, $M-2$ to 2, and so on ....
ii) All voters for which $d(1;p) > d(M;p)$, give $M-1$ points to M, $M-2$ to 1, $M-3$ to $M-1$, $M-4$ to $M-2$, and so on.
iii) All voters for which $d(1;p) = d(M;p)$, give $M-1$ points to their ideal party, $M-2$ to 1, $M-3$ to 2, and so on.

No deviation can guarantee a party as many points as 1 gets, which is $((N+1)(M-1)/2)+((N-1)(M-2)/2) = N(M-2)+(N-1)/2$.

We need to show that the strategies used in the above NE are not dominated. We do this for the case $m \neq 1, M$ and $d(1;p) < d(M;p)$: the proof for other cases follows the same methodology. The equilibrium strategy here gives $M-1$ points to 1, $M-t$ points to p and 0 points to M (which is the voter's least preferred party). Call this strategy $h = (M-1, M-2, \ldots, 0)$.

Now consider any other strategy $k = (k_1, \ldots\ldots k_M)$ with $k_i \in \{0, \ldots\ldots, M-1\}$ for all i. To show that h is not dominated, it is sufficient to show that if k is better than h for some situation, then h is better than k for some other situations. To do that, note that if $k \neq h$ and $k_i > h_i$ for some party i, then $\exists j \neq i$ such that $h_j > k_j$. So suppose k dominates h for some situation, then there exist a $j \neq M$ (since $h_M = 0$) for which $h_j > k_j$ and if there is a situation in which M has h_j votes more than party j, h dominates k which completes the proof. QED

3 Conclusion

Our results suggest that in elections with three or more candidates, or, more generally, in collective choice with three or more alternatives, it is difficult to rule out nonmedian equilibrium outcomes, even if candidates or alternatives are nicely aligned in a single dimension and agents have single peaked, linear Euclidean preferences, so that the median outcome is a Condorcet winner. We are assured to attain an outcome preferred by the median if the number of alternatives is two, in which case sincere and strategic voting coincide and the median voter theorem (Black 1948) implies that the outcome preferred by the median is chosen by majority rule, which, with two alternatives, coincides with plurality rule and Borda rule. With more than two alternatives, for the three electoral games that we have considered, nonmedian undominated equilibrium outcomes exist.

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How Should Votes Be Weighted to Reflect the Existing and "Calculated" Distribution of Voting Power of Weighted Voting Organizations Integrating Different Majority Requirements?

Michèle Khouri-Hagot and Bertrand Lemennicier

1 Introduction

In general, international financial organizations which are of increasing importance in the world economy, especially with globalization, are characterized by a weighted voting system. Economists use the term "weighted voting organizations" (WVO) to international organizations that operate according to the weighted voting power of their members. Felsenthal and Machover (1998, p. 156)[1] showed that there is a widespread fallacy among the general public, reporters, and politicians, which equates the voting weight and the relative voting power of each member state. Currently, the voting weight represents the number of votes assigned to each member state usually on the basis of its financial contributions, while the voting power measures the ability of a member to influence or control voting outcomes.

Weighted voting and majority requirements are procedures of collective decision adopted to protect those who contribute the most to the funding of these financial organizations from a progressive redistribution toward the median voter observed in one man one vote IOs. But, as voting power is the key element in influencing

[1] Felsenthal and Machover (1998).

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the voting outcomes and not voting weight, weight ought to be allocated to members in such a way as to bring about a distribution of voting power which protects larger contributors—i.e., wealthy countries—from exploitation of their contributions by coalitions of less wealthy countries. Unfortunately, the literature reveals a divergence between voting weight and voting power measured by Shapley and Shubik (1954), Banzhaf (1965), and Coleman (1971) power indices.[2]

Leech (2002a)[3] described the theoretical computation of these power indices and focused on the fact that in a weighted voting body, the distribution among members of voting power, which represents the ability of each member to influence the voting outcomes by adding his/her votes to those of a losing coalition so that it wins, is completely different from the distribution of votes or voting weight.

Felsenthal and Machover (1998)[4] commented several times in their book the difference between voting weight and voting power. Moreover, they argued (1998, pp. 236–237) that the power of a voter does not depend on its own quota and weight but in general on the whole distribution of weight among all voters. For that reason, it should not be surprising to observe with the introduction of a new member, while decreasing the weight of the old ones, higher chances of forming winning coalitions[5] with some of the members increasing consequently their voting power.

Brams and Affuso (1976)[6] argued that when admitting new members to the European Economic Community (EEC), the voting power, measured by the Banzhaf, Shapley–Shubik and Coleman indices of an existing member, may increase even though its voting weight decreases as is the case of Luxembourg when adding Great Britain, Ireland, and Denmark to the EEC. They termed this as the "Paradox of New Members."

Fischer and Schotter (1978)[7] illustrated that in voting bodies the redistribution of voting weight may increase some members' voting power, measured by the Banzhaf and Shapley–Shubik power indices, while their voting weight is reduced. They demonstrated that such a "Paradox of Redistribution" always occurs when the number of voters in a voting body is sufficiently large. Fischer and Schotter concluded that this paradox could be avoided if the organizations planning the reallocation of votes identify the difference between voting power and voting weight.

[2]The power indices cited above are used in small voting bodies. However, Leech (2003) and Leech and Leech (2006) developed new methods for computing power indices in large voting games.

[3]Leech (2002a).

[4]Felsenthal and Machover (1998).

[5]Coalitions comprise members with the same preferences. A "winning coalition" represents the set of voters in a division with positive outcome; the other set of voters with negative outcome is called a "losing coalition." See Appendix.

[6]Brams and Affuso (1976), pp. 29–56.

[7]Fischer and Schotter (1978), pp. 49–67.

Dreyer and Schotter (1980)[8] showed that the change of quotas of IMF's members, in April 1978, reflecting some preconceived view of changes in the importance of the country in the world economy (e.g., in terms of share of exports of any particular country in total exports of all IO members), achieves opposite to the framers' intentions. Actually, 38 countries have found that their voting weight diminished while their voting power, as measured by the Banzhaf index, increased. On the other hand, the reallocation of votes in the IMF increased the voting weight of Belgium, Holland, Japan, and West Germany, whereas their voting power diminished. Leech (2002b), later on, showed that the discrepancy between voting power and voting weight is also altered by majority requirements. Always within the board of governors of the IMF organization, under simple majority rule, the United States has more voting power (25.4 %) than voting weight (17.55 %), while with an 85 % majority requirement, its voting power (3.57 %) is far less than its voting weight (17.55 %). Strong majority requirements do not protect large contributors from exploitation by less wealthy countries' decisive coalitions. To correct this failure, Leech (2002) suggests allocating voting weight in such a way as to bring the desired distribution of voting power. He/she offers some calculations based on IMF board of governors. Assuming a voting power of 17.55 % equal to the existing voting weight in 1999 and a majority requirement of 85 %, Leech's results give a potential of 69.78 % of voting weight allocated to the United States![9]

The aim of this paper is to update these former studies based on voting power and weight of IMF's member states for 2008 and to extend it to four other weighted voting IGOs. In doing so, we will answer the usual three questions suggested by this literature:

1. How do voting powers of large contributors diverge from their voting weight?
2. How does the size of majority requirement employed alter the voting power of the main contributors?
3. How should the votes be allocated to the main contributors in such a way to reflect their existing voting power?

To our knowledge, none of the previous or recent studies have raised such an issue and answered the three questions by using a counterfactual analysis based on linear regression tools nor have they extended the analysis of voting power to more than one international organization (especially the IMF or the European Union) and to all member states, which enlarge the scope of the study and permit comparisons.

In this paper, we will proceed as follows: in Sect. 1, we will explain the method used to make our calculations and discuss their significance. Section 2 presents the data on which our calculations are made. Section 3 will present the results. Finally, Sect. 4 summarizes and evaluates the relevance of our findings.

[8] Dreyer and Schotter (1980), pp. 97–106.

[9] Leech (2002b), pp. 376–395.

2 The Method of Calculation[10]

The idea is quite simple. Refer to Fig. 1. On the vertical axis, we plot voting powers and on the horizontal axis the voting weight. We estimate through a linear regression the proportionality rule between voting powers and weight by excluding all contributors (often top contributors) which depart from the best fitted proportionality discovered between other members. This function reveals the "exact" congruence between voting weight and voting powers as it has been designed by the framers of the IO. Then we calculate for "outliers" the difference between the expected voting powers corresponding to their received weight.

This vertical difference, if it is a loss, is an opportunity cost (or profit opportunity if it is a gain) of being exploited through coalitions in the organization. At the same time, if any "outlier" country continues to cooperate, this vertical difference reveals the minimum expected gains, which implicitly compensated the opportunity costs in such a way that this contributor is incited to cooperate and be exploited by coalitions of other less wealthy countries.

The horizontal difference measures the quotas of votes (and the contribution associated with) which restitute to the weighted voting procedure its original aims:

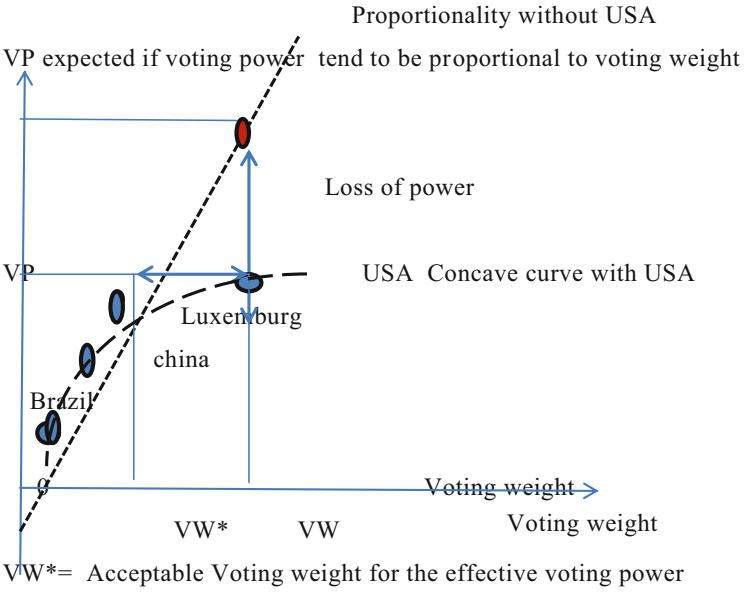

Fig. 1 Voting weight and voting power in IO: a fictitious example for a given majority requirement

[10]We thank J.D. Lafay and B. Grofman for their comments on such a presentation.

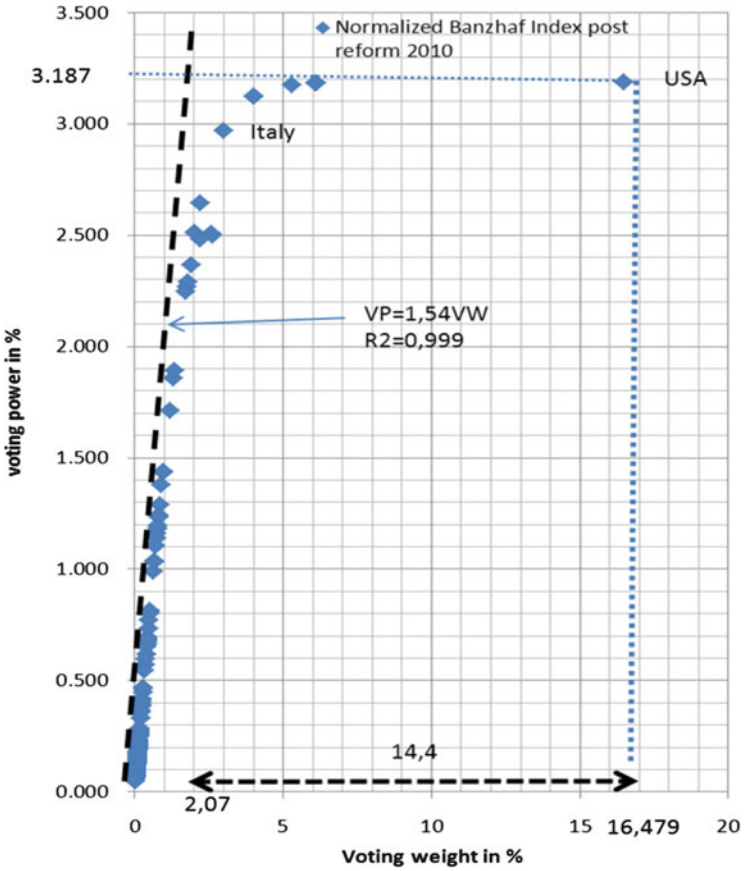

Fig. 2 Voting powers and weight in IMF board of governors comprising 187 countries. Majority requirement equals 85 %

to align voting powers and voting weight in a "fair way," i.e., by excluding any over- or underexploitation of the minority by the majority through coalitions.

A lot of countries and small contributors have voting powers proportional to their voting weight, and the top contributor departs from this rule. Why does the top one accept to cooperate in the IO? One interpretation is that the top contributor keeps the power to block a proposal, while his/her power to act on a positive one initiated by this contributor is far harder. Another one is to take into account the inside information which circulates in the IO and has a great value for him/her. If it is the case, this member could accept lower (respectively a higher) voting weight (VW − VW*) associated with lower (respectively higher) contributions for the same voting power. As a real example, Fig. 2 presents the case of IMF with the 85 % majority requirement in the post reform of 2010.

The quota of the United States is 16.479 %, while its voting power is of 3.187 %.

The best fitted regression line which expresses the best congruence between voting power and voting weight is VP (voting power) = 1.54 VW (voting weight). The coefficient of correlation is $R^2 = 0.999$

This regression line is obtained by excluding the first 12 top contributors. Voting power is 1.54 voting weight. The US voting weight, under the post reform 2010, equals 16.479 %, and its calculated voting power with the normalized Banzhaf index is 3.187 %. With 16.479 % voting weight, the US governor could expect 25.37 % voting power; the loss of power is dramatically huge (25.37 − 3.187 = 22.19 %)! Horizontally, the best fitted proportionality hypothesis shows that the acceptable quota is (VP/ 1.54) = (3.187/1.54) = 2.07 %. It means that the US government has a voting power similar to Brazil or Spain. For the same voting power, the US can reduce its quotas by 14.4 %. If quotas are proportionally linked to contributions, then there are substantial economies to realize by adjusting voting weight to voting powers. In the same vein, if we look at Japan, the second country excluded, with 6.138 % voting weight and 3.183 % voting power, the expected voting power is 9.45 %, and the opportunity cost is far lower as it is 6.27 %. The acceptable voting weight is 2.07 %. Note that this adjustment balances voting power among the members of IMF. Table 1 resumes the results for six top contributors.

Hereafter, we extend this method to some other international organizations.

3 Data and Measurement

Voting powers of member states are measured by the normalized Banzhaf index, $ß_i$, which represents the number of swings for member i as a fraction of the total number of swings for all members. Voting powers are computed for each international organization for each majority requirement using the weight of 2008. The weight is gathered from the official website or annual report 2009 of each international organization. Voting powers of member states are computed using the Leech algorithm for power in large games. The program that we chose to compute the normalized Banzhaf index is the *ipmmle*. The latter uses Leech's modification of Owen's multilinear approximation method for large bodies in terms of number of members and votes with good approximation. (To access to the computer software that calculate voting power indices in weighted voting bodies, see http://homepages.warwick.ac.uk/~ecaae/#Progam_List.)

The sources of voting weight, in 2008, are gathered from official websites or annual 2008 reports of the international organizations. The choice of four well-known weighted voting intergovernmental organizations (international nongovernmental organizations (INGOs) and purely regional organizations are excluded from our study in order to have a homogenous sample), AfDB, IBRD, IFAD, and IMF, can be explained by the fact that they use simple and supermajorities in their decision-making system.

Equations used in our model are linear regressions with the normalized Banzhaf index (y) as dependent variable and voting weight (x) as independent variable.

Table 1 Voting weight post reform 2010 IMF and voting powers with majority requirement of 85 % for six top contributors

Countries	GNI per head 2008 in thousands of dollars	Voting weight post reform 2010 % Col 1	Banzhaf voting power % Col 2	Opportunity cost in terms of loss of voting power (Col 1×1.54)−col 2	Estimated acceptable weight for the calculated voting power % Col 2/(1.54)
United States	43.51	16.479	3.187	22.191	2.069
Japan	38.94	6.138	3.183	6.270	2.067
Germany	34.98	5.308	3.175	4.999	2.062
France	34.95	4.024	3.123	3.074	2.028
United Kingdom	38.32	4.024	3.123	3.074	2.028
Italy	30.52	3.016	2.967	1.678	1.927

3.1 Existing Voting Powers and Weight

Graphs below show that the relationship between existing voting powers, measured by the Banzhaf index, and voting weight, allocated to member states in our sample of weighted voting organizations, is linear except for the largest contributors. In fact, for issues involving a qualified majority, in our sample of weighted voting organizations, the linear relationship between voting powers (i.e., the dependent variable) and voting weight (i.e., the independent variable) fails to hold for the largest contributors for which the curves flattened considerably and are concave; this concavity is more pronounced for issues involving supermajority requirement. On the other hand, for issues involving simple majority, in our sample of weighted voting organizations, the relationship between powers and weight is linear except for the largest contributors for which the curves bowed downward and are convex.

3.2 Method Used to Compute Adjusted Voting Powers

Top contributors with extreme values represent the "outliers." Consequently, linear curves in the graphs below denote the relation between voting power, the dependent variable, at the ordinate axis and voting weight, the independent variable, at the abscissa axis of member states excluding the "outliers."

We adjust, through a linear regression, the proportionality rule between voting power and weight by excluding top contributors which departs from the proportionality discovered between other members. In other words, we consider that existing "outliers" are along the linear curves. We adjust for each one of the "outliers" the value of its voting power (y; dependent variable) through replacing its existing voting weight (x; independent variable) in 2008 in the corresponding linear regression. Then we compare the value of the adjusted voting power with the existing voting power of the "outlier" or top contributor in order to verify if he/she currently has more or less power.

4 Results

4.1 Adjusted Voting Powers in WVO Under Simple Majority Requirement

For AfDB (Fig. 3) under a 50 % of majority requirement, the linear curve (without the "outliers") shows a similar increase in members' individual voting weight and voting powers. The United States, the second largest contributor, with 6.34 % voting weight and 6.47 % voting power is situated at the end of the linear curve. The top contributor Nigeria, the "outlier," has 8.72 % voting weight, while it has 9.37 %

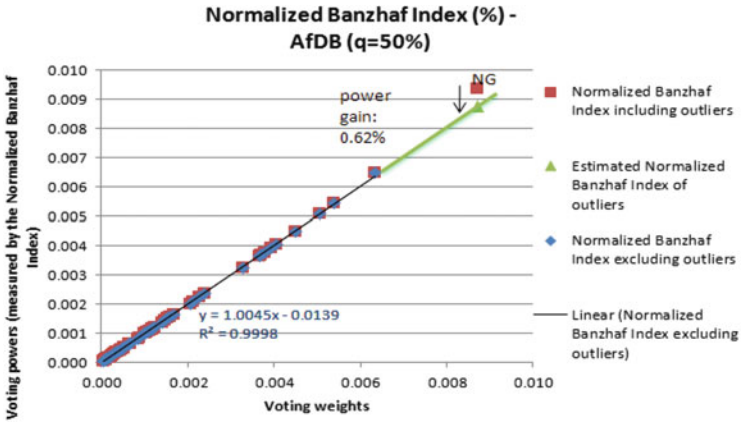

Fig. 3 "Outlier" or top contributor is Nigeria

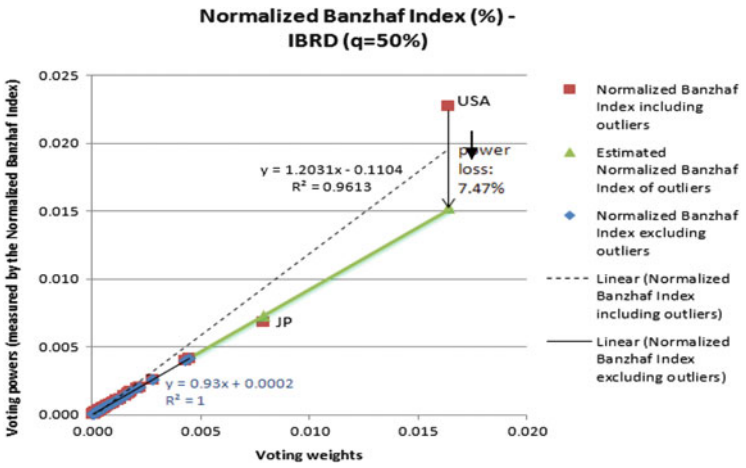

Fig. 4 "Outliers" or top contributors are from the bottom to the top respectively Japan (JP) and the United States (USA)

voting power. Therefore, the United States and Nigeria under 50 % of majority requirement have more power than weight. Consider now that Nigeria is along the linear curve, the value of its voting power is 8.75 % for 8.72 % of voting weight, while its voting power in 2008 is 9.37 %. We notice that Nigeria on the linear curve has 0.62 % (9.37 % minus 8.75 %) less power than weight.

For IBRD (Fig. 4, without the "outlier") and with 50 % majority requirement along the linear curve, voting powers are similar to voting rights for countries with the lowest voting weight (86 members), while voting powers for the remaining member states (97 members) are slightly less important than their voting weight. Germany, the second largest contributor, has 4.49 % weight and 4.17 % voting

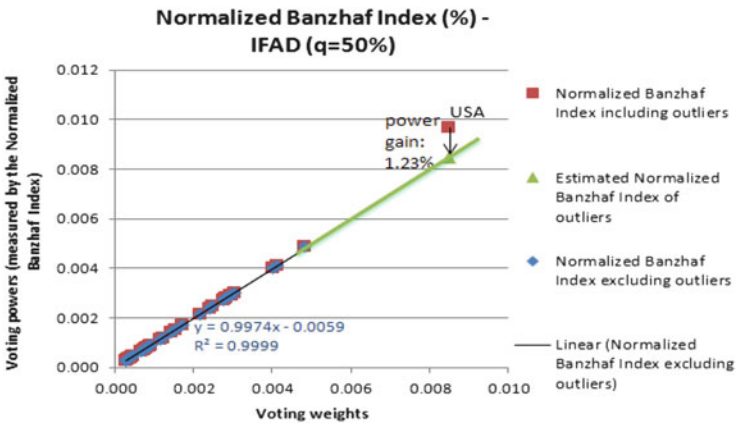

Fig. 5 "Outlier" or top contributor is the United States (USA)

power. The top contributor, the United States, is the "outlier" with 22.70 % voting power versus 16.38 % voting weight.

Along the linear curve, the adjusted voting power of the United States became 15.23 %. Consequently, below a 50 % majority requirement, the United States has more power with the existing distribution in 2008 than along the linear curve.

The linear curve of IFAD (Fig. 5) for decisions requiring a 50 % majority shows that the contributor at the top of the linear curve, Saudi Arabia, has a voting power slightly higher than its voting weight (4.86 % versus 4.82 %, respectively). Contributors Germany and Japan, respectively, have similar voting weight and powers (4.12 % for Germany and 4.02 % for Japan). The next 25 members each have less voting powers than weight, while each of the remaining members (i.e., 137 members) has similar voting power and weight. The "outlier," the United States, has greater voting powers than weight (9.71 % versus 8.51 %, respectively).

If the United States is along the linear curve, the adjusted voting power (the dependent variable) is 8.48 %. Therefore, the United States has a voting power in 2008 (9.71 %) greater than the adjusted power (8.48 %) through the linear regression ($y = 0.9974x - 0.0059$), where voting weight is the independent variable (x) equal to 8.51 %.

Regarding the IMF, the linear curve (Fig. 6) under a simple majority requirement indicates that the largest contributors at the top of the linear curve, Japan and Germany, have less power than weight (respectively 5.64 % voting power versus 6.17 % weight and 5.52 % versus 6.03 %). Moreover, France and the United Kingdom have at about 0.4 % less power than weight, China has 0.3 % less power than weight, and Italy, Saudi Arabia, Canada, and Russia have about 0.2 % less voting power than voting weight. All the remaining countries (i.e.,178 members) also have less power than weight but at a lesser extent than the most developed countries cited above, and for some of the least developed countries, their voting powers are the same as their voting weight (for instance, Antigua and Barbuda,

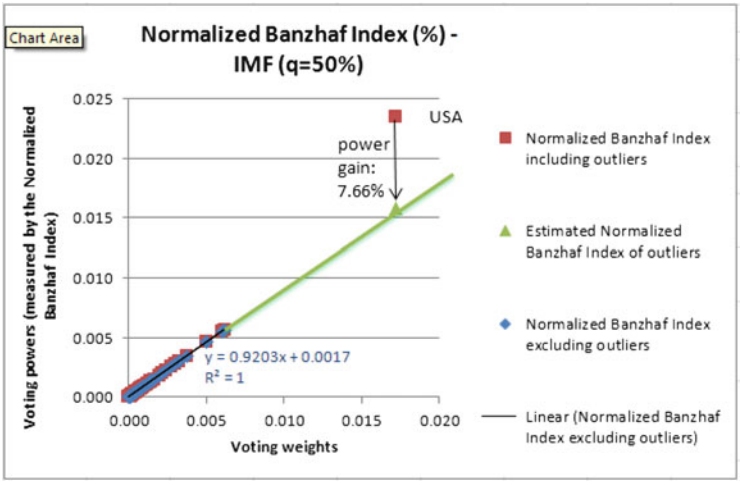

Fig. 6 "Outlier" or top contributor is the United States (USA)

Djibouti, Eritrea, Ghana, Guinea-Bissau, and Saint Lucia). The "outlier," the United States, with the highest voting weight (17.20 %) has a greater voting power (23.49 %).

If the United States is along the linear curve, its adjusted voting power through the linear regression ($y = 0.9203x + 0.0017$) is 15.83 % which is less than its existing voting power 23.49 % for the same voting weight 17.20 %.

4.2 Adjusted Voting Power in WVO Under Qualified Majority Requirement

For AfDB (Fig. 7) when decisions involve a 70 % majority requirement, the linear curve indicates that member states (i.e., 72 members) have slightly more power than weight except for the two "outliers" and the top three contributors along the linear curve. Actually, the top three contributors who have less power than weight are South Africa with 4.44 % voting power and 4.50 % voting weight, Egypt with 4.88 % voting power and 5.06 % voting weight, and Japan with 5.12 % voting power and 5.40 % voting weight. The "outliers," the United States and Nigeria, have respectively 5.70 % voting power versus 6.34 % weight and 6.59 % voting power for 8.72 % voting weight.

We suppose now that the "outliers" are along the linear curve; the adjusted voting power of the United States is therefore 6.33 % (while its current power in 2008 is 5.70 %), and Nigeria voting power is 8.69 % (while its existing power in 2008 is 6.60 %). We notice that, with 70 % qualified majority and with the current 2008

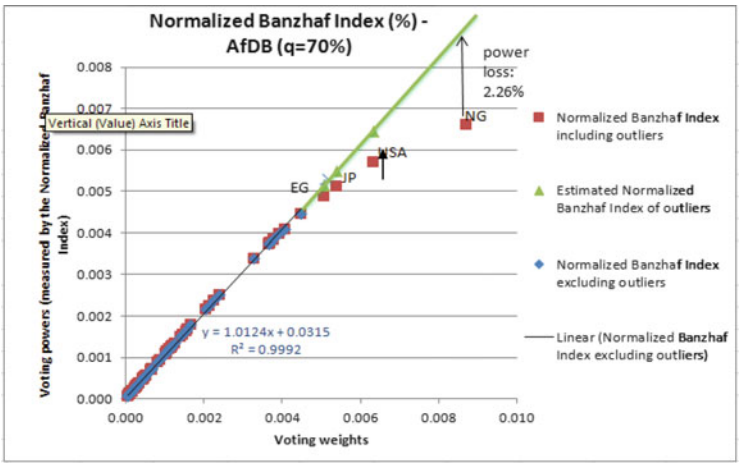

Fig. 7 "Outliers" or top contributors are from the bottom to the top respectively, Egypt (EG), Japan (JP), the United States (USA), and Nigeria (NG)

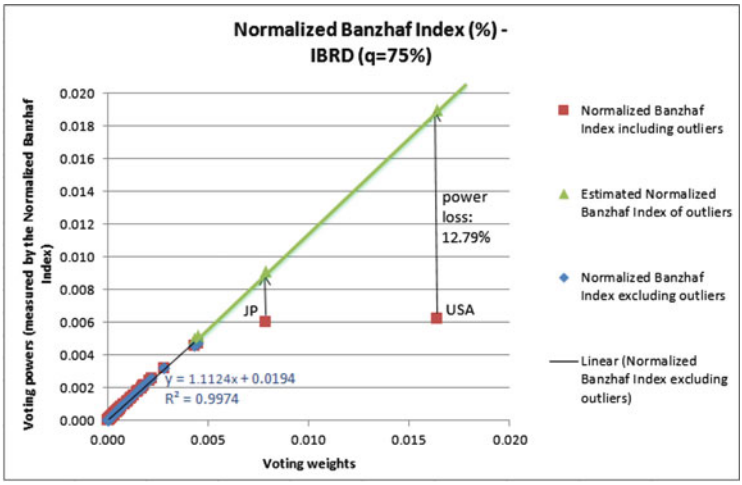

Fig. 8 "Outliers" or top contributors are from the bottom to the top respectively the United Kingdom (UK), France (FR), Germany (DE), Japan (JP), and the United States (USA)

distribution of power, the United States has 0.63 % less power and Nigeria has 2.09 % less power compared to their adjusted power along the linear curve.

The linear curve of IBRD (Fig. 8) for decisions requiring a qualified majority of 75 % illustrates a greater percentage of voting power than weight for member states except for the top two contributors Japan and Germany (the second and third largest contributors) at the end of the linear curve which have less power (6.00 % and 4.72 %, respectively) than weight (7.86 % and 4.49 %, respectively). The United

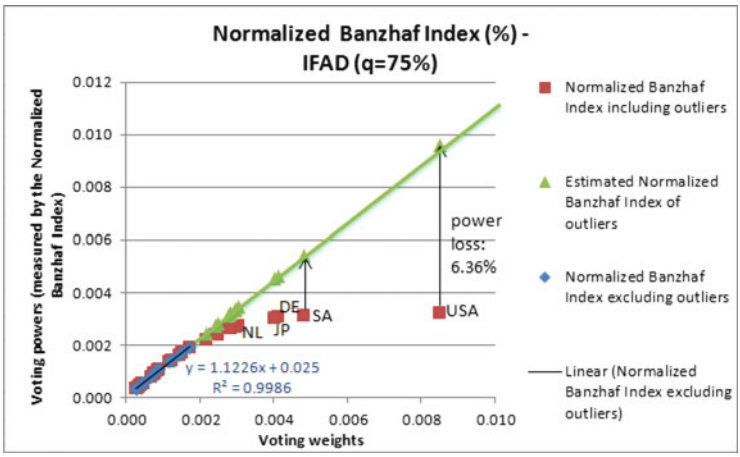

Fig. 9 "Outliers" or top contributors are from the bottom to the top respectively Kuwait (KW), Norway (NO), Venezuela (VE), Canada (CA), Sweden (SE), the United Kingdom (UK), France (FR), Italy (IT), the Netherlands (NL), Japan (JP), Germany (DE), Saudi Arabia (SA), and the United States (USA)

States is the "outlier" with just 6.20 % voting power relative to 16.38 % voting weight in 2008.

We consider now that the United States is not an "outlier" anymore and is along the linear curve; the adjusted voting power (the dependent variable) if we replace its voting weight 16.38 % (the independent variable) in the linear regression ($y = 1.1124x + 0.0194$) is 6.92 %. We notice that with a qualified majority, the existing voting power (6.20 %) in 2008 is less than the adjusted power (6.92 %).

Under a qualified majority requirement of 75 %, the IFAD linear curve (Fig. 9) shows that the higher the voting weight is, the lower the increase in voting power. The first ten contributors along the linear curve have less power than weight (the first ten contributors are respectively Germany, Japan, the Netherlands, Italy, France, the United Kingdom, Sweden, Canada, Venezuela, and Norway). The remaining 153 members have slightly more power than weight. The "outliers," the United States (8.51 % voting weight versus 3.22 % voting power) and Saudi Arabia (4.82 % voting weight versus 3.13 % voting power), have less power than weight.

If we suppose now that the United States and Saudi Arabia are along the linear curve, their adjusted voting powers are respectively 8.06 % and 4.60 % which are less than their existing power in 2008.

Under a special majority of 75 %, the linear curve of the IMF (Fig. 10) illustrates a general increase in power relative to the voting weight for the remaining countries, especially Canada, China, Italy, the Netherlands, Russia, and Saudi Arabia which have about 0.4 % more power than weight; Australia, Brazil, Korea, Mexico, and Spain have 0.3 % more power than weight; Argentina, Austria, Indonesia, South Africa, Sweden, and Venezuela have about 0.2 % more power than weight. Regarding the "outliers," Germany, Japan, and the United States, they have less

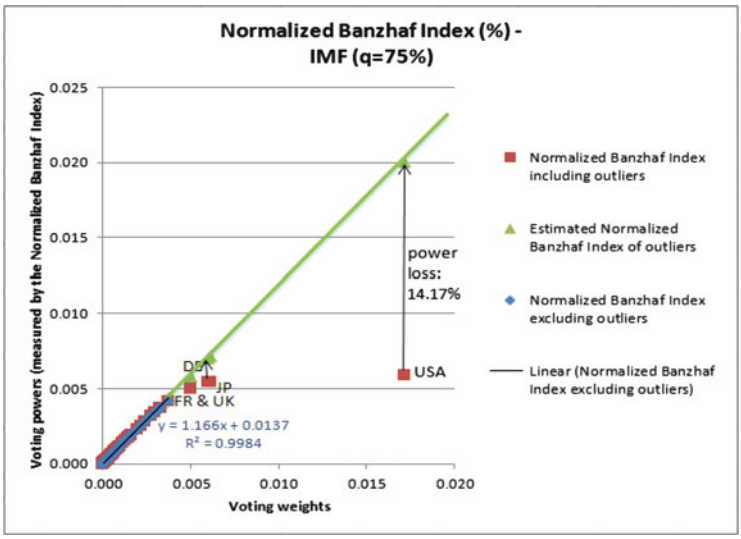

Fig. 10 "Outliers" or top contributors are from the bottom to the top respectively China (CN), the United Kingdom (UK), France (FR), Germany (DE), Japan (JP), and the United States (USA)

power than weight respectively, 6.03 % voting weight and 5.43 % voting power, 6.17 % voting weight and 5.48 % voting power, and 17.2 % voting weight and 5.9 % voting power.

If we replace voting weight, the independent variable, of each "outlier" in the linear regression ($y = 1.1792x + 0.0109$), the adjusted voting power, the dependent variable, is 7.12 % for Germany, 7.29 % for Japan, and 20.29 % for the United States. We observe that under a qualified majority of 75 %, the adjusted voting power is higher than the existing voting power especially for the United States.

With a special majority of 85 %, as we can see in Fig. 11, the linear curve illustrates that top contributors France and the United Kingdom have 1.3 % less power than weight and China 0.2 % less power than weight. However, remaining member states have greater power than their weight, especially Australia, Brazil, India, Korea, Mexico, Spain, and Switzerland with an increase of about 0.6 % power relative to their individual voting weight; Venezuela and Belgium have 0.5 % more voting power than weight and the Netherlands 0.4 % more power than weight. The "outliers," Germany, Japan, and especially the United States, have less power than weight respectively, 6.03 % voting weight and 3.68 % voting power, 6.17 % voting weight and 3.68 % voting power, and 17.2 % voting weight and 3.69 % voting power.

If we consider now that Germany, Japan, and the United States follow the linear curve and are not "outliers" anymore, the adjusted voting power, the dependent variable, of each one of them in the linear regression ($y = 1.3592x + 0.026$) is 8.22 % for Germany, 8.41 % for Japan, and 23.40 % for the United States. Therefore, adjusted voting powers are higher than existing voting powers of the "outliers"

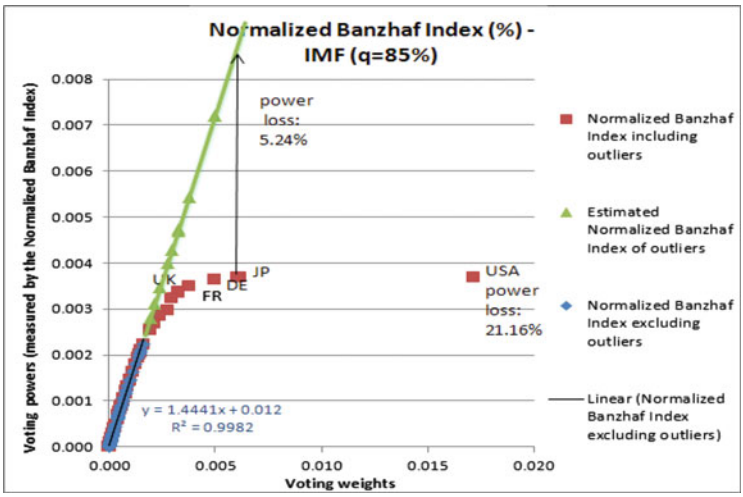

Fig. 11 "Outliers" or top contributors are from the bottom to the top respectively India (IN), Belgium (BE), the Netherlands (NL), Russia (RU), Canada (CA), Saudi Arabia (SA), Italy (IT), China (CN), the United Kingdom (UK), France (FR), Germany (DE), Japan (JP), and the United States (USA)

particularly for the United States, and we notice that the adjusted voting powers with 85 % of majority requirements are even higher than under a 75 % of majority requirement.

5 Results Summary and Implications

We notice from our 2008 data that the most affected member states by the qualified and supermajority requirements are the largest contributors to weighted voting organizations, particularly the United States whose voting power measured by the Banzhaf index $ß_i$ declines steeply as q increases. On the other hand, we notice that under qualified majority requirements, member states with less voting weight have slightly greater voting power. Therefore, qualified majorities appear to equalize voting power between member states and do not privilege higher contributors. These results are consistent with Leech (2002b) results when he/she studied the effect of the majority requirement on major contributors at the IMF in 1999. Moreover, under qualified majorities, adjusted voting powers along linear curves are greater than existing voting powers for "outliers" in 2008. Thus, as top contributors, the "outliers" should have more powers if the latter were proportional to the voting weight.

Furthermore, we observe that a simple majority requirement favors top contributors disproportionately giving them more power than their voting weight while all other members have slightly less power. Consequently, the distribution of power is more unequal under simple majority requirements ($q = 50$ %). In addition, adjusted voting powers along linear curves are lower than existing voting powers for "outliers" in 2008. Therefore, the largest contributors, the "outliers," should have less powers if the latter were proportional to the voting rights (Table 2).

Consequently, as Leech (2002b) has argued in the case of the United States at the IMF in 1999, supermajority conceived to protect the largest contributors by giving them a veto power seems to limit their power and to be damaging to their sovereignty. Indeed, John Maynard Keynes, the leader of the British delegation at the original Bretton Woods Conference, has criticized the plan of special majorities granted to the United States over important decisions at the IMF and the World Bank, because special majorities favor coalitions between smaller member states being capable of blocking United States' own proposals (Leech 2002b, p. 375).

6 Conclusion

In the websites, documents, and annual reports of international organizations, there is a common fallacy confounding the term voting weight with voting power. Our results confirm the previous studies on the question that voting weight of member states in weighted voting organizations does not reflect their effective voting power. For that reason, a distinction should be made between both terms.

Our 2008 data applied to a sample of four weighted voting organizations (AfDB, IBRD, IFAD, and IMF) show that the former results observed by Fischer and Schotter (1978), Dreyer and Schotter (1980), and Leech (2002) for the distribution of voting weight are again confirmed for 2008 voting weight and can be extended to other IOs. As majority requirements (q) increase, the power—measured by the normalized Banzhaf index—of greater contributors, particularly the United States, decreases. At the same time, supermajority of 85 % decreases the gap of voting power between member states reducing thus inequalities. Therefore, supermajority perceived to protect the interests of the largest contributors by giving them a veto power seems to limit their power and to be harmful to their sovereignty (Leech 2002b, p. 390). Furthermore, we observe that, under qualified majorities, adjusted voting powers along linear curves are higher than existing voting powers for "outliers" in 2008.

Simple majority requirement shows clearly that top contributors are disproportionately privileged with more power than their financial contributions or weight, whereas all other member states have slightly less power than weight. Accordingly, we can conclude that under simple majority requirement, the distribution of power is more unequal than under qualified majority requirement. Furthermore, estimated voting powers along linear curves are lower than existing voting powers for

Table 2 Summary of "outliers" adjusted weight and powers under different majority requirements in weighted voting organizations

Weighted voting organizations $q =$ majority requirements Linear regressions	Existing voting weight in 2008 of the "outliers" (1)	Adjusted voting weight in 2008 of the "outliers" if along linear curves (2)	Loss (or gain) of voting weight for a given voting power (1)−(2)	Existing voting power in 2008 of the "outliers" (4)	Adjusted voting power of "outliers" if along linear curves (5)	Opportunity cost (or gain if negative) in terms of loss of power (5)−(4)
AfDB$q = 50\ \% y = 1.0045x - 0.0139$	Nigeria: 8.72 %	Nigeria: 10.71 %	Nigeria: −1.99 %	Nigeria: 9.37 %	Nigeria: 8.75 %	−0.62 %
AfDB$q = 70\ \% y = 1.0124x + 0.0315$	Egypt: 5.06 %	Egypt: 1.71 %	Egypt: 3.35 %	Egypt: 4.88 %	Egypt: 5.15 %	+0.27 %
	Japan: 5.40 %	Japan: 1.95 %	Japan: 3.45 %	Japan: 5.12 %	Japan: 5.50 %	+0.38 %
	United States: 6.34 %	United States: 2.52 %	United States: 3.82 %	United States: 5.70 %	United States: 6.45 %	+0.75 %
	Nigeria: 8.72 %	Nigeria: 3.41 %	Nigeria: 5.31 %	Nigeria: 6.60 %	Nigeria: 8.86 %	+2.26 %
IBRD$q = 50\ \% y = 0.93x + 0.0002$	Japan: 7.86 %	Japan: 7.29	Japan: 0.57 %	Japan: 6.80 %	Japan: 7.31 %	+0.51 %
	United States: 16.38 %	United States: 24.39 %	United States: −8.01 %	United States: 22.70 %	United States: 15.23 %	−7.47 %
IBRD$q = 75\ \% y = 1.1588x + 0.0073$	United Kingdom: 4.30 %	United Kingdom: 3.32 %	United Kingdom: 0.98 %	United Kingdom: 4.58 %	United Kingdom: 4.99 %	+0.41 %
	France: 4.30 %	France: 3.32 %	France: 0.98 %	France: 4.58 %	France: 4.99 %	+0.41 %
	Germany: 4.49 %	Germany: 3.44 %	Germany: 1.05 %	Germany: 4.72 %	Germany: 5.21 %	+ 0.49 %
	Japan: 7.86 %	Japan: 4.55 %	Japan: 3.31 %	Japan: 6 %	Japan: 9.12 %	+3.12 %
	United States: 16.38 %	United States: 4.72 %	United States: 11.66 %	United States: 6.2 %	United States: 18.99 %	s+12.79 %

(continued)

Table 2 (continued)

Weighted voting organizations $q =$ majority requirements Linear regressions	Existing voting weight in 2008 of the "outliers" (1)	Adjusted voting weight in 2008 of the "outliers" if along linear curves (2)	Loss (or gain) of voting weight for a given voting power (1)−(2)	Existing voting power in 2008 of the "outliers" (4)	Adjusted voting power of "outliers" if along linear curves (5)	Opportunity cost (or gain if negative) in terms of loss of power (5)−(4)
IFAD$q = 50\ \% y = 0.9974x - 0.0059$	United States: 8.51 %	United States: 10.33 %	United States: −1.82 %	United States: 9.71 %	United States: 8.48 %	−1.23 %
IFAD$q = 75\ \% y = 1.1226x + 0.025$	Kuwait: 2.16 %	Kuwait: 0.26 %	Kuwait: 1.9 %	Kuwait: 2.21 %	Kuwait: 2.45 %	+0.24 %
	Norway: 2.43 %	Norway: 0.12 %	Norway: 2.31 %	Norway: 2.37 %	Norway: 2.75 %	+0.38 %
	Venezuela: 2.49 %	Venezuela: 0.08 %	Venezuela: 2.41 %	Venezuela: 2.41 %	Venezuela: 2.82 %	+0.41 %
	Canada: 2.76 %	Canada: 0.09 %	Canada: 2.67 %	Canada: 2.61 %	Canada: 3.12 %	+0.51 %
	Sweden: 2.792 %	Sweden: 0.12 %	Sweden: 2.67 %	Sweden: 2.63 %	Sweden: 3.16 %	+0.53 %
	United Kingdom: 2.83 %	United Kingdom: 0.13 %	United Kingdom: 2.7 %	United Kingdom: 2.64 %	United Kingdom: 3.20 %	+0.56 %
	France: 2.93 %	France: 0.17 %	France: 2.76 %	France: 2.69 %	France: 3.31 %	+0.62 %
	Italy: 2.96 %	Italy: 0.18 %	Italy: 2.78 %	Italy: 2.70 %	Italy: 3.35 %	+0.65 %
	Netherlands: 3.06 %	Netherlands: 0.22 %	Netherlands: 2.84 %	Netherlands: 2.75 %	Netherlands: 3.46 %	+0.71 %
	Japan: 4.02 %	Japan: 0.47 %	Japan: 3.55 %	Japan: 3.03 %	Japan: 4.54 %	+1.51 %
	Germany: 4.12 %	Germany: 0.48 %	Germany: 3.64 %	Germany: 3.04 %	Germany: 4.65 %	+1.61 %
	Saudi Arabia: 4.82 %	Saudi Arabia: 0.56 %	Saudi Arabia: 4.26 %	Saudi Arabia: 3.13 %	Saudi Arabia: 5.43 %	+2.3 %
	United States: 8.51 %	United States: 0.64 %	United States: 7.87 %	United States: 3.22 %	United States: 9.58 %	+6.36 %

IMF$q = 50\ \%y = 0.9203x + 0.0017$	United States: 17.2 %	United States: 25.34 %	United States: −8.14 %	United States: 23.49 %	United States: 15.83 %	−7.66 %
IMF$q = 75\ \%y = 1.166x + 0.0137$	China: 3.76 %	China: 2.39 %	China: 1.37 %	China: 4.16 %	China: 4.39 %	+0.23 %
	United Kingdom: 4.98 %	United Kingdom: 3.11 %	United Kingdom: 1.87 %	United Kingdom: 5 %	United Kingdom: 5.82 %	+0.82 %
	France: 4.98 %	France: 3.11 %	France: 1.87 %	France: 5 %	France: 5.82 %	+0.82 %
	Germany: 6.03 %	Germany: 3.48 %	Germany: 2.55 %	Germany: 5.43 %	Germany: 7.05 %	+1.62 %
	Japan: 6.17 %	Japan: 3.52 %	Japan: 2.65 %	Japan: 5.48 %	Japan: 7.21 %	+1.73 %
	United States: 17.2 %	United States: 3.89 %	United States: 13.31 %	United States: 5.9 %	United States: 20.07 %	+14.17 %
IMF$q = 85\ \%y = 1.4441x + 0.012$	India: 1.94 %	India: 0.92 %	India: 1.02 %	India: 2.53 %	India: 2.81 %	+0.28 %
	Belgium: 2.14 %	Belgium: 1.03 %	Belgium: 1.01 %	Belgium: 2.69 %	Belgium: 3.11 %	+0.42 %
	Netherlands: 2.4 %	Netherlands: 1.14 %	Netherlands: 1.26 %	Netherlands: 2.84 %	Netherlands: 3.48 %	+0.64 %
	Russia: 2.76 %	Russia: 1.23 %	Russia: 1.53 %	Russia: 2.97 %	Russia: 4 %	+1.03 %
	Canada: 2.96 %	Canada: 1.41 %	Canada: 1.55 %	Canada: 3.24 %	Canada: 4.29 %	+1.05 %
	Saudi Arabia: 3.24 %	Saudi Arabia: 1.49 %	Saudi Arabia: 1.76 %	Saudi Arabia: 3.35 %	Saudi Arabia: 4.70 %	+1.35 %
	Italy: 3.28 %	Italy: 1.50 %	Italy: 1.76 %	Italy: 3.37 %	Italy: 4.74 %	+1.37 %
	China: 3.76 %	China: 1.59 %	China: 2.17 %	China: 3.49 %	China: 5.43 %	+1.94 %

(continued)

Table 2 (continued)

Weighted voting organizations $q =$ majority requirements Linear regressions	Existing voting weight in 2008 of the "outliers" (1)	Adjusted voting weight in 2008 of the "outliers" if along linear curves (2)	Loss (or gain) of voting weight for a given voting power (1)−(2)	Existing voting power in 2008 of the "outliers" (4)	Adjusted voting power of "outliers" if along linear curves (5)	Opportunity cost (or gain if negative) in terms of loss of power (5)−(4)
	United Kingdom: 4.98 %	United Kingdom: 1.69 %	United Kingdom: 3.29 %	United Kingdom: 3.64 %	United Kingdom: 7.20 %	+3.56 %
	France: 4.98 %	France: 1.69 %	France: 3.29 %	France: 3.64 %	France: 7.20 %	+3.56 %
	Germany: 6.03 %	Germany: 1.72 %	Germany: 4.31 %	Germany: 3.68 %	Germany: 8.72 %	+5.04 %
	Japan: 6.17 %	Japan: 1.72 %	Japan: 4.98 %	Japan: 3.68 %	Japan: 8.92 %	+5.24 %
	United States: 17.2 %	United States: 1.72 %	United States: 15.48 %	United States: 3.69 %	United States: 24.85 %	+21.16 %

"outliers" in 2008. Therefore, the "outliers" should have less power if the latter were proportional to the voting rights.

Adjusted voting weight to reflect the existing voting power of the "outliers" or top contributors, as we have seen before, seems to be an interesting tool that permits to remedy the disproportionately great power of the United States relative to its voting weight under a simple majority requirement and to the loss of power of largest contributors under qualified majority requirements.

We conclude with the following reflection: 30 years after the first exploration by Dreyer and Schotter of the relationships between voting rights and voting powers, the situation stays the same. Our results always raise "the fundamental question about the desirability of using quota as an appropriate basis for determining member countries' influence or power" in weighted international organizations. One tentative answer is given by our paper if we look at the loss of powers by top contributors. Changing the rule by adjusting weight to voting powers means equality of powers between members and is not without opportunity costs. One of these costs consists of the fact that equity of voting powers introduces more uncertainty in the outcome of coalitions. This opportunity cost could be higher than the one suffered by top contributors in the present system.

A.1 Appendix: Banzhaf Indices

The pioneering work of Penrose (1946, 1952) on measuring voting power was ignored by mainstream social choice theorists. His/her main idea was so natural and simple: *the more powerful a voter is, the more often will the outcome go the way s/he votes*. This means that a more powerful voter is more able to influence the outcome and is more often on the winning side of a division (Felsenthal and Machover, 2004, p. 5).

Without knowing of Penrose's work, Banzhaf (1965), an American jurist, was the first, among many other scholars, who reinvented some of his/her ideas. Banzhaf addressed the problem of measuring the voting power in much the same way as Penrose. However, he/she was not interested in absolute voting power but in relative voting power, in other words, in the ratio of one voter's power to another's. The Banzhaf index is represented by ß.

The Banzhaf index considers all coalitions Ti as equiprobable, such that voters are arranged randomly and in no particular order. The Banzhaf index for a member *i* represents the number of swings for that member divided either by the total number of coalitions of other members measuring in that case the probability of a swing or by the total number of swings for all members measuring thus the member's relative capacity to swing. The number of swings for a member *i* is $\eta_i = \sum_{\tau_i} 1$

The non-normalized Banzhaf index for a member *i* is the probability of a swing, denoted by $ß_i$', which includes the total number of coalitions except *i*, that is, 2^{n-1}, as denominator. Actually, each subset of *N* that does not take into account *i* represents

the voting outcome of the remaining n-1 voters. Consequently, 2^{n-1} represents the maximum number of swings for voter i. Hence, the non-normalized Banzhaf index can be represented as follows:

$$\beta_i' = \sum_{\tau_i} 1/2^{n-1} = \eta_i/2^{n-1}, \quad i = 1, 2, \ldots, n$$

The non-normalized Banzhaf index measures the absolute voting power of each voter and illustrates relative voting powers of different members but without giving a direct interpretation of power distribution (Leech, 2002a, p. 11).

For that reason, the normalized Banzhaf index, ßi, is used to measure the relative voting power among members. It represents the number of swings for member i as a fraction of the total number of swings for all members. Hence, the Banzhaf index can be written as follows:

$$\beta_i = \eta_i / \sum \eta$$

For example, suppose a voting body represented by the vector $v = [60: 40, 30, 20]$ where 60 is the decision rule, in other words, a decision requires 60 votes to pass, and 40 represents voting weight of member state A, 30 is the voting weight of member state B, and 20 is the voting weight of member state C. The winning coalitions, with swing voters (i.e., pivotal voters who change the coalition from a losing to a winning one) in bold:

AB: both member states are decisive voters since the coalition loses if either member state leaves.

AC: both member states are decisive voters since the coalition loses if either member state leaves.

ABC: A is only pivotal voter since the coalition wins even if B leaves or C leaves but not if A leaves.

Thus, the total number of swing votes is 5, where A is decisive three times, B is decisive one time, and C is decisive one time. Therefore, the power of member states measured by the Banzhaf index is divided as follows:

$$\mathrm{A} = 3/5; \qquad \mathrm{B} = 1/5 \quad \text{and} \quad \mathrm{C} = 1/5.$$

We should note that the Banzhaf index ßi is just a normalized version of the Coleman index (as we will see below) and is only used for comparing the voting powers of members under the same decision rule and is not consistent under two different decision rules. In the latter case, the Penrose index should be used (Felsenthal and Machover, 2004, pp. 6–7).

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Part III
Elections

Party Activists in the 2009 German Federal Elections

Norman Schofield and Anna-Sophie Kurella

1 Introduction

Formal modelers of party competition often have to face the fact that their models predict far too centrist equilibrium positions when compared to empirically observed party positions. Various components have been suggested as extensions for the standard Downsian spatial model, in order to receive more plausible, diverging equilibrium configurations. One important improvement is the inclusion of a valence term that accounts for non-policy related factors that influence vote decisions (Schofield and Sened 2005a,b). The underlying assumption is that valence describes an overall perceived external popularity or competence, that is ascribed to a party and/or its leader and cannot be attributed to the parties' policy position. This valence term is thus assumed to be exogenous and constant among voters. The model can further be extended by the inclusion of an additional individual specific non-policy element, such as partisan bias (Adams et al. 2005) or ideological distances to party positions (Kurella and Pappi 2015). This stabilizes the formal game of party competition by diminishing the probability of parties leapfrogging each other in equilibrium configurations. Still, the predictions of those models show significant discrepancy to empirical party configurations.

One possible explanation for the missing link in those models is activists influencing parties' policy positions by having the power to manipulate parties' valences (Schofield 2006; Schofield et al. 2011). Thus, the valence term is not

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exogenous defined, but depends to some extent on the policy position of the party. Beyond the literature of formal theory, activist influence is a widely studied field, especially for the American political system, starting from the primary to the presidential elections as well as covering the elections of governors. Within those settings, it has been shown empirically that campaign spending influences the probability of winning elections (Nagler and Leighley 1992). Thus, activists play a major role in political competition due to their spending behavior that affects the volume and scope of the campaign a candidate can run. This mechanism has also been revealed to hold outside the USA. For example, Chang and Lee (2009) show a positive effect of campaign spending on vote share for legislator elections in Taiwan, and Cox and Thies (2000) show that the effect of campaign money on electoral success is even stronger in Japan than in the USA.

In German electoral competitions donations are expected to play a smaller role, due to the fact that German parties get public funds for their electoral campaigns, which diminishes the dependence on donors. Beside that, anonymous donations are not allowed and donations over 50,000 Euro have to be published immediately including the name of the donor. This fact may deter parties and donors from giving as well as receiving large donations so not to raise suspicion of lobbying or corruption. Thus, the role as well as the identity of activists in the German case is expected to constitute a different pattern than in the US and may be harder to grasp. This might also explain why activist influence on the German party competition is rather understudied, whereas there exists a large body of literature on activist influence on the American parties.

This paper provides an empirical investigation of the puzzle of activist influence on German parties in the federal elections of 2009 relying on formal theory. Five parties competed in this electoral campaign. Being in a grand coalition, the Conservatives CDU/CSU[1] and the Social Democrats SPD were in an invidious situation during the campaign. Both parties wanted to end the current grand coalition and rather form a new coalition with their partner of choice, which would be the liberal FDP for CDU and the Greens for the SPD. However, having worked quite well together in the grand coalition and having shared responsibility for the policies of the past four years, it would not have been a credible tactic to attack each other during election campaign. Also, both parties could not be sure whether their vote shares would suffice to form a new coalition with the respective smaller party, or whether they would have to continue the grand coalition. Thus, in order to keep all options open, competition was unusually lacking in content and more about promoting persons. This led the broad public to perceive the competition as being rather boring. In the end, both big parties had historically low vote shares, and the grand coalition was replaced by a coalition of CDU and FDP.

Considering this general setup, one could argue that party valence played a large role in the 2009 election, and that policy positions of the two major parties would

[1]Throughout the remainder of the paper we will refer to CDU/CSU as one party "CDU." In the analyses the CDU is substituted by the CSU for the Bavarian respondents.

converge. However, parties' policy positions were perceived to be quite distinct. This may be due to activists influencing policy positions in a trade-off for increasing a party's valence. Because of the minor role of donations in the electoral campaign, it could be argued that the activists influencing German party positions are not wealthy donors, as in the US case, but rather ideologically committed partisans and intellectual leaders. Their way of manipulating a party's valence is thus not by donating money to run a bigger electoral campaign, but by advertising the party directly among their acquaintance and by public endorsements. This may lead to a smaller extent of activist influence in Germany than, for example, in the USA, but explains why it is still not zero.

We will apply the standard spatial model including a valence term. In order to draw conclusions on activist influence we will rely on the balance theorem as described in Schofield (2006) and Schofield and Gallego (2011). The basic idea is to regard the empirically observed party positions as an equilibrium configuration, in which parties are confronted with an electoral pull, which forces the party to move its position towards the center, and an activist pull, which forces the party to move its position more to the extreme of the policy space. The position at which each party locates in equilibrium is the point that balances both pulls and thus maximizes the party's vote share given the location of all other parties. This model will be used to estimate the position of each party's activist group within the policy space, which will offer insights in the mechanism of activist control within the German party system from a formal modeller's perspective.

The basic concept of the model and the conditions for convergence will be described in the following section. Furthermore, the balance solution that applies if we do not observe convergence is presented. The Sect. 3 describes the data and gives an overview of the empirical configuration in the German policy space at the 2009 federal election. Afterwards, the Sect. 4 presents and discusses the results of the equilibrium analyses and the conclusions that can be drawn concerning activist influence and their policy ideal points. The last section concludes.

2 A Spatial Election Model for Germany Including Activist Valence

Germany has a political system of proportional representation. At the time of the 2009 federal election campaign five parties were represented in the German parliament. They had been present in parliament since the German reunification in 1990 and all of them were reelected in 2009. So it is fair to speak of a stable five party system at the time period of interest. The formal model should be applicable to that. Furthermore, no restrictions should be placed on the dimensions of the policy space, so that the model can be flexibly applied to the present data structure. Additionally, a valence term should be integrated in the model, which should further

be differentiated into an exogenous fixed valence term and an endogenous valence term, that is generated by activists and depends on the policy position of the party.

A model that fulfils all those demands was developed by Schofield (2006). This model, on the other hand, is based on the multi-party stochastic model of Lin et al. (1999) which assumes vote maximization by the party or candidate. Vote maximization is a reasonable assumption for the German multi-party system with proportional representation, where an increase in vote share increases the chance to getting the power to form a coalition and thus participate in government. This is even true for the smaller parties who can become junior partner in the coalition.

Further, the model utilizes a broader concept of valence that not only takes into account exogenous, non-policy related evaluations of parties or leaders that corresponds to the valence term as conceptualized by Stokes (1992). It also includes an additional endogenous, policy related valence term, referring to the work of Aldrich (1983a,b) and Aldrich and McGinnis (1989). This additional valence is generated by activists, who, depending on the policy position of the party, decide to invest time, money, or other resources in supporting a party and thereby improving its standing in the electorate. The model thus combines two valence terms with spatial distance in the policy space. The utility that voter i receives from voting for party j depends on his/her ideal point within the policy space described by the vector $\mathbf{x}_i$ and the vector of policy positions of party j, $\mathbf{z}_j$ in the ω-dimensional policy space with $k = 1, \ldots, \omega$. It is given by

$$u_{ij}(\mathbf{x}_i, \mathbf{z}_j) = \lambda_j + \mu_j(\mathbf{z}_j) - \sum_{k=1}^{\omega} \beta_k (x_{ik} - z_{jk})^2 + \epsilon_{ij}. \tag{1}$$

The party's valence is described by the exogenous valence λ_j and by the endogenous activist function $\mu_j(\mathbf{z}_j)$ describing the additional valence of party j that is generated by activists as a function of the party's vector of policy positions $\mathbf{z}_j$. The vector of spatial parameters $\boldsymbol{\beta}$ is also ω-dimensional and describes the relative weight of utility loss of the squared Euclidian distances between the voter's ideal points and the party's policy positions on the distinct dimensions of the policy space. The sum of those weighted distances constituted the spatial part of the model. The error term ϵ_{ij} is assumed to follow a type-I extreme value distribution (also known as Gumbel distribution).

It is assumed that voting behavior is stochastic in a way that the voter has a certain probability to vote for each party. The probability of voting for party j is given by

$$\rho_{ij}(\mathbf{z}) = \Pr[[u_{ij}(\mathbf{x}_i, \mathbf{z}_j) > u_{il}(\mathbf{x}_i, \mathbf{z}_l)], \forall l \neq j] \tag{2}$$

$$= \Pr[[\lambda_j + \mu_j(\mathbf{z}_j) - \sum_{k=1}^{\omega} \beta_k (x_{ik} - z_{jk})^2 - \lambda_l - \mu_l(\mathbf{z}_l)$$

$$+ \sum_{k=1}^{\omega} \beta_k (x_{ik} - z_{lk})^2 > \epsilon_{ij} - \epsilon_{il}], \forall l \neq l]. \tag{3}$$

Since the difference of two type-I extreme value distributed variables follows a logit distribution, this results in the conditional logit model of the form

$$\rho_{ij}(\mathbf{z}) = \left[1 - \sum_{l \neq j} \exp(f_l)\right]^{-1}, \tag{4}$$

where

$$f_l = \lambda_j + \mu_j(\mathbf{z}_j) - \sum_{k=1}^{\omega} \beta_k (x_{ik} - z_{jk})^2 - \lambda_l - \mu_l(\mathbf{z}_l) + \sum_{k=1}^{\omega} \beta_k (x_{ik} - z_{lk})^2. \tag{5}$$

The expected vote share of each party is the mean of the individual choice probabilities.

$$V_j(\mathbf{z}) = \frac{1}{n} \sum_{i \in N} \rho_{ij}(\mathbf{z}) \tag{6}$$

Equilibrium positions for all j parties can be found by maximizing this function while simultaneously conditioning on the policy positions of all other parties, $\mathbf{z}_{-j}$.

Schofield (2007) formulates necessary and sufficient conditions for the joint electoral mean to be a local Nash equilibrium (LNE) for all parties in case the endogenous activist valence is identically zero. The joint electoral mean is defined by the vector

$$\mathbf{x}^* = \frac{1}{n} \sum_{i \in N} x_i. \tag{7}$$

Since the model utilized in this paper defines the spatial parameter to vary for the distinct policy dimensions, the theorem has to be adapted as described in the Appendix of Chapter 5 of Schofield and Gallego (2011). However, before stating the theorem some definitions have to be given.

Definition 1 (The covariance matrix ∇_0^*) Let ∇_0 denote an $\omega \times \omega$ matrix containing the covariances of voters' ideal points within the policy space. The covariance matrix ∇_0^* is then defined to be $\nabla_0^* = \frac{1}{n}\nabla_0$.

Definition 2 (The characteristic matrix for party j) When located at the joint electoral mean, $\mathbf{z} = (0, \ldots, 0)$ the vote share of each party is independent of i's ideal points and is given by

$$\rho_j = \left[1 + \sum_{l \neq j} [\lambda_l - \lambda_j]\right]^{-1}. \tag{8}$$

The characteristic matrix of party j is given by

$$C_j = 2(1-2\rho_j)\boldsymbol{\beta}\nabla_0^*\boldsymbol{\beta} - \boldsymbol{\beta}. \tag{9}$$

Here, $\boldsymbol{\beta} = \begin{pmatrix} \beta_1 & 0 & 0 & 0 \\ 0 & \beta_2 & 0 & 0 \\ \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & 0 & \beta_\omega \end{pmatrix}$ is the diagonal matrix of beta weights, one for each dimension.

Definition 3 (The convergence coefficient) The convergence coefficient for the model $M(\lambda, \boldsymbol{\beta})$ with zero activist valence is given by

$$c(\lambda, \boldsymbol{\beta}) = \frac{2(1-2\rho_1)\text{trace}(\boldsymbol{\beta}\nabla_0^*\boldsymbol{\beta})}{\frac{1}{\omega}(\beta_1 + \beta_2 + \cdots + \beta_\omega)}, \tag{10}$$

where ρ_1 denotes the vote share at the electoral mean of the party with the smallest valence.

Utilizing those definitions, it can be tested whether the joint electoral mean is an LNE. The necessary conditions are stated in the following theorem.

Mean Voter Valence Theorem (For different coefficients: $\boldsymbol{\beta} = \beta_1, \beta_2, \ldots, \beta_\omega$)

(i) The joint mean satisfies the first order condition to be an LNE.
(ii) A necessary condition for the joint mean to be an LNE is that the trace of the characteristic matrix C_1 is smaller than zero: trace$(C_1) < 0$.
(iii) A necessary condition for the joint mean to be an LNE is that the convergence coefficient is bounded above by the number of policy dimensions: $c(\lambda, \beta) < \omega$.

Note, however, that the theorem states only necessary, but not sufficient conditions. Thus, a further step has to be taken to prove the existence of an LNE at the mean. This proof can be given, for example, via simulation.

In case the activist influence is not expected to be identically zero, the theorem does not apply. Activists tend to take up more extreme policy positions than the average voter, which means that they exert a centrifugal pull on the party's policy position if it is located at the joint electoral mean. Therefore, the electoral mean is unlikely to constitute an LNE. According to Schofield (2006), the first order condition for a Nash equilibrium configuration is that the parties balance the two opposing pulls from the electorate and the activists in a way to maximize their expected vote share. Such a balance solution is defined as stated below.

Definition 4 (The balance solution) Let ρ_{ij} be the n by j matrix of voting probabilities at the vector of party positions $\mathbf{z}_j$ and define the n by j matrix of weighting coefficients to be

$$[\varpi_{ij}] = \frac{\rho_{ij} - \rho_{ij}^2}{\sum_{l=1}^{n}(\rho_{lj} - \rho_{lj}^2)}. \tag{11}$$

The balance equation for the policy position z_{jk}^* for party j on dimension $k = 1, \ldots, \omega$ is given by

$$\mathbf{z}_j^* = \frac{1}{2\beta_k} \frac{d\mu_j}{dz_j}(\mathbf{z}_j^*) + \sum_{i=1}^{n} \varpi_{ij} x_{ik}, \tag{12}$$

where $\sum_i \varpi_{ij} x_{ik}$ is called the weighted electoral mean for party j. Define

$$\mathbf{z}_{\text{el}} = \sum_i \varpi_{ij} x_{ik} \tag{13}$$

to be the matrix of weighted electoral means for each party j on each policy dimension $k = 1, \ldots, \omega$. The centripetal marginal electoral pull on party j is a vector pointing from the balance positions on all dimensions $\mathbf{z}_j^*$ towards the weighted electoral mean $\mathbf{z}_{\text{el}}$, which is the point where the electoral pull is zero. This vector is defined as

$$\frac{d\mathcal{E}_j^*}{dz_j}(\mathbf{z}_j^*) = \left[\mathbf{z}_{\text{el}} - \mathbf{z}_j^*\right]. \tag{14}$$

Reformulating the balance equation gives

$$\frac{d\mathcal{E}_j^*}{dz_j}(\mathbf{z}_j^*) + \frac{1}{2\beta_k} \frac{d\mu_j}{dz_j}(\mathbf{z}_j^*) = 0. \tag{15}$$

The term $\frac{d\mu_j}{d\mathbf{z}_j}$ is called the marginal activist pull and is a vector pointing towards the position where the activist valence is maximized. If the vector $\mathbf{z}^*$ of all parties' policy positions in the ω-dimensional policy space fulfills the balance equation, call $\mathbf{z}^*$ a balance solution.

Proof According to Eq. (4), the matrix of voting probabilities at position vector $\mathbf{z}$ is given by

$$\rho_{ij}(\mathbf{z}) = \left[1 - \sum_{l \neq j} \exp(f_l)\right]^{-1},$$

where

$$f_l = \lambda_j + \mu_j(\mathbf{z}_j) - \sum_{k=1}^{\omega} \beta_k (x_{ik} - z_{jk})^2 - \lambda_l - \mu_l(\mathbf{z}_l) + \sum_{k=1}^{\omega} \beta_k (x_{ik} - z_{lk})^2.$$

Thus

$$\frac{d\rho_{ij}}{dz_j} = 2\left\{[\ldots \beta_k(x_{ik} - z_{jk})\ldots] + \frac{d\mu_j}{dz_j}(z_j)\right\}[\rho_{ij} - \rho_{ij}^2]. \tag{16}$$

is a vector in $\mathbb{R}^\omega$.

The first order condition for $\mathbf{z}^*$ to be an LNE is given by

$$\frac{dV_j(\mathbf{z})}{dz_j} = \frac{1}{n}\sum_{i\in N}\frac{d\rho_{ij}}{dz_j} = 0. \tag{17}$$

So

$$\frac{dV_j(\mathbf{z})}{dz_j} = \frac{1}{n}\sum_{i\in N} 2\left\{[\ldots \beta_k(x_{ik} - z_{jk})\ldots] + \frac{d\mu_j}{dz_j}(z_j)\right\}[\rho_{ij} - \rho_{ij}^2] = 0 \tag{18}$$

or

$$\frac{1}{n}\sum_{i\in N} 2\left\{\beta_k[(x_i)] + \frac{d\mu_j}{dz_j}(z_j)\right\}[\rho_{ij} - \rho_{ij}^2] = \sum_{i\in N}[\rho_{ij} - \rho_{ij}^2]\beta_k z_j \tag{19}$$

$$\frac{1}{n}\sum_{i=1}\left\{\frac{1}{2\beta_k}\frac{d\mu_j}{dz_j}(z_j)\right\}[\rho_{ij} - \rho_{ij}^2]x_i = z_j\sum_{l=1}^{n}[\rho_{lj} - \rho_{lj}^2] \tag{20}$$

so

$$z_{jk}^* = \frac{1}{2\beta_k}\left[\frac{d\mu_{jk}}{dz_j}(z_j)\right] + \sum_{i=1}^{n}\varpi_{ij}x_{ik}, \tag{21}$$

where

$$[\varpi_{ij}] = \left[\frac{\rho_{ij} - \rho_{ij}^2}{\Sigma_{l=1}^{n}(\rho_{lj} - \rho_{lj}^2)}\right] \tag{22}$$

and $\frac{d\mu_{jk}}{dz_j}(z_j)$ is the ω-dimensional component of the gradient $\frac{d\mu_j}{dz_j}(z_j)$. □

With those equations at hand, it can be tested whether we would expect convergence of party positions towards the mean when assuming that activists do not influence parties' policies. If the conditions of the mean voter theorem are fulfilled, and we nevertheless observe divergent party positions, we interpret this as strong evidence for activists to exert a pull on parties' positions. In that case, the balance equation can be utilized to estimate the activists' position given that the empirical configuration is in equilibrium. Before analyzing the data, the next section gives an overview of the empirical case at hand, which is the German federal election in 2009.

3 The German Federal Election in 2009

The analysis is based on data from the pre-election cross-section survey of the German Longitudinal Election Study 2009.[2] In order to construct a policy space for the 2009 electoral campaign in which voters as well as parties can be placed on a common scale, perception as well as self-assessment questions are used from the survey. Such item batteries are available for three distinct but still not too specific issues. More precisely, voters were asked to place all of the five parties according to their standpoint concerning an issue, and afterwards they were asked to report their own standpoint regarding this issue. The three issues concern a trade-off between low taxes and more social benefits, and attitudes towards immigration[3] and nuclear energy.[4]

Since respondents may use different ways to handle and interpret the 11-point scale, using the reported perceptions to determine valid party positions might be problematic. Even more so, one could run into problems when using the reported self-placements to calculate comparable distances to party positions, considering that there may also be projection effects when placing the parties. Therefore, we apply a rescaling procedure developed by Aldrich and McKelvey (1977) to transform the original perception and self-placement data into a common policy space. The method rests on the assumption that the respondent does not report true values, but "an arbitrary linear transformation of his perception of the space" (Aldrich and McKelvey 1977, 113). Thus, the position z_j of each party is reported as $\hat{w}_{ij}$, where

$$\hat{w}_{ij} = c_i + v_i z_i . \tag{23}$$

c_i is the anchoring point each voter uses for her evaluation of positions on the scale and v_i is his/her personal transformation coefficient. Via a factor analytical transformation of the data, the true party positions z_j are extracted. The resulting c_i and v_i values are subsequently used to estimate the true ideal point y_i of the respondent by inserting the reported ideal point in the above equation. Thus, it is

$$\hat{y}_i = c_i + v_i x_i . \tag{24}$$

This allows to place the respondents as well as the parties within one perception space with a common metric.[5] Party positions are defined as the mean value of

[2] The data is available under the study number ZA 5300 at http://www.gesis.org/wahlen/gles/.

[3] The scale ranges from hampering to facilitating immigration.

[4] The scale ranges from immediate shut-down of all nuclear energy plants to further extension of nuclear energy in Germany.

[5] Respondents with negative transformation coefficients are excluded from the analysis, to ensure that there are only individuals that share a basic understanding of the issue in order to arrive at a meaningful policy space for all respondents.

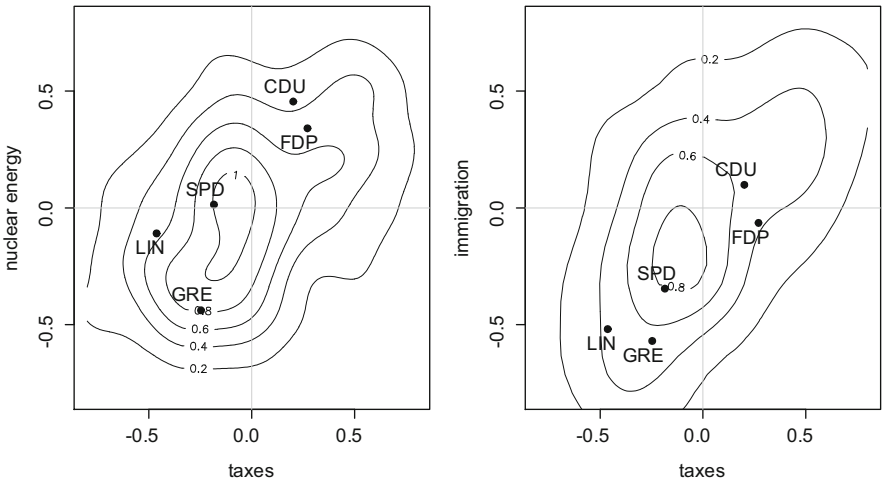

Fig. 1 Density of voter ideal points and perceived party positions in Germany 2009

the respondents' transformed perception values of a party's policy position on each issue dimension. An overview of party positions and voter ideal points is given in Fig. 1.

Concerning the tax issue, that constitutes the X-axes in both graphs, all parties are located in the expected order, with the left parties Linke, Greens, and SPD to the left of the electoral mean and the conservative CDU and liberal FDP to the right. Furthermore, the Greens are clearly perceived to be anti-nuclear energy, whereas the Conservatives and Liberals are correctly perceived to favor a further extension of nuclear energy.[6] Regarding the standpoints towards immigration, the order of the parties is also meaningful, with the leftist party Linke and the Greens having the most extreme positions, favoring simplification of immigration, the social democratic SPD taking a moderate position and the CDU and FDP holding the most rightist positions. However, it is remarkable that the most rightist position of the CDU is still only slightly north to the electoral mean. This indicates that there is a large part of the electorate favoring a stricter policy regarding immigration than is offered by any of the five parties. Overall, the density of voter ideal points is more widely spread concerning immigration than it is with regard to the tax or nuclear energy issue.

Table 1 reports the results of a conditional logit model, in which the dependent variable is the respondent's reported vote intention. Overall, the resulting vote shares based on the survey are 33.3 % for the CDU, 27.1 % for the SPD, 12.3 % for the FDP, 13.9 % for the Linke, and 13.4 % for the Greens, when considering only those

[6]The CDU only changed its standpoint regarding nuclear power plants after the Fukushima disaster in 2011.

Table 1 Results of conditional logit model of vote choice

	Coefficient	Std. error	p-value
Party constants			
CDU	1.04	0.10	0.00***
SPD	0.75	0.11	0.00***
Greens	0.26	0.12	0.04**
Linke	0.16	0.12	0.19
FDP	*base*		
Distances regarding			
Taxes	−2.35	0.29	0.00***
Immigration	−0.98	0.18	0.00***
Nuclear energy	−1.90	0.22	0.00***

$N = 1,154$; $R^2 = 0.08$; significance levels: **0.05; ***0.01

respondents that finally enter our analysis. The true vote shares that the parties actually received in the 2009 federal election are 33.8 % for the CDU, 23.0 % for the SPD, 14.6 % for the FDP, 11.9 % for the Linke, and 10.7 % for the Greens. Thus, the proportions are quite truthfully represented in our sample.

The party constants reflect the differences in vote probabilities that cannot be explained by the policy positions of parties and voters, and can thus be regarded as a measure of valence. Note that this does not imply anything about the way this valence has been generated, whether it is due to activists or whether it is exogenously defined. The FDP is the lowest valence party, and therefore is chosen as the reference for the estimation of the other parties' valences. The coefficient of the Linke is positive, but not significant. However, for reasons of simplicity, we refer to the FDP as the lowest valence party throughout the analysis.[7] As one would expect, the two major parties CDU and SPD have the highest valence among the electorate.

The distance parameters estimate the influence of the parties' and voters' policy positions on the vote decisions. We estimate distinct spatial parameters for each policy dimension. One could also summarize the distances on the three distinct policy dimensions into one measure and estimate a single spatial coefficient for all dimensions. However, that implies assuming that the policy space can be treated as a homogeneous space in which all dimensions have equal weight in the calculation of the vote decision. This is a too strong assumption for the empirical case at hand, as can be seen by the separately estimated coefficients that differ largely in size, with the parameter of the immigration policy dimension being the smallest in absolute size. The straightforward interpretation is that immigration policy is just not as important to the individual vote calculus as taxes and nuclear energy. However, it may also be the consequence of the skewed distribution of party positions on the immigration dimension as compared to the distribution of voter ideal points.

[7] The results of the Mean Voter Theorem conditions do not change when assuming the Linke instead of the FDP to be the lowest valence party.

Thus the small coefficient could also reflect the fact that even if respondents would want to base their vote decisions strongly on this issue, the distance to the next party might still be quite large as compared to the distances on the other two dimensions. Overall, however, the spatial parameters work well by adding significant explanatory power to the vote model.

Taking the coefficients from the conditional logit model, it can now be tested whether the mean voter theorem holds assuming that the activist influence is identically zero. According to the results of Table 1, it is $\lambda_F = 0$, $\lambda_L = 0.16$, $\lambda_G = 0.26$, $\lambda_S = 0.75$, and $\lambda_C = 1.04$. The vector of spatial coefficients[8] is given by

$$\boldsymbol{\beta} = \begin{pmatrix} \beta_{\text{tax}} & 0 & 0 \\ 0 & \beta_{\text{imm}} & 0 \\ 0 & 0 & \beta_{\text{n.e.}} \end{pmatrix} = \begin{pmatrix} 2.35 & 0 & 0 \\ 0 & 0.98 & 0 \\ 0 & 0 & 1.90 \end{pmatrix}.$$

The covariance matrix resulting from the data is

$$\nabla_0^* = \begin{array}{c} \\ \text{tax} \\ \text{imm} \\ \text{n.e.} \end{array} \begin{array}{c} \begin{array}{ccc} \text{tax} & \text{imm} & \text{n.e.} \end{array} \\ \begin{pmatrix} 0.20 & 0.09 & 0.05 \\ 0.09 & 0.27 & 0.06 \\ 0.05 & 0.06 & 0.13 \end{pmatrix} \end{array}.$$

The vote shares each party would receive when located at the electoral mean based on the vote model are $\rho_C = 0.337$, $\rho_S = 0.251$, $\rho_G = 0.154$, $\rho_L = 0.140$, and $\rho_F = 0.119$. Taking the lowest valence party FDP, we get the characteristic matrix

$$C_F = 2(1 - 2 \times 0.119) \times \begin{pmatrix} 2.35 & 0 & 0 \\ 0 & 0.98 & 0 \\ 0 & 0 & 1.90 \end{pmatrix} \times \begin{pmatrix} 0.20 & 0.09 & 0.05 \\ 0.09 & 0.27 & 0.06 \\ 0.05 & 0.06 & 0.13 \end{pmatrix}$$
$$\times \begin{pmatrix} 2.35 & 0 & 0 \\ 0 & 0.98 & 0 \\ 0 & 0 & 1.90 \end{pmatrix} - \begin{pmatrix} 2.35 & 0 & 0 \\ 0 & 0.98 & 0 \\ 0 & 0 & 1.90 \end{pmatrix} = \begin{pmatrix} -0.63 & 0.31 & 0.35 \\ 0.31 & -0.59 & 0.17 \\ 0.35 & 0.17 & -1.19 \end{pmatrix}$$

with $\text{trace}(C_F) = -2.41$. The convergence coefficient is given by

$$c(\lambda, \boldsymbol{\beta}) = \frac{2(1 - 2 \times 0.119) \times 1.85}{\frac{1}{3}(2.35 + 0.98 + 1.90)} = 1.62$$

[8]Note that we switch the sign of the spatial coefficients of the conditional logit model for the following calculations, since the negative sign is explicitly included in the utility function as defined in Eq. (1).

with the corresponding vector of eigenvalues $\upsilon = (-0.16 \ -0.88 \ -1.37)$. The mean voter valence theorem stated above requires for the joint electoral mean to be an LNE in the absence of activist influence that trace $(C_F) < 0$ and $c(\lambda, \boldsymbol{\beta}) < \omega$. The present data fulfill both conditions. Since they are only necessary conditions, further proof has to be given. This is done via a computer simulation applying an optimization algorithm for each party subsequently. Given a certain configuration of starting positions, one party after the other adapts its position within the policy space to a position where it maximizes its vote share given the present location of all other parties. The respective vote shares are calculated on basis of the empirically estimated parameters of the conditional logit model as shown in Table 1. When setting the initial positions to the electoral mean, no party moves away from that position. This proves that the joint mean is in fact an equilibrium configuration.

However, as can be seen in Fig. 1, the empirical pattern of party positions does not show convergence towards the mean. The major party CDU even takes the most extreme position concerning the nuclear energy and immigration issue. This could be evidence for activists influencing German party competition by generating additional valence for the parties depending on their policy positions. The next chapter therefore looks at the balance equation to shed light on the question where the activists are located and how strongly they influence the distinct parties on each of the three policy dimensions.

4 Estimating Activist Positions and Influence

Assuming that activist influence is not identically zero, the balance equation can be utilized to disentangle activist and electoral pulls in the 2009 German election. This implies that we assume the configuration of empirically perceived party positions to constitute an equilibrium configuration. Based on this assumption we can calculate the weighted electoral mean for each party separately on every policy dimension k using the vector of voter ideal points x_{ik} and multiplying it with the transformed voting probability α_{ij} as described in Definition 4. The resulting coordinates for each party are given by the matrix

$$\frac{d\mathcal{E}^*}{d\mathbf{z}} = \begin{array}{c} \\ C \\ S \\ G \\ L \\ F \end{array} \begin{array}{c} \begin{array}{ccc} \text{tax} & \text{imm.} & \text{n.e.} \end{array} \\ \begin{pmatrix} 0.05 & 0.05 & 0.07 \\ -0.05 & -0.05 & -0.02 \\ -0.09 & -0.13 & -0.12 \\ -0.12 & -0.11 & -0.07 \\ 0.10 & 0.06 & 0.08 \end{pmatrix} \end{array}.$$

The weighted electoral mean lies to the left of the joint electoral mean for the left parties Linke and Greens as well as for the Social Democrats, whereas the Conservatives' and Liberals' weighted electoral means lie to the right on every policy dimension. Inserting this result as well as the empirical perceived positions

$\mathbf{z}_j^*$ and the vector of spatial parameters $\boldsymbol{\beta}$ into Eq. (15) yields to the following coordinate matrix of activist positions for each party.

$$\frac{d\mu}{d\mathbf{z}} = \begin{array}{c} \\ C \\ S \\ G \\ L \\ F \end{array} \begin{array}{c} \begin{array}{ccc} \text{tax} & \text{imm.} & \text{n.e.} \end{array} \\ \begin{pmatrix} 0.70 & 0.20 & 0.77 \\ -0.27 & -1.38 & 0.14 \\ -0.73 & -1.69 & -0.62 \\ -0.67 & -1.92 & -0.14 \\ 0.64 & -0.24 & 1.24 \end{pmatrix} \end{array}.$$

The SPD activists are located more in favor of nuclear energy than its weighted electoral mean. Thus, the activists are still more extreme, but in the opposite direction than the average weighted social democratic electorate. A similar pattern is revealed for the FDP activist position regarding immigration. Again, the activists are more extreme than the average weighted electorate, but located on the opposite side of the joint electoral mean. This, however, does not contradict the intuition when considering that the means are relative measures.

Before we start to interpret the activist positions in more detail, we want to check whether the method we applied produces meaningful estimates. Up to this point, we did not make any assumptions about the identity of the activists nor about the concrete mechanism they use to influence policy. The reason for this is that we want to be as parsimonious as possible and approach the whole topic from a spatial modeller's perspective. However, at this point it seems reasonable to conduct a robustness check. Therefore we compare the estimated activist positions with positions of respondents that could be characterized as activists. This means that we now need to make assumptions about who those activists are. However, those assumptions only hold for the robustness check, and not for the original analysis. To stay as general and parsimonious as possible, we simply identify those respondents to be activists, who report, on the one hand, to be party identifiers, and who, on the other hand, report the highest category when subsequently asked for the strength of their party identification. Such strong party identifiers are most likely to engage in party politics and maybe even become a member of a party and try to influence the party's profile bottom up. However, there are plenty more possibilities how party activism may look like, but at this point we just want one reference point.

Figure 2 plots the mean positions of such activists for the tax issue for all five parties together with the empirical party positions and the activist positions as they are estimated based on our analysis. It can be seen that the mean positions of the strong party identifiers lie in between the party's and the estimated activist's position. For the SPD, the strong identifiers even hold more extreme policy preferences than the estimated activist ideal point. However, the number of cases is quite small, ranging from 8 for the FDP to 83 for the CDU. Therefore, those average ideal points are to be handled with care. Yet they indicate that the strong party identifiers hold more extreme ideal points than the average voter, and also more extreme than the policy position of the respective party. Thus, the general idea

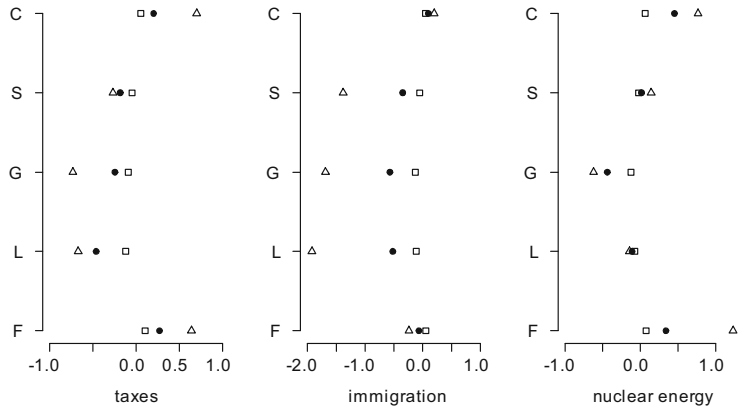

Fig. 2 Positions of parties *filled circle*, estimated activist positions *open triangle*, and position of strong party identifiers *open circle* regarding taxes

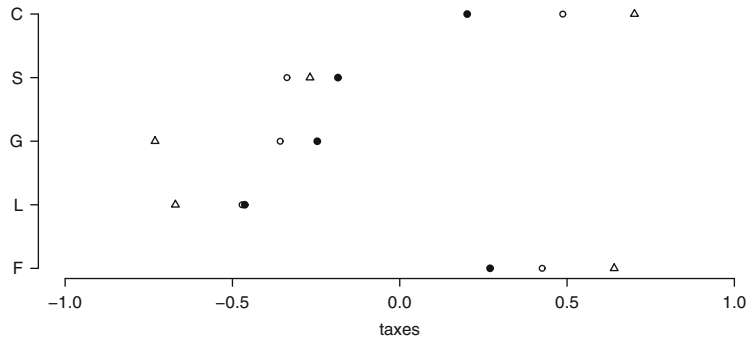

Fig. 3 Party positions *filled circle* between activist *open triangle* and electoral *open square* pull

that there are party activists that try to pull the party toward their own ideal point is supported by Fig. 2 and it can be seen that the estimated activist positions are not too far off.

Going back to the results of our analyses, Fig. 3 gives an overview of the pattern of party and activist positions by plotting the perceived party positions in between the electoral and activist pull. The graph shows that the CDU activists call for a far more rightist position on the tax dimension, but the balanced position lies closely to the more moderate weighted electoral mean. Thus, concerning the economic dimension, the activist effect is rather small for the Conservatives and is easily overruled by the electoral effect. Concerning the immigration issue, there seems to be broad agreement between activists and electorate, thus the Conservative's position is clearly defined. When it comes to nuclear energy, however, the Conservatives again have to balance two quite distinct positions where this time the activist effect predominates by pulling the party position more towards the activists' bliss

point. Since energy policy and environmental issues is not a very prominent and identifying topic for the CDU, it can be argued that it is plausible to count more on activist valence with regard to this dimension, since the Conservative's voters may base their decision rather on the other two policy dimensions.

The Social Democrats do not face strong pulls from either side concerning the tax and nuclear energy dimension. Regarding the immigration issue, the activists seem to be located far off on the extreme left side of the scale. This pulls the position to the left of the weighted electoral mean, although the effect is not very strong. We observe similar constellations on this dimension regarding the other two left parties Linke and Greens. This strengthens the assumption that the result could be due to the skewed pattern of party locations in relation to the distribution of voter ideal points and the resulting low spatial coefficient on this dimension. Therefore, the patterns of activist positions with regard to immigration policy are to be handled with caution and we disclaim from drawing more specific conclusions on this dimension.

Regarding the smaller left party the Greens, the pattern follows a different logic than that of the major SPD and CDU. Unlike them, the Greens are far more influenced by activists regarding their very identifying core topic of nuclear energy. Here, the distance to the weighted electoral mean is larger than that to the activist position, indicating a larger benefit from activist valence than from diminishing the policy distance towards a larger part of the electorate. This may reflect the general difference between the major catch all parties and the minor parties, targeting on more extreme voters from the beginning. At the same time, they still try to appeal to the electoral mean on the other dimensions of tax and immigration. This strengthens the argument, by indicating that the Greens count on their core clientele with regard to nuclear energy. Since the voters' ideal points on the nuclear energy dimension are not highly correlated with their ideal points regarding tax or immigration policy, the Greens rather take a position close to the weighted electoral mean on those two dimensions in order to appeal to as many anti-nuclear energy voters as possible.

A similar pattern can be found for the leftist party Linke, who is also located closer to the extreme activist position on the tax dimension, which is a fundamental issue of their historical background and today's identity as a party. Concerning the other two policy dimensions, immigration and nuclear energy, the activist effect is minor and they are located close to the weighted electoral mean.

Concerning the liberal party FDP the pattern is not as clear as for the left parties. From the viewpoint of this analysis they cannot be easily defined as being a niche party as the other two small parties, because their political identity is not that exclusively related to one of the three issue dimensions. The most discussed topic in their 2009 campaign, however, was tax reduction. Based on the pattern that we detected for the other small parties, we would thus expect the FDP to balance the two opposing pulls more in favor of its activists on the tax dimension. However, this is not what we observe in Fig. 2. The electoral effect is much stronger, resulting in a very moderate policy position close to the weighted electoral mean and quite distant from the activists' ideal point. Furthermore, one would generally expect a liberal party to promote a liberal domestic and labor market policy, which would lead to the prediction of a left position regarding immigration, favoring a simplification of

immigration to ensure a flexible labor market. Yet, the FDP's activists are located very moderately, only slightly to the left of the joint mean, whereas the weighted electoral mean lies even to the right of the joint mean. The party position lies closely in between. Generally, the FDP is located very moderately on all dimensions and its standpoint is closer to the weighted electoral mean than to the activists ideal point on all issues, making it the most central party in the three-dimensional policy space. Only on the tax dimension they propose a slightly more right policy position than the Conservatives.

It could be the special circumstances of the 2009 election that led the Liberals to pursue those unusually moderate policy positions. The Liberals aimed at replacing the Social Democrats in the current grand coalition. This would be their only chance of participating in the government, and at the same time it was common knowledge that the voters were quite happy with the current government. Since a continuation of the grand coalition was a credible threat, it could have been a risky strategy for the Liberals to take positions clearly to the right of the Conservatives. It seems plausible that they did not want to end up in a situation like that of the 2005 election, where the vote shares of CDU and FDP did not suffice to form a coalition together. Thus, this time the Liberals tried to appeal to the moderate voters to ensure their place in government. This implies not to let the extreme activists pull the position too far to the extremes.

In the end, one could argue, the strategy payed off since the FDP got over 10 % of the votes and could replace the SPD as coalition partner of the CDU. At the same time, however, a discussion about the liberal party forgetting its ideological foundation and liberal principles started. In the following election of 2013 the vote share of the FDP did not even suffice to pass the 5 %-threshold and enter parliament. Referring to the above detected pattern of extreme positions on the core dimensions of small parties, one is tempted to interpret this downfall as the prize for a small party abandoning its defining and distinctive positioning. However, this explanation is insufficient as it ignores the complex influence of strategic voting in German coalition systems. A discussion of the effects of strategic voting and vote splitting goes far beyond the scope of this article. However, the results open up new angles for the discussion the FDP's recent failure.

5 Conclusion

This paper applied Schofield's valence model and balance solution to data of the 2009 federal election of Germany in order to detect activist influences in the German party system from a formal modeling viewpoint. We constructed a three-dimensional policy space and used different spatial coefficients for the distinct dimensions with the goal of achieving precise predictions on rather concrete policy dimensions. It turns out that the joint electoral mean constitutes a LNE for all parties if we assume that the activist influence on parties' valences is identically zero. However, the empirical pattern of perceived party positions tells a different story,

with all five parties taking clearly distinct and diverging positions within the three-dimensional policy space.

Therefore, we reject the assumption of zero activist valence and calculate the balance condition resting on the assumption that the empirical pattern is an equilibrium configuration. This yields to the revelation of activist positions on each dimension for all parties. We see that activists always take rather extreme positions on all dimensions, although we refrain from drawing too specific conclusions from the immigration dimension due to peculiar party behavior. Generally, we observe two different patterns of activist and party locations for major and smaller parties. Major parties locate very close to the weighted electoral mean on dimensions on which they put much emphasis, e.g. taxes vs. social benefits. However, on dimensions that do not play a major role in their party identity, activists seem to be more successful in pulling the party towards their ideal point, as observed with the CDU regarding the nuclear energy dimension.

Small parties, on the other side, pursue the opposite logic. They are heavily influenced by activists' extreme positions on their core topics, such as nuclear energy for the Greens or social benefits vs. taxes for the Linke. On dimensions that are less important to their ideology, however, the electoral effect is stronger, placing the party more towards the electoral mean. Thus, the small parties appeal to a larger electorate on issues that they do not put as much emphasis on as voters may do.

The liberal party FDP constitutes a special case in the analysis, since it does not clearly follow that pattern. This may be due to several reasons, e.g. its experience from the previous election that might have led it to pursue a different strategy by trying to appeal to more moderate voters than before. It seems that it was quite successful with that strategy, considering the large vote share it got. However, there are also strategic considerations of those voters who wanted to end the grand coalition, who would trade their CDU vote to the FDP, increasing the odds for their favored coalition. Thus, we do not want to jump to a conclusion on the basis of those results alone, especially not against the background of the disastrous defeat of the FDP in the most recent election of 2013.

The aim of this paper was rather to analyze activist influence on German parties, and one conclusion we can generally draw from this analysis is that activists do influence party positions. Furthermore we can conclude that activists may only achieve to influence major parties' positions on less important issues, whereas small niche parties are more likely to be influenced by activists on their core issue dimensions. Thus, although activist influence may not be that obviously exercised and measurable as in the American political system, it still finds a more subtle way to influence German parties by manipulating their valences. The identification of those activist groups as well as the concrete mechanism by which they influence parties' valences remains an open question. This analysis can merely constitute a starting point for more research on activist influence within the German party system.

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Application of the Variable Choice Logit Model to the British General Election of 2010

Elena Labzina and Norman Schofield

In most democratic countries the same sets of parties run for the elections in all national constituencies. This is the main reason why the setup of a single domain of the votes' alternatives may be justified. This is exactly the case of the canonical version of the formal stochastic vote model (Schofield and Sened 2006; Schofield 2005, 2007), where the multinomial logistic approach (MNL) is applied to the spatial multi-dimensional ideological framework. However, not in all countries every party competes in all constituencies. By definition, therefore, the necessary assumption of the irrelevant alternatives (IIA) (e.g., Austen-Smith and Banks 2000) may not be claimed. Hence, MNL may not be used any more. Among developed countries, the most straightforward instances requiring an adjustment for MNL are Canada and UK. In Canada, *Bloc Quebecois* runs for the elections only in Quebec (for more details, see McAlister et al. 2013), while in the UK, the influential *Scottish National Party* competes only in Scotland, and *Plaid Cymru*—in Wales.[1] The case of UK is considered in this chapter. A study of Scotland is particularly relevant because of the referendum on Scottish independence in September, 2014. The method deployed here is also relevant in many countries in Europe where there are regional parties, including Spain, Belgium, and Italy.

Fortunately, a theoretical solution for the problem of the violation of the IIA has been already proposed. In his paper, Yamamoto (2011) describes a modification of the logistic MNL model to serve this purpose, called the varying choice logit (VCL) model. Also, he provides an actual example of its application to the elections

[1]Northern Ireland has completely its own parties and is excluded from this analysis.

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in Japan. The idea of this adjustment is to estimate the categorical probabilities based only on those alternatives from which an individual could actually choose. For completeness, the probabilities of unfeasible options are explicitly set to zero. This approach naturally splits the voting sample based on their available choice sets of parties.

In contrast to Yamamoto, who programs the maximum likelihood method explicitly, this paper takes the Bayesian tools provided by the R package *rjags*, applying the Metropolis algorithm (e.g., Gelman et al. 2014) to the data on the British General Elections of 2010. Indeed, as Gallego et al. (2014) note, a natural solution to the problem with the random effects is the hierarchical Bayesian model. Despite being heavy "computationally," it provides a useful means to control for the unobserved randomness. Especially, given that as the technologies develop the time costs decrease, however, still being higher than those of the "direct" estimation.

Methodologically, this work can be considered a more complex continuation of McAlister et al. (2013). In that paper, the authors look at Canada, where in Quebec an additional influential party (Bloc Quebecois) runs for the elections. Meanwhile, in Britain both Wales and Scotland have their own specific parties that collected a significant share of votes in those regions during the General Elections of 2010. The Scottish National Party (SNP) gained 19.9 % in Scotland, being the second after the Labour Party, which gave it about 2.6 % of the total national vote. Compared to that, the share of Playd Cymru (PC) in Wales does not look impressive: only 0.6 at the national level—some other small parties managed to get even more—however, in Wales PC got 11.14 %, which clearly suggests the violation of IIA.

Substantively, our paper is the next step after Schofield et al. (2011), where the British General Elections of 2005 and 2010 are analyzed separately for England, Wales, and Scotland. Their results for 2010 show an unexpected insignificance of the valence of the Labour Party, which is easily explained, given the results of this work. The valence on the national level becomes significant (still very small), when the structure of the bundle of the parties in Scotland, where the Labour Party had a tremendous support of 42 % in 2010, is properly accounted for in the analysis. This satisfies the expected assumption that the Scottish electorate influenced the electoral strategy of the Labour party during the General Elections of 2010.

First, the paper makes an overview of the extended formal model (Yamamoto 2011) with the focus on the particular case of the UK. Second, the model is applied to the data from the British Election Study (2010). Third, the results of the substantive priors, the newly obtained estimates, and the counterfactuals for the valences of the parties are compared briefly. Lastly, the assessment of the convergence of the party positions is performed according to the specification presented in detail in McAlister et al. (2013).

This work introduces a pure spatial electoral model with regional additions to the valences. Some of the findings to be presented are:

1. the VCL model reveals that the counterfactual model underestimates the spatial effect;
2. the valence of the Labour party is very close to zero;

3. the proper inclusion of Scotland decreases significantly the estimated valence of the Conservative Party.

Furthermore, the paper proposes an approach that can be easily extended in the further research on UK or applied to other countries, where IIA is not met.

1 Formal Model in the Application to the UK

This is a modification of the canonical Schofield's analysis (e.g., Schofield and Sened 2006) for the specific case with the varying individual choice sets of the parties. As it was already mentioned before, because of the violation of IIA, the application of the usual multinomial logistic regression is impossible.

In UK, three major parties—the Conservative, Labour and Liberal Democrats—gained 88.2 % of the votes in the General Elections of 2010. The rest of the votes were split among minor parties (at the national scale), which could have been neglected in the following analysis if all voters had the same alternatives in their electoral choice bundles. Our major interest is, first, the investigation of the party valences, and, second, the convergence of the positions, especially those of the major parties. The challenge emerges from those two parties that each ran for the elections only in one specific region: the Scottish National Party in Scotland and Playd Cymru in Wales. In simple words, because of this we cannot assume that an individual in Wales did not vote for SNP, simply because he did not want, since he did not have such an option at all. Important to note that the implicit assumption made is the similarity of all voters across the regions, except for the sets of the voting alternatives.

In the further analysis, we assume that the full set of parties consists of the five parties labeled with the numbers from 1 to 5: Labour (1), Conservative (2), Liberal Democrats (3), SNP (4) and Plaid Cymru (5). Then, denoting the region of individual i[2] as r(i) and the utility i obtains from voting for party j as $u_{i,j}$. If x_i is the political position of the individual and z_j is the position of j party, three possible sets of the utilities exist in the analysis:

$$r(i) = 1 \implies \bar{u}_{i\,r(i)} = \{1, 2, 3\} \implies u_i(x_i, z | r(i) = 1) = \{u_{i\,1}, u_{i\,2}, u_{i\,3}\}$$
$$r(i) = 2 \implies \bar{u}_{i\,r(i)} = \{1, 2, 3, 4\} \implies u_i(x_i, z | r(i)) = 2) = \{u_{i\,1}, u_{i\,2}, u_{i\,3}, u_{i\,4}\}$$
$$r(i) = 3 \implies \bar{u}_{i\,r(i)} = \{1, 2, 3, 5\} \implies u_i(x_i, z | r(i) = 3) = \{u_{i\,1}, u_{i\,2}, u_{i\,3}, u_{i\,5}\}$$

In words, it means that given the region of an individual his or her personal utility is modeled only for the parties for which this person could vote. Particularly, In

[2] 1 for England, 2 for Scotland, 3 for Wales.

England (1), only three major parties (1–3) competed at the elections. Meanwhile, in Scotland (2) and Wales (3) SNP (4) and PC (5) ran, respectively, as well.

The Bayesian approach enables to include extra random intercepts to capture the regional variation of the valences for the three major parties (μ_{ij}, $i = 1, 2$, $j = 2, 3$). Here, England is assumed as the base region and the Liberal Democrats—as the base party. We do not include regional valences for SNP and PC in the model, since they ran only in one region.

Therefore, the general form of the most straightforward version of the individual utility function (e.g., Schofield and Sened 2006):

$$u(x_i, z_j) = \lambda_j - \beta||x_i - z_j|| + \mu_{jr(i)} + \epsilon_i \tag{1}$$

Here, λ_j is the valence of party j, which is the intercept specific for party j, and β is the common (for all parties) spatial coefficient, representing the personal sensitivity to the ideological deviation of the party from the individual "bliss" point. Hence, x_i is the individual ideological position, while z_j is the ideological position of party j. $\mu_{jr(i)}$ is the regional addition to the valence specific for region r(i)'s support for party j, which is the region of the individual.

Assuming that only for some combinations of j and r(i) the regional-party valences are significantly different from zero, e.g. $E(\mu_{jr(i)}) \neq 0$, the aggregated *mixed valence* of party j, with the control for the number of the individuals from each region, may be defined as:

$$\lambda'_j = \lambda_j + \frac{1}{n} \sum_{r(i):E(\mu_{jr})\neq 0} n_r \mu_{jr} \tag{2}$$

This is an innovation in relation to the canonical definition of valences. This definition takes into account the distribution of the potential electorate of a party across the regional units. For instance, given the equal size of the regional subsamples, the second component on the right hand becomes an average of the regional valences. Meanwhile, in the case with a base party k, its regional effect is set to 0.

Based on the definition above, now we can define the *mixed valences* for the five parties of interest as:

$$\lambda'_1 = \lambda_1 + \frac{1}{n}(\mu_{12} n_2 + \mu_{13} n_3)$$

$$\lambda'_2 = \lambda_2 + \frac{1}{n}(\mu_{22} n_2 + \mu_{23} n_3)$$

$$\lambda'_3 = 0$$

$$\lambda'_4 = \lambda_4$$

$$\lambda'_4 = \lambda_5$$

Finally, a conservative[3] way to estimate the standard error of the mixed valence is proposed:

$$\mathrm{sd}(\lambda'_j) = \sqrt{\mathrm{Var}(\lambda_j) + \frac{1}{n^2} \sum_{r(i):E(\mu_{jr})\neq 0} n_r^2 \mathrm{Var}(\mu_{jr})} \tag{3}$$

1.1 Predicted Vote Shares

Another important point is the approach to predict the sample probabilities, if one wants to compare the sample and the model in terms of the predicted votes. To remind, in this canonical setting the predicted probability (and the share of votes) is $\hat{p}_j = \sum \widehat{p_{ij}}/n$, where $\widehat{p_{ij}}$ is the individual prediction for the probability of the vote for party j.

Meanwhile, in the VCL model, in which the estimated individual probability is $p_{ij} = \frac{e^{u_{ij}}}{\sum_{k\in m(i)} e^{u^{ik}}}$, where $m(i)$ is the set of parties from which i chooses, the prediction of the votes for j in the region of i, $r(i)$, is

$$\widehat{p_{jr}} = \frac{\sum_{i\in r} p_{ij}}{n_r}$$

Hence, the total probabilities are:

$$\widehat{p_j} = \frac{1}{n} \sum_{r\in m(i)} n_r \, \widehat{p_{jr}}$$

Here, n_r is the number of the observations for region r, and n is the total size of the sample. It is easy to be that n_j's sum up to one.

In a way, these probabilities, considering the full set of five parties, are tentative. No individual in the sample chooses from all of them. However, these probabilities can be understood as a general characteristic of the each party, the expected vote share, that incorporates two probabilities: the weight or "the probability" of the region and, given the region, the probability to vote the party. To generalize:

$$p_j = \int p(j|r)\, p(r) dr$$

[3] Assuming no correlation between the terms, which most probably leads to the overestimation of the magnitude, and requires refinement in the further work on this topic.

The conservative estimates (assuming the zero correlation of the probabilities across the regions) of the standard errors for the probabilities on the national level:

$$\mathrm{sd}_{p_j} = \sqrt{\mathrm{Var}(p_j)} = \sqrt{\frac{1}{n^2}\sum_{r\in m(i)} n_r^2 \mathrm{Var}(p_{jr})}$$

1.2 Convergence at the Critical Point

As McAlister et al. (2013) have shown in their paper,[4] the combination of the party positions, $z = (z_1, \ldots, z_k)$, is the critical point in the model if:

$$\frac{\partial V_j(z)}{\partial dz_j} = \frac{2\beta}{N_j}\sum_{t=1}^{w}\sum_{i=1}^{n}(x_{it} - z_{jt})\rho_{ij}(1-\rho_{ij}) = 0$$

Here $V_j(z)$ is the votes maximized by party j and w is the number of the ideological dimensions.

Then, a critical point is a Local Nash Equilibrium (LNE), or, in simple words, a set of positions from which each party has no rational grounds to deviate, given the proximate radius, the following conditions must be satisfied:

1. All eigenvalues for the matrices of the second derivatives (the Hessian) with respect to z must be negative.

The Hessian for the varying choice sets and the two-dimensional policy space[5]:

$$H_{j1}(z_j^*) = \begin{pmatrix} \frac{2\beta}{n'}\sum_{i=1}^{n'} p_{ij}(1-p_{ij})(2\beta(x_{i1}-z_{j1})^2(1-2p_{ij})-1) \\ \frac{4\beta^2}{n'}\sum_{i=1}^{n'}(x_{i2}-z_{j2})(x_{i1}-z_{j1})p_{ij}(1-p_{ij})(1-2p_{ij}) \end{pmatrix} \quad (4)$$

$$H_{j2}(z_j^*) = \begin{pmatrix} \frac{4\beta^2}{n'}\sum_{i=1}^{n'}(x_{i2}-z_{j2})(x_{i1}-z_{j1})p_{ij}(1-p_{ij})(1-2p_{ij}) \\ \frac{2\beta}{n'}\sum_{i=1}^{n'} p_{ij}(1-p_{ij})(2\beta(x_{i2}-z_{j2})^2(1-2p_{ij})-1) \end{pmatrix}$$

[4] To see more mathematical details on the derivation of the first and second other conditions for V_z, see McAlister et al. 2013, pp. 6–15.

[5] Based on McAlister et al. (2013), pp 13–14.

Important to note, $n^{'}$ is not the total number of the observations in the sample, but the number of the individuals having party j in their choice bundle, since a party is expected to maximize only across those who can vote for it. Hence, for our case $n^{'}_{\text{LAB}} = n^{'}_{\text{CON}} = n^{'}_{\text{LAB}} = n_1 + n_2 + n_3 = n$, $n^{'}_{\text{SNP}} = n_2$ and $n^{'}_{\text{PC}} = n_3$.

2. The convergence coefficient of the electoral system, which is the largest convergence coefficient among the parties, must be less than 1 with respect to each policy dimension.

Therefore, in the two-dimensional case, the convergence coefficient for each party:

$$c_j(z) = c_j^1(z) + c_j^2(z) = \frac{2\beta}{n^{'}} \sum_{i=1}^{n^{'}} p_{ij}(1 - 2\,p_{ij})(x_{i1} - z_{j1})^2 + \frac{2\beta}{n^{'}} \sum_{i=1}^{n^{'}} p_{ij}(1 - 2\,p_{ij})(x_{i2} - z_{j2})^2 \tag{5}$$

$c_j^1(z)$ and $c_j^2(z)$ are the components related to each dimension of the policy.

Then, for party j:

- If $c_j(z) > 2$, then there is no convergence.
- If $c_j(z) < 2$, $c_j^1(z) < 1$ and $c_j^2(z) < 1$, then the system converges.

The convergence coefficient for the whole electoral system:

$$c(z) = max(\{c_j(z)\}) \tag{6}$$

If conditions 1 and 2 are satisfied, then each party has no incentives to deviate, given that other parties do not deviate. Formally, this means that z is a Local Nash Equilibrium for the electoral system

On the next, computational stage of the analysis, various modifications of the Eq. (1) were tried. Based on the parsimonious grounds, the final model assumes non-zero $\mu_{jr(i)}$'s for $(j, r(i)) = \{(1,2), (2,2), (1,3), (2,3)\}$ only (while j = 3, Liberal Democrats, is the reference party).

2 The British General Elections in 2010

2.1 Variables of the Analysis

This paper uses the data from British Election Study 2009–2010. The individuals from Northern Ireland were excluded from the survey. Anywhere, further in the text Great Britain refers to England, Wales, and England.

The variables of the analysis are:

1. Dependent variable: *the party voted* may take the following values:
   - Labour
   - Conservatives
   - Liberal Democrats
   - Scottish National Party
   - Plaid Cymru
2. Independent variables: *Survey questions used to construct the individual scores of the ideological dimensions of nationalism (anti-EU) and economy (anti-taxes)*.[6]
3. Control variable: *the region of the respondent:*
   - England
   - Scotland
   - Wales

The intent was to keep as many observations as possible. Hence, only those observations that had explicit 'Don't know' in the independent questions were dropped. Control and dependent variables had no missing values. These missing independent variables were assumed *missing at random*(MAR). To fill in the missing values the R package MICE (Multivariate Imputation by Chained Equations) was used. [7]

2.2 Sample and Electoral Statistics

Tables 1 and 2 present the comparison of the electoral results for the General Elections of 2010 in UK. Seemingly, among the parties of our interest Liberal Democrats and SNP are overrepresented in the sample, while the Conservatives and, especially, PC are underrepresented. This is the feature of the raw sample and, for example, Schofield et al. (2011), who used the same survey, have very similar summary statistics.

[6]For more details on the questions see the Appendix of Schofield et al. (2011). This paper employs the exact same set of the questions.

[7]This can be done with the sequential application of the *mice()* and *impute()* functions.

Table 1 2010 election in great Britain

	Population			Sample[a]	
Party	Vote %	Seats	Seat %	Observations	Observations %
Conservative	36.1	306	47.1	3,097	35.43
Labour	29.0	258	39.7	2,350	26.89
Liberal democrats	23.0	57	8.8	2,384	27.28
Scottish National Party	1.7	6	0.9	210	2.40
Plaid Cymru	0.6	3	0.9	43	0.49
Others	9.6	20	2.6	656	7.51
Total	100	650	100	8,740	100

[a]Based on 2010 British Election Survey campaign Internet panel data

Table 2 2010 election in great Britain by region: voting

	All			Scotland			Wales		
Party[a]	El[c](%)	Obs[b]	Obs (%)	El(%)	Obs	Obs (%)	El(%)	Obs	Obs (%)
Con	36.1	3,097	38.31	16.7	134	16.75	26.1	110	28.50
Lab	29.0	2,350	29.07	42.0	283	35.38	36.2	137	35.49
LibDem	23.0	2,384	29.49	18.9	173	21.63	20.1	96	24.87
SNP	1.7	210	2.60	19.9	210	26.25	–	–	–
PC	0.6	43	0.56	–	–	–	11.3	43	11.14
Total	90.4	8,084	100	97.5	777	100	93.7	370	100

[a]Only major parties and region-specific parties: Con: Conservative Party; Lab: Labor Party; LibDem: Liberal Democrat Party; SNP: Scottish National Party; PC: Plaid Cymru
[b]Sample based on BES 2010 containing only observations of those voted for the five parties
[c]Elections

2.3 Component Factor Analysis: Ideological Positions

In the original dataset the ideology of the respondents is represented with 8 related questions. Meanwhile, the core independent variables in our spatial model are two ideological coordinates, the axis representing the attitudes towards *nationalism* and *economy*. Hence, we need "to shrink" the number of dimensions from 8 to 2, and component factor analysis (CFA) is the method to apply in this situation. As Gill writes, its "*basic idea to linear transform a dataset into smaller dimension dataset with the property that each of the transformed variables is uncorrelated*" (Gill undefined).

This procedure is done with the R function *factanal* that performs maximum likelihood factor analysis. To minimize the interaction of the dimensions, the basis is set to be orthogonal, hence the *varimax* rotation is used in the computation (e.g., Abdi 2003).

Table 3 presents the results of our CFA analysis.

Table 3 2010 factor analysis

	Nationalism	Economy
1. EU membership	0.894	
2. EU cooperation	0.845	0.174
3. Nuclear plan	0.281	0.395
4. Tax-spend	−0.325	−0.388
5. Tax exemption		0.373
6. Mansion tax	0.118	0.632
7. Tax relief		0.294
8. Ecotax	0.266	0.392
n	8,084	
% Variance	0.223	0.140
Cumulative % variance	0.223	0.363

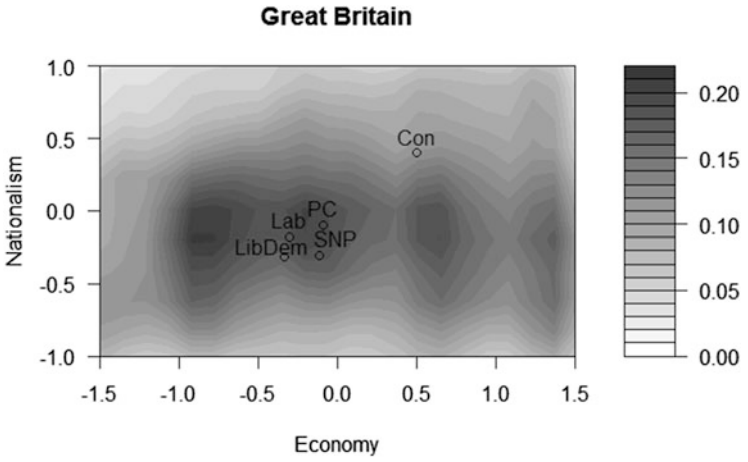

Fig. 1 Density plot of the ideological dimensions: great Britain 2010

The correlation matrix for Great Britain in 2010 is:

$$\nabla_0 = \begin{bmatrix} & \text{nat} & \text{econ} \\ \text{nat} & 0.867 & 0.066 \\ \text{econ} & 0.066 & 0.592 \end{bmatrix}.$$

Important to note that the ideological scores are weakly correlated: 0.066. Interestingly, the ideological preferences along the dimension of the nationalism are more spread out.

The pattern of the spatial distributions shows that in contrast to the dimension of the nationalism, according to which the individuals are symmetrically distributed around the origin, the economic dimension provides three clear "tops," one of which is located around the origin, while two others lie on each side of the origin in about 0.7 points (Fig. 1). If we look at the same plot for the case of England (Fig. 2),

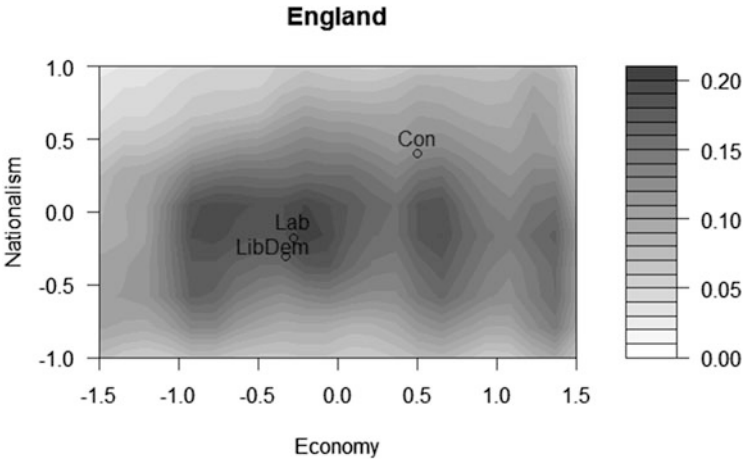

Fig. 2 Density plot of the ideological dimensions: England

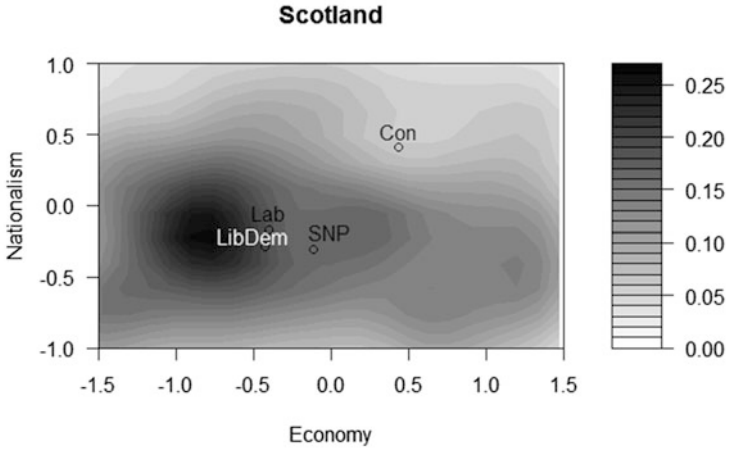

Fig. 3 Density plot of the ideological dimensions: Scotland

we observe a very similar picture. Meanwhile, Scotland (Fig. 3) provides only one extreme point, corresponding to one of those from the aggregated plot. In Wales (Fig. 4), two extreme points present. Interestingly, in this case no dense area exists proximate to the origin. Meanwhile, the "left" concentration "top" is practically the same as that unique one in Scotland.

The ideological individual averages grouped by the party voted:

$$z^* = \begin{pmatrix} & \text{Lib} & \text{Con} & \text{LibDem} & \text{SNP} & \text{PC} \\ \text{nat} & -0.31 & 0.50 & -0.34 & -0.11 & -0.09 \\ \text{econ} & -0.18 & 0.40 & -0.31 & -0.31 & -0.10 \end{pmatrix}$$

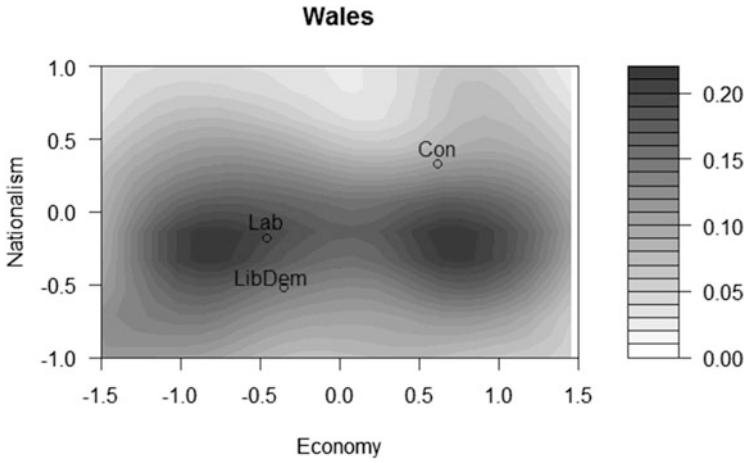

Fig. 4 Density plot of the ideological dimensions: Wales

These results provide the evidence that *the Conservatives* is the only party positive in terms of their ideological coordinates. Meaning, they are more anti-EU and more anti-tax than the average across the population. This observation may be, probably, at least, a partial explanation of their success at the General Elections of 2010. Furthermore, the supporters of *the Conservatives* are the most extreme in terms of the magnitude. Among the pro-EU and pro-tax supporters, *the Liberal Democrats* are the most extreme. The supporters of *Plaid Cymru* are the least extreme.

2.4 Spatial Model

The canonical model[8] modified to include the assumption of the varying party bundles can be specified as:

$$u(x_i, z_j) = \lambda_j - \beta||x_i - z_j|| + \mu_{jr(i)} + \epsilon_i \tag{7}$$

Here, for individual i the utility is assumed to be defined only for those parties for which he or she can actually vote. The major innovation is the regional valence, $\mu_{jr(i)}$. Since significantly more observations come from England than from Scotland and Wales, 6,898 of 8,084, England is set to be the "base" region in the model. Consequently, in terms of the coefficients, the assumption is $\mu_{jr(i)} \neq 0$ only

[8]See, for example, Schofield and Sened (2006).

if $(j, r(i)) \in \{(1,2)(2,2)(1,3)(2,3)\}$, while $\mu_{jr(i)} = 0$ for the rest, where j $\in$ {1,2,3,4,5} $\equiv$ {*Labour*, *Conservatives*, *LibDem*, Scottish National Party, Plaid Cymru}) and r(i) $\in$ (1, 2, 3) $\equiv$ {*England*, *Scotland*, *Wales*}.

2.4.1 Non-informative or "Substantive" Priors?

The Bayesian approach requires specification of the prior distribution for the coefficients. For the model introduced above (7) this means setting priors to 12 random variables: one for each coefficient and three more to specify their dispersion (see Table 4). Given a large number of iterations, the role of the prior distributions is not very important, since the posterior distribution with the increase of the number of iterations converges to the true distribution.

First, for simplicity, each coefficient is assumed to be distributed normally with the dispersion having with the inverse-gamma distribution with the parameters 0.1 and 0.1. The only question left: what is the best way to specify the means for the normal distribution of the coefficients? Is there any difference if the posterior distribution, in any case, must converge eventually to the true distribution?

As it is going to be shown soon, in terms of the final estimates, small differences in the "starting" means do not affect the results. However, it is still interesting to compare the results given that some prior information is used or not.

What are the informative, "substantive," priors for the means? Why can they be of interest? Let's imagine the situation in which researchers cannot apply this relatively complicated VCL approach. Meanwhile, they may not want to violate IIA explicitly. Then the best predictor for the valence of a party is the estimate from MNL, that was run for the largest region in which this party runs. This is very similar to the approach proposed by Yamamoto (2011) for choosing the starting points for ML to estimate VCL.

In case of this paper, we get the informative prior estimates for the Labour and the Conservatives from MNL run for England; for SNP for Scotland, and for PC for Wales. The ordered means for the prior distributions of the valences are:

$$\lambda^{\text{prior}} = (\lambda^{\text{prior}}_{\text{PC}}, \lambda^{\text{prior}}_{\text{Lab}}, \lambda^{\text{prior}}_{\text{LibDem}}, \lambda^{\text{prior}}_{\text{SNP}}, \lambda^{\text{prior}}_{\text{Con}}) = (-0.827, -0.099, 0, 0.233, 0.276) \tag{8}$$

Table 4 Prior distributions of the coefficients

	Non-informative	Informative
β	$N(0, 1/\tau_1)$	$N(0, 1/\tau_1)$
λ_1	$N(0, 1/\tau_2)$	$N(-0.099, 1/\tau_2)$
λ_2	$N(0, 1/\tau_2)$	$N(0.276, 1/\tau_2)$
λ_4	$N(0, 1/\tau_2)$	$N(0.233, 1/\tau_2)$
λ_5	$N(0, 1/\tau_2)$	$N(-0.827, 1/\tau_2)$
λ_{21} λ_{21} λ_{31} λ_{32}	$N(0, 1/\tau_3)$	$N(0, 1/\tau_3)$

*$\tau_i \sim$ Gamma(0.1, 0.1)

Interestingly, it turned out that based on the prior estimates Plaid Cymru is the least attractive party, and the Conservatives, expectedly, is the most attractive.

Table 4 shows the specification for two sets of priors. As it can be seen, the distinction between them is the means for $\lambda_1, \lambda_2, \lambda_4, \lambda_5$.

2.4.2 Bayesian Estimation

Based on the above priors, two models are set. In both models, after running 25,000 iterations of three chains with the R package *rjags*, the convergence is confident according to the Gelman-Rubin diagnostic: all partial potential scale reduction factors and the multivariate potential scale reduction factor equal to 1. In relation to the Heidelberger-Welch diagnostic both tests have passed in all chains and for all coefficients [9] (see the plots of the Gibbs sampling in the Appendix) (Figs. 5 and 6).

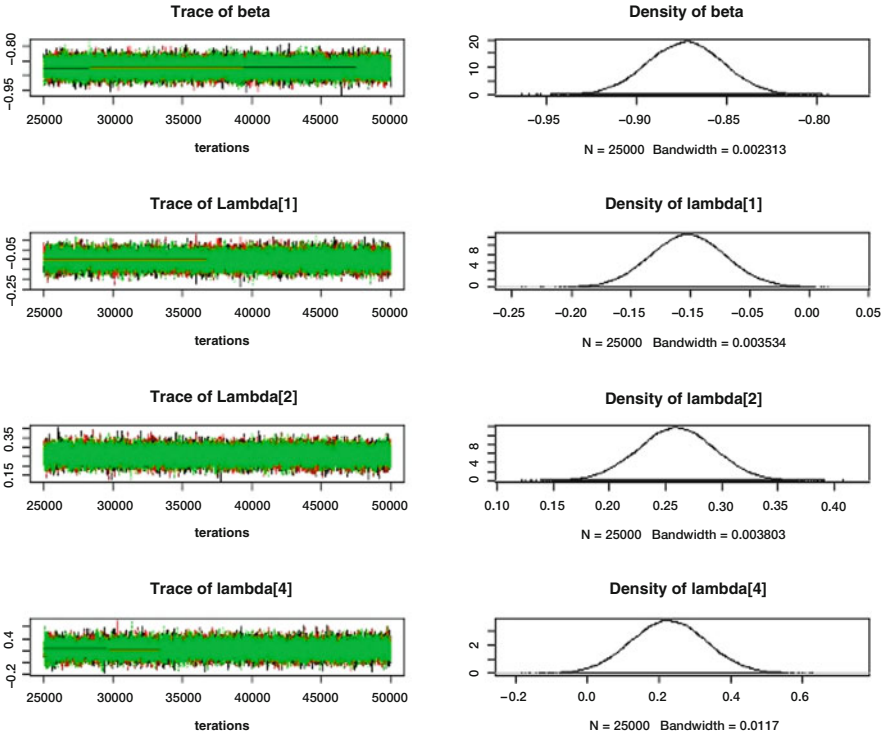

Fig. 5 Gibbs sampling for MCMC: pure spatial models with regional effects 1

[9] with a minor exception in one chain for μ_{Lab3}, which is expected since the confidence interval contains 0.

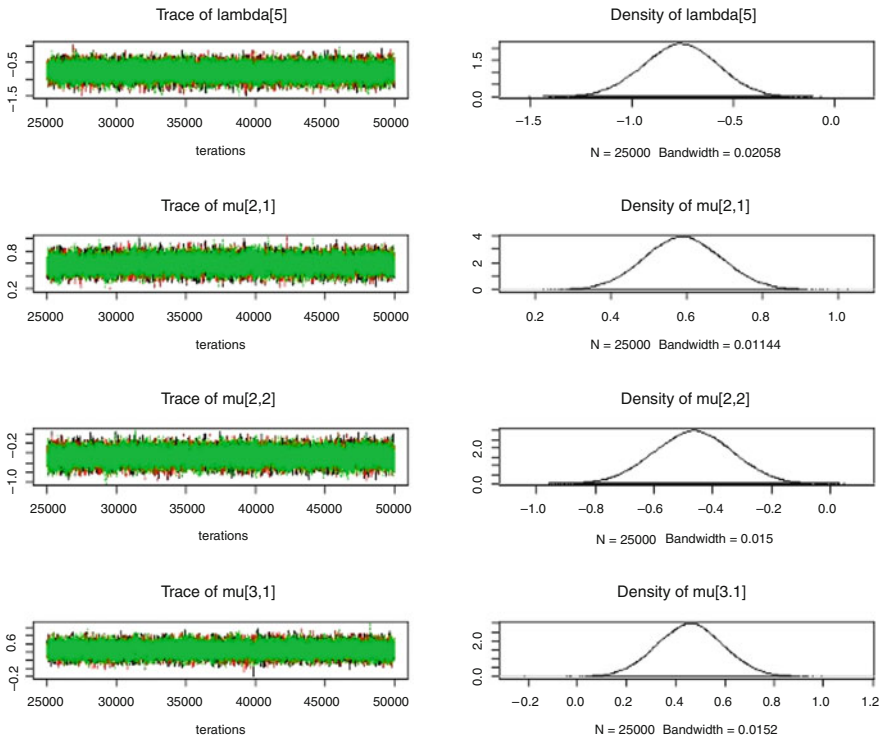

Fig. 6 Gibbs sampling for MCMC: pure spatial models with regional effects 2

Table 5 Pure spatial model with regional effects

	Model 1		Model 2	
	Estimate	Credible interval (95 %)	Estimate	Credible interval (95 %)
β	0.873	[0.833, 0.913]	0.873	[0.833, 0.914]
λ_{Lab}	−0.102	[−0.163,−0.039]	−0.101	[−0.163,−0.039]
λ_{Con}	0.259	[0.193, 0.325]	0.260	[0.194, 0.326]
λ_{SNP}	0.227	[0.024,0.432]	0.227	[0.025,0.432]
λ_{PC}	−0.762	[−1.127,−0.409]	−0.762	[−1.125,−0.408]
μ_{Lab2}	0.589	[0.391,0.792]	0.590	[0.391, 0.790]
μ_{Con2}	−0.466	[−0.729,−0.208]	−0.466	[−0.728, −0.207]
μ_{Lab3}	0.458	[0.193, 0.726]	0.459	[0.198, 0.722]
μ_{Con3}	−0.056	[−0.363,0.247]	−0.056	[−0.363, 0.250]
DIC	Mean/penalized deviance 15175/15184		Mean/penalized deviance 15175/15184	
N	8,084			

The results of the estimated models are provided in Table 4. The estimates are expectedly very close across the models (Table 5).

Table 6 Regional mixed valences

	England	Scotland	Wales	Mixed
λ_{PC}	–	–	−0.762	−0.762
λ_{Lab}	−0.102	0.487	0.091	0.002
λ_{Con}	0.259	−0.470	0.622	0.213
λ_{SNP}	–	0.227	–	0.227

Table 6 shows the results for the mixed party valences relative to the base Liberal Democratic party.

2.5 Counterfactuals and Comparison

What would happen if we pretend that IIA holds? This is, probably, the most interesting question to answer, since it addresses the gain from the development of the VCL model, which is the aim of this paper.

In this section, the counterfactual results, the substantive priors from the previous section, and the VCL estimates are compared.

In the counterfactual model, the estimates for SNP and PC are expectedly highly negative: since most of the voters from our sample could vote for them, the assumption of the opposite must lead to the underestimation of the valences of SNP and PC. Hence, *a priori*, we know that those estimates should not make much sense. Meanwhile, the counterfactual estimates for the major parties potentially (as one can suppose) might be still making sense.

Table 7 presents the estimates from the counterfactual model, meanwhile, Table 8 provides three sets of the results (substantive priors, counterfactuals, and VCL).

In Table 8, the most catching eye result is the estimate for the Labour Party which is slightly negative, while in the corresponding VCL model it is confidently positive. The source of that is a higher popularity in Scotland and Wales relative to that in England. This holds despite the presence of such close alternatives as Scottish National Party and Plaid Cymru, the effect of which is captured by the VCL model. Furthermore, the relative popularity of the Conservatives is 25 % lower in the VCL model (0.28 and 0.21). This is a consequence of the structure of the voting preferences in England, where the Conservatives have the most of their support. The last feature to mention is the larger spatial coefficient in the VCL. Hence, the counterfactual model underestimates the votes' sensitivity to the policies (the spatial coefficient is 0.76 in the counterfactual model, while in the VCL it is 0.87).

Models:

1. "Substantive" Priors
2. *Mixed* valences from the pure spatial VCL model
3. Counterfactuals

Table 7 Counterfactual MNL

Base = LibDem	
Variable	Est
β	(|t-stat|)
	0.761***
	0.017
λ_{Lab}	−0.024
	0.029
λ_{Con}	0.281***
	0.031
λ_{SNP}	−3.903***
	0.084
λ_{PC}	−5.489**
	0.160
n	8,084
LL	−8396.6
McFadden R^2	0.141

Table 8 Comparison of the results

	(1)	(2)	(3)
β	–	0.87	0.76
λ_{lab}	−0.01	0.002	−0.02
λ_{con}	0.28	0.21	0.28
λ_{snp}	0.23	0.23	−3.90
λ_{pc}	−0.83	−0.76	−5.49

2.6 Assessment of the Convergence at the Origin

The last aim of our investigation is to check whether the voting system is stable if the parties take mean positions relative to their constituencies. Practically, this is performed via plugging in the numbers below (9) into the formulas from Sect. 1.2 using the VCL results from Sect. 2.4.2.

$$z^0 = (z^0_{\text{lab}}, z^0_{\text{con}}, z^0_{\text{lib}}, z^0_{\text{snp}}, z^0_{\text{pc}}) = \begin{pmatrix} 0 & 0 & 0 & -0.19 & -0.09 \\ 0 & 0 & 0 & -0.13 & -0.11 \end{pmatrix} \tag{9}$$

The conclusions of this subsection are especially interesting, being looked at as an examination of the two-dimensional variation of the median voter theorem.

The Hessian matrices for the parties are:

$$H_{\text{Lab}|z^*} = \begin{pmatrix} -0.185 & -0.008 \\ -0.008 & -0.222 \end{pmatrix} \quad H_{\text{Con}|z^*} = \begin{pmatrix} -0.266 & -0.031 \\ -0.031 & -0.275 \end{pmatrix}$$

$$H_{\text{LibDem}|z^*} = \begin{pmatrix} -0.203 & -0.034 \\ -0.034 & -0.238 \end{pmatrix} \quad H_{\text{SNP}|z^*} = \begin{pmatrix} -0.098 & 0.014 \\ 0.014 & -0.211 \end{pmatrix}$$

$$H_{\text{PC}|z^*} = \begin{pmatrix} 0.024 & 0.002 \\ 0.002 & -0.060 \end{pmatrix}$$

The estimates above show that for the major parties the relative costs of the departure from the origin have a trade-off between the dimensions: the cross-derivatives are negative. Interestingly, in the case of SNP, the cross-derivative is positive, hence a tiny potential synergy effect between the dimensions exists for this party. The Hessian for PC provides the evidence that it could do better by moving along the nationalism dimension positively.

$$\text{eigen}(H|z^*) = \begin{pmatrix} & \text{Lib} & \text{Con} & \text{LibDem} & \text{SNP} & \text{PC} \\ \text{Nat} & -0.183 & -0.240 & -0.182 & -0.096 & 0.024 \\ \text{Econ} & -0.224 & -0.302 & -0.258 & -0.213 & -0.060 \end{pmatrix}$$

$$\{c(z^*)_j\} = \begin{pmatrix} c(z_1^*) \\ c(z_2^*) \end{pmatrix} = \begin{pmatrix} & \text{Lib} & \text{Con} & \text{LibDem} & \text{SNP} & \text{PC} \\ \text{Nat} & 0.115 & -0.201 & 0.080 & 0.178 & 0.126 \\ \text{Econ} & 0.084 & -0.239 & 0.057 & 0.089 & 0.072 \end{pmatrix} =$$

$$\begin{pmatrix} \text{Lib} & \text{Con} & \text{LibDem} & \text{SNP} & \text{PC} \\ 0.2 & -0.44 & 0.137 & 0.267 & 0.197 \end{pmatrix}$$

$$c(z) = \max(\{c(z^*)_j\}) = 0.267 < 1$$

We observe that the only party for which the median position is the saddle point is Playd Cymru. Meanwhile, the rest of the conditions for the convergence of the electoral system are confidently satisfied. Dependent on our perception of PC, this situation may be evaluated in two different perspectives.

First, formally, this electoral system does not converge, if we consider all parties to be equally important. The second approach is to remember that the inclusion of Plaid Cymru was rather technical, mostly to control formally for the violation of IIA in Wales. However, clearly it is not a major player, and many parties not included in the analysis got significantly more voters (e.g., Green Party).

What is the most important, in terms of the three major parties, the electoral system confidently converges. This does not change with the inclusion of the only other candidate that can be considered as a major party—Scottish National Party.

Table 9 Predicted and sample voting probabilities (Pure spatial model with regional effects)

	England			Scotland		
	Sample	Est	Conf interval (95 %)	Sample	Est	Conf interval (95 %)
p_{Lab}	0.280	0.280	[0.277, 0.283]	0.354	0.352	[0.346, 0.359]
p_{Con}	0.414	0.413	[0.407, 0.420]	0.167	0.167	[0.156, 0.182]
p_{LibDem}	0.307	0.307	[0.303, 0.310]	0.216	0.216	[0.211, 0.221]
p_{SNP}	–	–	–	0.262	0.263	[0.258, 0.267]
p_{PC}	–	–	–	–	–	–
	Wales			All sample		
p_{Lab}	0.355	0.352	[0.339, 0.365]	0.291	0.291	[0.291, 0.291]
p_{Con}	0.285	0.286	[0.261, 0.311]	0.383	0.383	[0.382, 0.384]
p_{LibDem}	0.250	0.251	[0.239, 0.262]	0.295	0.295	[0.294, 0.295]
p_{SNP}	–	–	–	0.026	0.026	[0.026, 0.026]
p_{PC}	0.111	0.112	[0.109, 0.114]	0.005	0.005	[0.005, 0.005]

An interesting observation is the negative convergence coefficient for the Conservatives. This means that they benefit extremely from their position, and even a small deviation from the mean position might cause a significant decrease of the voting support (Table 9).

3 Conclusion

This paper presents an example of the Bayesian application of the varying choice logistical model to the electoral data from the British General Elections of 2010. The British electoral system in 2010 was shown to converge at the origin considering the Labour, Conservative, Liberal Democratic, and Scottish Nation parties. However, it diverges with the addition of Plaid Cymru.

Appendix

Code

Pure spatial model with the regional valences: Uninformative priors for the valences

```
basicVCL = function()
{
    for(i in 1:N)
   {
         for(k in 1:K)
```

```
            {
             v[i,k] <- lambda[k] + beta*((eu[i]-peu[k])^2 +
                                    (tax[i]-ptax[k])^2) + mu[region[i],k]
            expv[i,k] <- exp(v[i,k])*phi[region[i],k]
            pv[i,k] <- expv[i,k]/sum(expv[i,1:K])
            }
        vote[i] ~dcat(pv [i, 1:K])
    }
    lambda[1] ~dnorm(0, taul)
    lambda[2] ~dnorm(0, taul)
    lambda[3] <- 0
    lambda[4] ~dnorm(0, taul)
    lambda[5] ~dnorm(0, taul)
    beta ~dnorm(0,1/1000)
    for (p in 2:3)
    {
        for (y in 1:2)
       {
           mu[p,y] ~dnorm(0,taum);
         }
    }
    mu[p,3] <-0
    mu[p,4] <-0
    mu[p,5] <-0
    for (p in 1:5)
    {
        mu[1,p] <-0
    }
     for (y in 1:3)
    {
        for (k in 1:3)
       {
           phi[y,k] <-1
       }
    }
    phi[1,4] <- 0
    phi[1,5] <- 0
     phi[2,4] <- 1
    phi[2,5] <- 0
    phi[3,4] <- 0
    phi[3,5] <- 1
    taum ~dgamma(.1,.1);
    taul ~dgamma(.1,.1)
}
```

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Turnout and Polarization Under Alternative Electoral Systems

Konstantinos Matakos, Orestis Troumpounis, and Dimitrios Xefteris

1 Introduction

The effect of electoral rules on voter turnout has been extensively studied.[1] Most empirical studies tend to report a regularity that can be summarized as follows: more proportional electoral rules are associated with higher political participation and voter turnout (see Jackman 1987; Jackman and Miller 1995; Powell 1980, 1986; Blais and Dobrzynska 1998; Blais and Carty 1990 among others). Yet, even if this relationship holds, there is less understanding and agreement on the forces and the exact mechanisms that give rise to this regularity (for a discussion see Herrera et al. 2013; Selb 2009).

According to the "calculus of voting" model, voter turnout depends on two forces: the probability that a voter can affect the outcome (pivotality) and the benefit associated with altering the outcome of the election. In order for a voter

[1]The literature is huge and we do not aim to review it. For related surveys refer for example to Geys (2006) and Blais (2006).

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to participate in the election the expected benefit (Pivotality $*$ Benefit) has to compensate the cost of voting.[2] That is:

$$\text{Pivotality} * \text{Benefit} > \text{Cost of Voting}.$$

If this model describes reasonably well the behavior of real voters, electoral rules should be indeed relevant for determining voter turnout since they clearly affect both parameters of the left-hand side of the inequality.

Electoral rules can affect the relative competitiveness of the electoral race at the district level and hence, they can affect the probability that a voter is pivotal. For instance, proportional rules with multi-member districts tend to generate more competitive districts as every vote counts. On the other hand, first-past-the-post electoral rules with single-member districts (SMD) tend to have higher variability in the degree of district competitiveness: in the same election some districts might be very competitive while others might not be competitive at all. Hence, the degree of district competitiveness is indeed a channel through which electoral rules might affect voter turnout and for this reason most previous studies have focused on providing evidence in favour of this hypothesis (Selb 2009). Their claim is that the observed empirical pattern can be explained via the following mechanism: proportional rules increase average district competitiveness and hence voter turnout. This is particularly problematic for two reasons. Firstly, as Grofman and Selb (2011) show district magnitude and the proportionality of the electoral rule may not be good predictors of the pivotality of a given race. Second, and most importantly, recent experimental evidence by Enos and Fowler (2014) who test the hypothesis that "greater electoral competition and the increased chance of pivotality will motivate citizens to participate" have found that "the predominant models of turnout focusing on pivotality are of little practical use".

The second channel (i.e., benefit) through which electoral rules might affect voter turnout has received less attention and it was explored mainly through the effect that electoral rules have on the number of competing parties and the size of the party-system. Contrary to what one would expect many empirical studies have found that larger party-systems are in fact depressing voter turnout (e.g., Blais and Dobrzynska 1998; Blais and Carty 1990; Jackman 1987; Jackman and Miller 1995). That is, there is no solid empirical support for this second channel through which electoral rules should affect voter turnout and, hence, *no solid empirical support for the "calculus of voting" model as a whole.*

[2]Despite the critique on the rational choice model of voter turnout, it is widely accepted (see Selb 2009 and others) that the calculus of voting model can be very useful in explaining variations in voter turnout. While the original formulation by Riker and Ordeshook (1968) also contains the benefit of the act of voting on the left hand side our cost can be understood as the net cost of voting after having subtracted the latter.

This study aims to provide support in favour of this second channel by uncovering a missing link in the relationship between electoral rule disproportionality and voter turnout: the effect of electoral systems on platform polarization and hence abstention associated with the latter. We first present a formal model where parties' platforms are chosen endogenously and depend on the degree of the electoral rule disproportionality. In line with our previous research (Matakos et al. 2013) we show that more proportional rules generate centrifugal forces that increase platform divergence and candidate differentiation.[3] This, in turn, increases the stakes of the election for the voter: as parties' platforms diverge, for any given cost of voting and race closeness, more voters are willing to vote as they are less likely to be indifferent among the proposed alternatives.

This main prediction of our theoretical model is then empirically tested. As it is obvious, this is a two-step hypothesis stating that the disproportionality of the electoral rule indirectly affects voter turnout by altering the positions (platforms) that parties take in the policy dimension. That is, there appears to be a missing link in the nexus between electoral rule disproportionality and voter turnout. As our empirical results show this hypothesis is empirically validated even when we control jointly for the prevailing pivotality and party-system size hypotheses.

The chapter is structured as follows: We first present our theoretical model and its main predictions. We then state our main hypotheses, describe the data and present our empirical results. Finally we provide some concluding remarks.

2 Theory

We consider two parties ($j = L, R$) that compete in an election by simultaneously announcing platforms (p_L and p_R). After both parties announce their platforms the voting stage follows which determines parties' vote-shares (V_L and V_R). Given parties' vote-shares (V_L and V_R), the announced platforms (p_L and p_R), and the (dis)proportionality of the electoral system (n) a policy $\hat{p}$ is implemented.

The policy space is assumed to be continuous, one-dimensional and is represented by the interval $\Pi = [0, 1]$. We assume that each voter has symmetric and single-peaked preferences on the policy space. In particular we consider that if $\pi_i \in \Pi$ denotes the ideal policy of voter i, then the utility that voter i derives from policy $p \in \Pi$ is given by

$$u_i(p) = -(\pi_i - p)^2.$$

[3] Several justifications for platform divergence are well established. These may vary from informational or media-related factors (e.g., Grosser and Palfrey 2013; DellaVigna and Kaplan 2007) to candidates' diverging policy preferences (e.g., Calvert 1985; Roemer 1994) and candidates' valence characteristics (e.g., Groseclose 2001; Aragonès and Palfrey 2002; Aragonès and Xefteris 2012; Schofield and Sened 2006; Schofield and Gallego 2011; Schofield and Kurella 2015; Serra 2010).

Each voter observes the platforms proposed by the two parties and decides whether to vote for one of the two parties or to abstain. The rule that determines voters' behavior is the following: voter i votes for party L if $u_i(p_L) - u_i(p_R) > v$, votes for party R if $u_i(p_R) - u_i(p_L) > v$ and abstains otherwise. The value of v is assumed to be non-negative and common for all voters. Parameter v is the so-called indifference threshold above which a voter is willing to vote for the party that is closest to his ideal point (Riker et al. 1973; Enelow and Hinich 1984; Adams et al. 2005). The higher this threshold is the larger the difference between the two proposed platforms must be so that it is worthwhile for a voter to participate in the election. If v is low, then voters are willing to participate even if parties' platforms do not differentiate significantly.

The above implies that if, for example, $p_L < p_R$ all voters with ideal policies smaller than $\max\{0, \frac{v+p_L^2-p_R^2}{2p_L-2p_R}\}$ vote for party L, all voters with ideal policies from $\max\{0, \frac{v+p_L^2-p_R^2}{2p_L-2p_R}\}$ to $\min\{\frac{-v+p_L^2-p_R^2}{2p_L-2p_R}, 1\}$ abstain and all voters with ideal policies larger than $\min\{\frac{-v+p_L^2-p_R^2}{2p_L-2p_R}, 1\}$ vote for party R. Notice that abstainers are more or less moderate individuals who are relatively indifferent between the two platforms.

We assume that there exists a unit mass of voters and that their ideal policies are uniformly distributed on $\Pi = [0, 1]$. Therefore parties' vote-shares are given by

$$V_L(p_L, p_R) = \begin{cases} \max\left\{0, \frac{v+p_L^2-p_R^2}{2p_L-2p_R}\right\}, & \text{if } p_L < p_R \\ 0, & \text{if } p_L = p_R \\ 1 - \min\left\{\frac{v+p_L^2-p_R^2}{2p_L-2p_R}, 1\right\}, & \text{if } p_L > p_R \end{cases}$$

and

$$V_R(p_L, p_R) = \begin{cases} 1 - \min\left\{\frac{-v+p_L^2-p_R^2}{2p_L-2p_R}, 1\right\}, & \text{if } p_L < p_R \\ 0, & \text{if } p_L = p_R \\ \max\left\{0, \frac{-v+p_L^2-p_R^2}{2p_L-2p_R}\right\}, & \text{if } p_L > p_R \end{cases}.$$

In order to illustrate voters' behavior consider the following examples depicted in Fig. 1. In the two first examples the proposed platforms are quite differentiated $[(p_L, p_R) = (0.3, 0.7)]$ while in the two last examples parties propose less differentiated platforms $[(p_L, p_R) = (0.45, 0.55)]$. In the first and third example we consider that voters have a high cost of supporting platforms that are not differentiated enough ($v = 0.04$) while this cost is much lower in the second and fourth example ($v = 0.01$). As one can see turnout can vary from 60 (third example where platforms are similar and v is high) to 97 and a half percent (second example where platforms are differentiated and v is low). Lowest turnout levels are observed when platforms are very similar and costs are high while the highest turnout is observed when costs are low and parties are differentiated. Notice that in all four

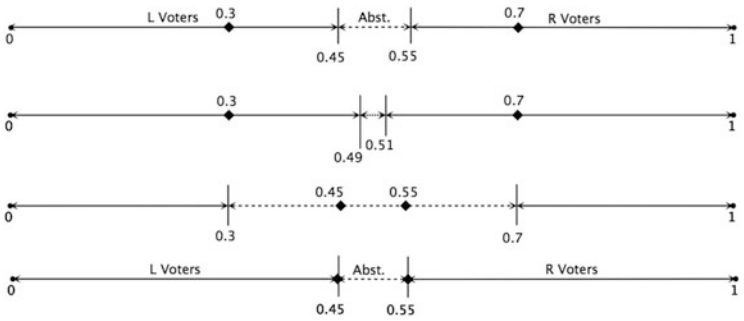

Fig. 1 *Solid lines* represent voters and *dashed lines* abstainers. *Diamonds* represent parties' proposed platforms. In the first and third example $v = 0.04$ and in the second and fourth example $v = 0.01$

examples it is the relatively moderate voters that abstain. Nevertheless, these do not necessarily have to lie between the proposed platforms (see example three). Finally, notice that for a given cost turnout is higher the more differentiated the platforms are.

Parties are policy motivated. Their payoffs depend on the implemented policy rather than on an exogenous given office value for winning the election. Each party j has an ideal policy $\pi_j \in \Pi$. We assume that parties have an ideal policy at the extremes of the policy line, that is, $\pi_L = 0$ and $\pi_R = 1$ and that party's j preferences over policies are the same as the preferences of a voter with the same ideal policy. Therefore parties want the implemented policy to be as close as possible to one of the two extremes of the policy space. Let us mention that our results are robust to parties with non-extreme policy preferences.

The implemented policy is determined through the parliamentary mean model (Ortuño-Ortín 1997; Llavador 2006; De Sinopoli and Iannantuoni 2007; Matakos et al. 2013; Saporiti 2014). This means that the implemented policy is a weighted average of parties' parliamentary power. Notice that parties' seat-shares are of course a function of parties' vote-shares (V_L, V_R) which ultimately are a function of the proposed platforms and the disproportionality of the electoral system denoted by n, where $n \geqslant 1$. Following our previous work (Matakos et al. 2013) the way parties' vote-shares (V_L and V_R) translate into seat-shares (S_L and S_R) in the parliament depends on the disproportionality of the electoral system (n) and follows Theil (1969):

$$\frac{S_L}{S_R} = \left(\frac{V_L}{V_R}\right)^n.$$

Through the above formula and $n = 1$ one captures a purely proportional representation system where no distortions are present. Letting $n = 3$ the seat allocation is based on the famous "cube law" which is used in the literature as a good approximation of the distortions created in favour of the winner in first past

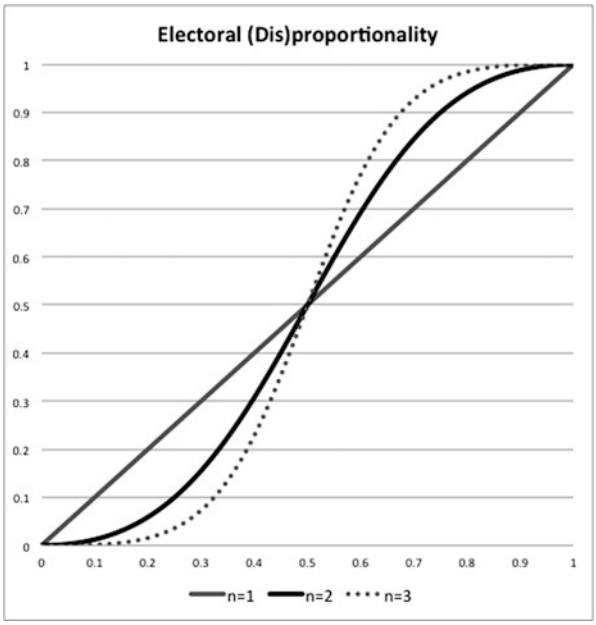

Fig. 2 The weight of a party's proposal (i.e. its seat-share) as a function of its vote-share for the cases where $n = 1$, $n = 2$, and $n = 3$

the post (FPTP) elections. In general as n increases the electoral system is more disproportional in favour of the winner of the election. The implemented policy function can then be rewritten as:

$$\hat{p}(p_L, p_R, n) = \frac{V_L(p_L, p_R)^n}{V_L(p_L, p_R)^n + V_R(p_L, p_R)^n} * p_L + \frac{V_R(p_L, p_R)^n}{V_L(p_L, p_R)^n + V_R(p_L, p_R)^n} * p_R,$$

where the proposed platforms p_L and p_R are weighted by parties' parliamentary power S_L and S_R. In Fig. 2 we depict how vote-shares translate to parliamentary power and the effect of n on the latter. If, for example, we are under an FPTP rule ($n = 3$), then a 60 % vote-share would translate to 77 % of the parliamentary power compared to a 60 % power in case of a pure proportional representation system ($n = 1$). When turnout is zero we assume that

$$\hat{p}(p_L, p_R, n) = \frac{p_L + p_R}{2}.$$

Individuals decide non-strategically whether to vote for one of the parties or not once they observe the announced platforms. Hence, parties are the only players of the game and strategically announce their platforms. The equilibrium concept we apply is Nash equilibrium in pure strategies.

2.1 Results

To avoid technical complexities that have to do with discontinuities of the payoff function for large parameter values we restrict attention to $n \in \{1, 2, 3\}$ and $v \in [0, 0.05]$. We regard these ranges of parameter values, though, as the most relevant ones: $n = 1$ represents a pure proportional representation rule while $n = 3$ is understood in the literature to better represent elections with single-member districts, the most disproportional kind of elections at least among parliamentary ones (Taagepera 1986). It follows that $n = 2$ represents mixed systems. Finally $v = 0$ ensures a 100 % turnout for any $p_L \neq p_R$ while $v = 0.05$ can generate arbitrarily low turnout when platforms are sufficiently similar. Our theoretical predictions follow.

Proposition 1

(i) There exists a unique electoral equilibrium

$$(p_L^*, p_R^*) = \left(\frac{-1 + 2n - \sqrt{1 - 4vn}}{4n}, \frac{1 + 2n + \sqrt{1 - 4vn}}{4n} \right).$$

(ii) The distance between p_R^* and p_L^* is decreasing in n.

All proofs can be found in the appendix.

Our first theoretical result provides the unique equilibrium of the electoral game presented in the previous section. The second part of our proposition relates electoral rule disproportionality with platform polarization and, in line with Matakos et al. (2013), it shows that parties platforms are less polarized under more disproportional electoral systems. In general, a move towards the centre has two opposing effects on the welfare of a party (say, for example, the leftist one): ceteris paribus, it pushes the implemented policy away from the party's ideal policy ($S_L * p_L + S_R * p_R$ is increasing in p_L when S_L, S_R and p_R are constant) but also it drags the implemented policy close to the party's ideal policy as a move towards the median increases the party's vote-share and hence its weight in the implemented policy ($S_L * p_L + S_R * p_R$ is decreasing in S_L when p_L, S_R and p_R are constant). As the disproportionality of the electoral system increases, proposing a moderate platform may be worthwhile since the incentives to obtain some extra votes are amplified.

Given that the equilibrium turnout is given by the sum of the equilibrium vote-shares of party L and R one can obtain the equilibrium turnout under a rule n using the following expression:

$$\begin{aligned} T^*(n) &= V_L \left(\frac{-1 + 2n - \sqrt{1 - 4vn}}{4n}, \frac{1 + 2n + \sqrt{1 - 4vn}}{4n} \right) \\ &\quad + V_R \left(\frac{-1 + 2n - \sqrt{1 - 4vn}}{4n}, \frac{1 + 2n + \sqrt{1 - 4vn}}{4n} \right) \\ &= \frac{1}{2} + \frac{1}{2}\sqrt{1 - 4vn}. \end{aligned}$$

Proposition 2 *For every* $v \in (0, 0.05]$ *equilibrium turnout,* $T^*(n)$*, is strictly decreasing in* $n \in [1, 3]$.

Proposition 2 makes a clear prediction regarding the relationship between the electoral rule disproportionality and voter turnout that can be tested against the data. It shows that the disproportionality of the electoral rule (measured by the majoritarian bias parameter n) has a negative effect on voter turnout. As we have demonstrated this effect operates via the endogenous choice of parties' platforms and the larger fraction of voters who abstain from indifference; as the disproportionality of the electoral system increases, parties choose less differentiated platforms and more people become relatively indifferent between them. In line with the predictions of our formal model we formulate the following hypothesis:

(H.1) Platform Distance Hypothesis: Voter turnout is increasing in the distance between parties' platforms (measured by polarization) which, in turn, is decreasing in the disproportionality of the electoral rule (measured by n).

In addition to our main theoretical prediction above, we also test two other hypotheses that were put forward by past literature. The reason is that in our effort to uncover a missing link in the proportionality-turnout nexus it is important to document that this effect is present even if one accounts for the other two theoretical mechanisms that were previously discussed. That is, we will document that our proposed mechanism, which was largely ignored by past literature, operates in addition to the competitiveness and party system hypotheses. Formally, we test the following two complementary hypotheses:

(H.2) Competitiveness-Pivotality Hypothesis: Weak electoral competition and the resulting decreased chance of pivotality are suppressing voter turnout.

(H.3) Party-System Size Hypothesis: Voter turnout is increasing in the number of competing parties.

The last two hypotheses have been explored by a number of related studies in the past yielding inconclusive evidence. While most studies refute H.3 (e.g. Blais and Aarts 2006; Powell 2000) finding the effect of party-system size on turnout to be negative, the evidence for H.2 is mixed; some studies (e.g. Selb 2009) provide conditional support for the Competitiveness-Pivotality hypothesis and others (e.g. Enos and Fowler 2014) call those earlier findings into question. By testing all three hypotheses together, we aim at uncovering a third link between electoral rules and voter turnout.

3 Data and Methodology

Our data set contains electoral, political, institutional, socioeconomic, and demographic observations for more than 300 elections from 23 OECD countries during the period from 1960 to 2006 by combining three different sources (Carey 2012;

Table 1 Summary statistics of key variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
Electoral margin of victory	302	9.87	7.93	0.1	34.4
Voter turnout (in %)	307	79.73	12.36	35.8	95.8
Electoral rule dummy (FPTP = 1)	307	0.17	0.38	0	1
Majoritarian bias parameter (n)	255	1.70	0.89	1	3.42
Type of political regime (Presidential = 1)	251	0.25	0.43	0	1
Coalition habits dummy (Coal. Govt. = 1)	290	0.57	0.50	0	1
Polarization (Dalton index 0–10)	307	1.70	0.79	0.23	5.14
Polarization (MDP index 0–10)	307	2.43	1.10	0.34	6.55
Electoral district magnitude (Average)	255	17.70	35.04	1	150
Log Avg. electoral district magnitude	255	1.78	1.43	0	5.01
Years of consolidated democracy	254	49.87	20.73	1	87
Effective number of electoral parties	307	4.06	1.49	2.0	10.3
Actual number of parties	307	5.65	2.18	1	12
# Parties participating in Gov't/Cabinet	250	2.03	1.27	1	6
Degree of institutional constraints (0–6)	305	2.15	1.47	0	5

Note: Data reported at electoral not calendar year
Source: Comparative political studies data set 1, Carey–Hix data archive and the Manifesto Project Database. Period of observation: 1960–2007 for 23 OECD states

Armingeon et al. 2012; Volkens et al. 2012). As a result, our data are suitable for a cross-country pooled time-series analysis (see also Matakos et al. 2013). Summary statistics for our main variables can be found in Table 1.

3.1 The Dependent Variable: Voter Turnout

Our dependent variable, voter turnout is retrieved from the Armingeon et al. (2012) Comparative political data set I (CPDS-I) compiled by the University of Bern. We have chosen to focus on voter turnout as it is the most direct and easily measurable index of civic engagement and participation with the political affairs of the state. Moreover, the variable exhibits sufficient variation both over time and also across countries (see Table 1).[4]

[4]There are some countries in our sample (Australia, Belgium and Switzerland) that have introduced compulsory voting laws. We deal with those complications in the next section, when we present our econometric modelling strategy.

3.2 The Main Explanatory Variables: Polarization, Electoral Margins and the Number of Competing Parties

Our key explanatory variable, platform polarization, is constructed using data from the Volkens et al. (2012) Comparative Manifesto Project (CMP) Data Set compiled by the Berlin Centre for Social Research (WZB). The latter records the ideological position of the platforms proposed by hundreds of political parties since 1946. In line with our theoretical model we consider a unidimensional policy space in a 0–10 scale where zero stands for extreme left and ten for extreme right.[5] In order to maintain consistency with our theoretical model as well as with previous literature we measure polarization in two different ways. First, as the most distant platforms (MDP) index which captures the distance between the two most distant platforms (e.g., Budge and McDonald 2006; Andrews and Money 2009). This allows for a one-to-one correspondence between our theoretical predictions and the empirical estimation but it has the following drawback: sometimes the two most distant platforms belong to parties that are frictional and receive tiny vote-shares. As a result, they do not seem to matter a lot in terms of electoral competition and policy formation which implies that the platforms of those parties may not be relevant from the voters' perspective.

In order to address this complication, following Dalton (2008), we also use a second index of platform polarization.[6] Formally, we define the Dalton index of platform polarization (IP_i) in election i as:

$$IP_i = \sqrt{\sum_j V_j \left(\frac{p_j - \bar{p}}{0.5} \right)^2},$$

where $\bar{p}$ denotes the weighted mean of parties' proposed platforms (each party j is weighted by its vote-share V_j), p_j is the platform proposed by party j while the difference between the two is normalized by the mid-point ideology position (in our case 0.5). It is easily checked that the Dalton index takes value 0 when all parties converge to a single position and 10 when parties are equally split between the two extreme positions. Weighting for the electoral size of each party implies that a large party at one of the extremes induces greater polarization than a frictional party occupying the same position. This property of the Dalton index is of particular importance as it assigns higher weight to platform differentiations that are more relevant from the voters' perspective. Clearly, a voter is more concerned when two

[5] Technically, the CMP provides parties' positions on a −100 to 100 scale. We perform an affine, monotonic, order preserving transformation of the index.

[6] Curini and Hino (2012) also use the Dalton index, while Ezrow (2008) and Dow (2011) use a very close analogue.

big parties, that have good chances of winning elections (and also affecting policy formation), are diverging than the case of two marginal parties (with no chance of participating in government or influencing policy) positioning themselves to the two extremes. In general, as we will later show, our findings are robust to the use of either of the two indices of polarization. We therefore present our estimates (in Tables 2 and 3) using both measures of polarization and show that our main results are consistent with the theoretical prediction and the hypotheses outlined above.

Our second variable of interest is the margin of electoral victory measured by the percentage margin between the winner and the runner-up candidate or party. This approach of capturing the closeness of the electoral race has been used extensively in the literature (e.g. Selb 2009) despite some critique (e.g. Cox 1988; Elkins 1974) as a rough approximation of the competitiveness of the race, which in turn, determines the degree of pivotality.[7] Clearly, in the case of SMD or two-party elections the electoral margin between the winner and the runner-up of the election is a very good approximation of how competitive the race is. Nevertheless, this is not straightforward in the case of multi-member districts with more than two competing parties. To tackle this issue, previous literature has suggested two possible ways ahead, which we nonetheless find equally problematic. The first one is to consider the contest and the margin for the final seat. The second is to calculate the effective threshold of exclusion that indicates the maximum vote-share with which it is possible not to win a seat and as a result it is argued that it provides the lower bound on the competitiveness of a given district.[8]

Yet, there are a number of complications related to the use of any of those two proposed measures of the competitiveness of the electoral race for multi-member proportional representation (PR) districts. The first one is that both critically depend on the magnitude (size) of the electoral district. That is, instead of capturing the closeness of a given electoral race in a specific district they simply capture the institutionally induced competitiveness of an average race. Moreover, as Grofman and Selb (2009) demonstrate not all PR systems are generating identical turnout incentives. In addition, in a follow-up paper (Grofman and Selb 2011) they show that not only proportionality does not necessarily have to increase with district magnitude, but at the same time the competitiveness of an electoral race does not necessarily increase with district magnitude. To see this, observe that the threshold of exclusions is uniquely determined by the size of the electoral district and as such

[7]The most common critique is centered on the fact that actual election results may not accurately reflect pre-election expectations. However, as Selb (2009) notes "because ex ante information such as forecasts based on pre-election polls are usually not available for all the districts of a given electoral system, there is virtually no alternative to using ex post measures." Hence, following Cox (1988), we also assume that pre-election expectations are on average correct.

[8]The effective threshold of exclusion for a given region i is calculated as $1/(S_i + 1)$ where S_i is the district magnitude (size). Clearly, in the case of FPTP with SMD (where $S_i = 1$) the effective threshold of exclusion becomes 50 %.

it does not vary across elections.[9] To say, then, that all elections in a specific district are equally competitive would be an oversimplification. In addition, the closeness of the contest for the final seat in a given district cannot be considered a good proxy to the competitiveness of the electoral race as this final seat might have minimal or insignificant influence in determining the overall electoral outcome and the policy formation. Moreover, this measure too—albeit in a lesser extent—also depends on the size of the electoral district. As a result, those two measures of the competitiveness of the race in a given district are also problematic.

Furthermore, both measures are not suitable for any cross-country pooled time-series regression analysis as both of them would exhibit zero variation within each country (over time).[10] Nevertheless, since party platform polarization is hard to conceptualize and measure at the district level (not least because in national elections party platforms do not vary distinctively at the district level, especially within PR systems) we have no other option but to conduct our analysis at the national instead of the district level. As a result, since the goal of this paper is to highlight the polarization link in the proportionality-turnout relationship, we have decided to use the margin of electoral victory between the winner and the runner-up even in the context of multi-member PR districts as we consider it to be a better analogue than the other two presented above. This is so, because even in those countries applying a multi-member PR system, with few exceptions (such as Belgium, Netherlands, Denmark and Finland) there are usually only two big parties competing for the first place at the national level, making the situation comparable to the one with SMD. Of course, needless to say, all the above methods are far from being ideal. Nevertheless, given the purposes of this study our chosen method seems to be the most suitable.

Finally, following the literature (e.g., Andrews and Money 2009; Curini and Hino 2012), we test the number of competing parties hypothesis (H.2) using the natural logarithm of the effective number of parties (ENP) index as our independent variable.[11] Nevertheless our findings in all specifications do not vary significantly when we substitute the natural log with the ENP or the actual number of parties.

[9] In fact the threshold of exclusion is collinear to the electoral district magnitude which is used in the literature to test the proportionality of the electoral rule. Hence, it is more a measure of the proportionality of the electoral rule rather than a direct way of measuring the exact mechanism which is the degree of competitiveness of the electoral race.

[10] This is easy to see as both of them critically depend on the average electoral district size (magnitude). Hence, any variation can only be exploited if the analysis is conducted at the electoral district and not at the country level.

[11] Laakso and Taagepera (1979) define the effective number of political parties as $1/\sum_j (V_j)^2$.

4 Empirical Results

In this section, we present our econometric analysis and address concerns of endogeneity and bias related to our estimation. First, we estimate Model 0 in order to give a first rough estimate of the relationship between electoral rule disproportionality and voter turnout by regressing the first on the latter.[12] Then we estimate Model 1 which jointly tests the two hypotheses that correspond to the links already identified by previous studies as determinants of turnout: the degree of competitiveness of the electoral race, measured by the margin of victory (H.2), and the size of the party-system, measured by the effective number of competing parties (H.3). That is, Model 1 serves as our benchmark since most of the literature tests these two hypotheses simultaneously (e.g. Jackman 1987; Selb 2009; Powell 2000; Blais and Carty 1990; Blais and Dobrzynska 1998; Jackman and Miller 1995). According to H.2, we expect $\beta_2 < 0$, as less competitive electoral races (higher electoral victory margins) reduce the chance of a voter being pivotal and hence, should suppress turnout. From H.3, we also expect $\beta_3 > 0$, as a larger number of parties is believed to lead to higher turnout through the channel of better representation of voters' preferences. Formally, we estimate the following equation:

$$\text{Turnout}_{it} = \beta_0 + \beta_2 * \text{Margin}_{it} + \beta_3 * \text{ENP}_{it} + \mathbf{X}'_{it} * \boldsymbol{\gamma} + \lambda_t + \alpha_i + \epsilon_{it}, \quad (1)$$

where λ_t and α_i are year- and country-specific dummies (fixed effects) and $\mathbf{X}'_{it}$ is a vector that includes other control variables such as: a dummy variable to indicate frequency of coalition governments (coalition habits dummy), the number of parties participating in government/cabinet and its interaction, the type of political regime (presidentialism vs. parliamentarianism), the degree of institutional constraints, the years of consolidated democracy and a dummy variable indicating government change. Apart from fully exploiting the structure of our data, one additional reason that necessitates the use of unit-specific (country) fixed effects is to account for any time-invariant country-specific characteristic (e.g. institutional arrangements such as compulsory voting laws) that can affect voter turnout. Nevertheless, for comparison purposes, we also present the estimates of Eq. (1) without the inclusion of controls or country-specific fixed effects.

In Model 2, we introduce our key explanatory variable (platform polarization) in order to account for the additional link between disproportionality and turnout (H.1). That is in addition to the other two previous explored links (competitiveness

[12]To control for the disproportionality of the electoral rule we introduce a dummy variable that takes the value of 1 if the country implements an FPTP rule (the most disproportional one) and zero otherwise (that is, in the case of list-PR or mixed-PR systems). This is admittedly a very crude measure of electoral rule (dis)proportionality. Therefore, as we introduce our instrumental variables (IV) estimations, we also introduce two more elaborate measures of disproportionality.

of the race and number of parties) that were tested via hypotheses H.2 and H.3, in this model we test all three hypotheses simultaneously. Formally, we estimate the following equation:

$$\begin{aligned} \text{Turnout}_{it} = \beta_0 + \beta_1 \text{Polarization}_{it} \\ + \beta_2 * \text{Margin}_{it} + \beta_3 * \text{ENP}_{it} + \mathbf{X}'_{it} * \boldsymbol{\gamma} + \lambda_t + \alpha_i + \epsilon_{it}. \end{aligned} \tag{2}$$

We also estimate two additional versions of the above model: one using the log of ENP to control for H.3 (Model 2.a) and one where we replace the Dalton index (DI) of polarization with the MDP one (Model 2.b). Table 2 presents the results of estimating Models 1 and 2.

4.1 OLS Results

In the first three columns of Table 2, we present the results of Model 0 that should not be given any causal interpretation by any means. They are just intended to show the broad picture and highlight the stylized fact that many others in the literature have pointed to. That is, less (more) proportional electoral rules suppress (increase) voter turnout. Thus, it is no surprise that this well-established pattern emerges quite strongly (all the coefficients are statistically significant at the conventional 5 % level) from our own estimates as well.

In the remaining columns (4–8) we explicitly test for the links through which electoral rule disproportionality affects voter turnout, as we have previously hypothesized. Columns 4 and 5 present the estimates of Model 1 (as in, e.g., Selb 2009) that tests the two "traditional" hypotheses: the competitiveness of the race (H.2) and the number of parties (H.3) hypotheses. As our results show, we find no support for H.3 (which is also the case in much of the previous literature, e.g., Blais and Aarts 2006; Powell 2000) but more surprisingly we only find limited support for H.3 under some specifications (small sample with controls) contrary to what previous literature has suggested (e.g. Selb 2009).

In columns 6–8, we introduce our key explanatory variable (platform polarization) and present the estimates of Models 2.a and 2.b in order to test our primary hypothesis (H.1) jointly with the remaining two. Again, in almost all specifications, we fail to find statistically significant support for any of our three hypotheses, including our primary one on the effect of electoral rules on turnout via platform polarization. That is, even though electoral rule disproportionality appears to be strongly correlated with voter turnout (see columns 1–3) none of the proposed mechanisms seems to be able to provide a clear link that connects proportionality and turnout. Moreover, even in those specifications that we do find some support for the competitiveness hypothesis (H.2) the estimates are not qualitatively important. Yet, we do not think that this failure of confirming any of the three hypotheses is very surprising or particularly problematic, since those simple OLS results should

Table 2 OLS regressions on the effect of electoral system disproportionality on voter turnout (1960–2007)

Dependent variable	Voter turnout (in %)							
	Model 0			Model 1		Model 2		
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First-past-the-post (*FPTP*) rule (dummy variable = 1)	−12.320 (6.216)*	−3.584 (1.524)*	−4.133 (1.179)**					
(H.1) Polarisation (Dalton index)	-.-	-.-	-.-	-.-	-.-	0.316 (0.448)	-.-	0.083 (0.576)
(H.1) Polarisation (MDP index)	-.-	-.-	-.-	-.-	-.-	-.-	−0.106 (0.390)	-.-
(H.2) Margin of victory (in %)	-.-	-.-	-.-	−0.067 (0.067)	−0.107 (0.051)*	−0.070 (0.069)	−0.065 (0.067)	−0.108 (0.051)*
(H.3) Log effective num. parties	-.-	-.-	-.-	0.380 (2.978)	−2.581 (3.325)	0.284 (2.982)	0.489 (3.049)	−2.621 (3.251)
Other controls?	No	No	Yes	No	Yes	No	No	Yes
Year dummies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.27	0.93	0.95	0.93	0.95	0.93	0.93	0.95
N	307	307	235	302	235	302	302	235

* $p < 0.05$;** $p < 0.01$

Note: Robust standard errors clustered at die country level reported in parentheses. Other controls include: a dummy variable to indicate the frequency and incidence of coalition governments (coalition habits dummy), the number of parties participating in government/cabinet and its interaction with log ENR the type of political regime (presidentialism vs. parliamentarianism), the degree of institutional constraints, the years of consolidated democracy and a dummy variable indicating government change

be interpreted with some caution. That is, there are reasons to believe that those results suffer from various sources of bias (e.g., omitted variables or endogeneity).

One such source of bias can be an omitted variable that can affect both voter turnout and also polarization at the same time. For instance, as previous literature has suggested the personal traits or characteristics of a candidate can be very influential both in the ability of its party to mobilize voters and also on the degree of perceived platform polarization. One can imagine that there can be a series of other unobservable or hard to measure parameters which can influence both polarization and voter turnout. As a result, omitted variables place the first important challenge to our OLS estimates.

In addition to omitted variable bias, as recent theoretical and empirical evidence suggests (e.g., Matakos et al. 2013), platform polarization also depends on the number of competing parties, which in turn can be endogenously determined by the (dis)proportionality of the electoral rule (Duverger 1954). Since empirical evidence (Gallagher 1991) and theoretical literature (Duverger 1954) suggest that electoral rules may also affect polarization through the structure of the party-system (e.g., number of parties) not accounting for this link and failure to test it jointly can result in a biased estimation (for details e.g., Cox 1990). Hence, this can be an additional explanation on the failure of obtaining statistically significant results under the OLS specification. Finally, there is always a very good chance that the OLS results also suffer from endogeneity. To put it simply, if voter turnout at year t is serially correlated with turnout in year $t-1$, then in the very likely case that polarization in year t also depends on past electoral outcomes (and turnout) it is obvious that a reverse causal link can be established between turnout and polarization.

For all the above reasons, we estimate Eq. (3) by introducing an IV to instrument for platform polarization. Moreover, econometric and technical reasons aside, there is a purely theoretical reason that justifies the use of a two-stage least squares (TSLS) specification. As the reader may recall, our argument on the possible link between proportionality and turnout is a two-step one. As we have shown, platform polarization is the mean through which electoral rules affect voter turnout. Hence, our theoretical model as well points to the direction of a TSLS specification by instrumenting platform polarization with the degree of electoral rule disproportionality.

4.2 Instrumental Variable Regressions: Electoral Rule Disproportionality

When it comes to the choice of our instrumental variable, our theoretical section can be quite instructive. As we have shown in Proposition 1 platform polarization is directly related to the disproportionality of the electoral rule: the more (dis)proportional the rule is the (lower) higher the degree of platform polarization. Hence, electoral rules constitute a good candidate for an instrumental variable

(IV). Moreover, apart from the theoretical considerations, there are other reasons of econometric nature that make electoral rules both a relevant (as Proposition 1 dictates) and a valid instrument. Electoral rule is a slow-moving, sluggish institutional variable. As a result, it is very unlikely that the electoral rule itself can also depend on voter turnout – this should address any endogeneity concern. Moreover, after controlling for the number of parties as we do, there is no other channel via which electoral rule disproportionality can affect platform polarization other than the one we have specified above. A similar argument is also made in Persson et al. (2007) where, in analogous fashion, they employ electoral rule type as an instrument for electoral fragmentation.[13] Hence, we conclude that our IV is not only relevant but also valid. Later in this section, we will resume the discussion behind the reasons that dictate the choice of electoral rule disproportionality as our IV. But first, we need to describe how we will operationalize the measurement of electoral rule disproportionality.

4.2.1 Measuring Electoral Rule Disproportionality

We construct the majoritarian bias parameter of the electoral rule n, as defined in our theoretical section. By combining data from two different sources (Armingeon et al. 2012; Carey 2012) we are able to estimate the bias parameter for 20 countries in our sample by applying the formula proposed by Taagepera (1986):

$$n = [\log(V)/\log(S)]^{(1/M)},$$

where V the total number of voters, S is the total number of parliamentary seats in the legislature and M is the average electoral district size (magnitude). Estimating this bias parameter permits a tight fit between our model's predictions and the empirical estimation. As we note in previous work (Matakos et al. 2013) "[an] additional advantage of using this variable, given that the electoral rule is a sluggish institutional variable, is that it is continuous and exhibits some within country variation, therefore allowing for both within and cross-country comparisons."

As a robustness check, we repeat our estimates using an alternative measure of electoral rule disproportionality as an instrument for platform polarization: a binary variable that takes the value of one whenever the FPTP rule with SMD is applied and zero otherwise. The rationale for using a binary variable as our instrument is as follows. Given that this version of our IV (electoral rule dummy) either does not vary at all or exhibits minimal variation within each unit (country), this allows us to effectively insulate our estimates from any additional concerns over endogeneity and ensure that the exclusion restriction (for our IV) is satisfied. For instance, one such concern might be that polarization could also affect the choice of electoral rules (for

[13] In many ways there is a clear analogy on how Persson et al. (2007) measure the index of electoral fragmentation with our own measurement of platform polarization using the Dalton Index as both indices capture the degree of vote share (or ideological) dispersion among different political parties.

a detailed discussion e.g., Matakos et al. 2013). Nevertheless, the sluggish or unit-invariant instrumental variable (electoral rule dummy) addresses any such concerns as, with the exception of three countries, it does not vary over time. For this reason, we present all our subsequent estimates under both specifications. Formally, in our TSLS model (Model 3) we estimate the following two equations:

$$\text{Polarization}_{it} = b_0 + \pi_1 Z_{it} + b_2 * \text{Margin}_{it} + b_3 * \text{ENP}_{it} + \mathbf{X}'_{it} * \boldsymbol{\gamma} + \lambda_t + \alpha_i + \xi_{it} \quad (3)$$

and

$$\text{Turnout}_{it} = \beta_0 + \beta_1 \widehat{\text{Polar}}_{it} + \beta_2 * \text{Margin}_{it} + \beta_3 * \text{ENP}_{it} + \mathbf{X}'_{it} * \boldsymbol{\gamma} + \lambda_t + \alpha_i + \epsilon_{it}. \quad (4)$$

Equation (3) specifies our first stage OLS regression, where Z_{it} is our instrument (electoral rule disproportionality) either in the form of the majoritarian bias parameter n (Model 3.a) or in the form of a dummy variable (Model 3.b) indicating the presence of FPTP system ($Z_{it} = 1$ and 0 otherwise). Remember that we measure polarization applying two distinct indices: the Dalton Index (DI) and the most distant platform (MDP) one. That is, overall we estimate four alternative first stage specifications with all of them yielding identical results. Equation (4) specifies the second stage regression, where we replace Polarization_{it} with its predicted value ($\widehat{\text{Polar}}_{it}$) from Eq. (3). As argued before, our theoretical results suggest that we should expect $\pi_1 < 0$, that is more disproportional rules result in less polarization. Similarly, we also expect the coefficient on Polarization in the second-stage regression to be positive ($\beta_1 > 0$). That is, according to our hypothesized relationship, increased platform divergence (more polarization) may reduce the indifference effect thus causing an increase in voter turnout.[14] We present our IV regression estimates (together with the first-stage regression results) in Table 3.

We also estimate the reduced form version of Model 3, using the natural log of the average electoral district magnitude as an additional alternative measure of our main explanatory variable, electoral rule disproportionality.[15] Formally, we estimate the following equation:

$$\begin{aligned} \text{Turnout}_{it} = {} & \beta_0 + \delta_1 \text{Disproportionality}_{it} \\ & + \beta_2 * \text{Margin}_{it} + \beta_3 * \text{ENP}_{it} + \mathbf{X}'_{it} * \boldsymbol{\gamma} + \lambda_t + \alpha_i + \eta_{it}. \end{aligned} \quad (5)$$

[14] That is, if one is to run the reduced form regressions (as we do in Table 4) the direct effect of electoral rule disproportionality (via our proposed mechanism) on voter turnout should be negative. That is, more disproportional (proportional) rules suppress (increase) voter turnout, exactly as we have hypothesized.

[15] An additional alternative measure of electoral rule disproportionality is the natural log of the average electoral district magnitude (as in Carey and Hix 2011). The idea behind its usage is that larger district magnitude reduces the effective threshold of exclusion, hence, making the electoral system more proportional (Taagepera 1986). We employ this variable only in the reduced form regressions presented in Table 4.

Table 3 2SLS regerssions on the effect of polarization (instrumented by electoral rule disproportionality) on voter turnout

Dependent variable	Voter turnout (%)							
	Model 3.a				Model 3.b			
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(H.1) Polarization (Dalton index)	5.293 (1.939)***	9.083 (4.093)**	2.687 (0.725)***	5.930 (1.523)***	-.-	-.-	-.-	-.-
(H.1) Polarization (MDP index)	-.-	-.-	-.-	-.-	3.840 (1.407)***	5.308 (1.752)***	2.087 (0.588)***	3.945 (0.925)***
(H.2) Margin of victory (in %)	−0.090 (0.088)	−0.192 (0.085)**	−0.088 (0.068)	−0.162 (0.066)**	−0.116 (0.088)	−0.188 (0.086)**	−0.106 (0.067)	−0.167 (0.072)**
(H.3) Log effective num. of parties	−2.818 (3.438)	−6.961 (5.218)	−0.437 (2.691)	−5.441 (3.327)	−5.727 (4.582)	−10.742 (4.284)**	−1.760 (3.161)	−8.647 (3.023)***
Adjusted R^2	0.88	0.78	0.91	0.88	0.89	0.86	0.91	0.90
	First-stage OLS regressions							
	Polarization (measured by the Dalton index)				Polarization (measured by the MDP index)			
Instrumental variable								
Majoritarian bias of ER (n)	−0.528 (0.148)***	−0.346 (0.168)**	-.-	-.-	−0.728 (0.192)***	−0.592 (0.187)***	-.-	-.-
First-past-the-post ER (Dummy = 1)	-.-	-.-	−1.601 (0.225)***	−1.200 (0.303)***	-.-	-.-	−2.061 (0.286)***	−1.803 (0.364)***
First stage *F-score* (on excluded IV)	12.79	4.27	50.84	15.65	14.45	10.04	51.83	24.50
First stage R^2	0.42	0.42	0.40	0.43	0.62	0.64	0.56	0.64
Other controls	No	Yes	No	Yes	No	Yes	No	Yes
Year$^-$ dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	253	235	302	235	253	235	302	235

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: Robust standard errors clustered at die country level reported in parentheses. Other controls include: a dummy variable to indicate the frequency and incidence of coalition governments (coalition habits dummy), the number of parties participating in government/cabinet and its interaction with log ENR the type of political regime (presidentialism vs. parliamentarianism), the degree of institutional constraints, the years of consolidated democracy and a dummy variable indicating government change

Clearly, since $\beta_1 = \delta_1/\pi_1$, we expect $\delta_1 < 0$ as more disproportional rules lead to a decrease in polarization ($\pi_1 < 0$) and in turn, a decrease in polarization should lead to a decrease in turnout ($\beta_1 > 0$). We present the estimates of the reduced form Eq. (6) above in Table 4.

4.3 IV Results

Our estimates presented in Table 3 provide strong support in favour of our first hypothesis (indifference): increased platform polarization (when measured by the Dalton Index) leads to a sizeable and statistically significant (at any conventional level) increase in voter turnout. The coefficient estimate, which ranges from 2.7 to 9.1, indicates that a one standard deviation (0.8) increase in polarization index is associated with a 4–7 percentage points increase in voter turnout. This result is not only statistically but also politically significant. Moreover, our findings are robust to alternative specifications (including more controls as in columns 2 and 4) and also to the use of alternative IVs (as in columns 3 and 4 where we use the dummy FPTP variable as our instrument). Furthermore, notice that in all cases the first-stage OLS estimates on the effect of the electoral rule on platform polarization are statistically significant (at any conventional level), large in magnitude and negative, as expected (the coefficient range is from -0.35 to -0.52 and from -1.2 to -1.6 respectively when two different IVs are employed).[16] That is, our first-stage regressions confirm the hypothesized relationship between electoral rule disproportionality and platform polarization (e.g., Cox 1990; Matakos et al. 2013) which implies that our IV is certainly relevant. In addition, in all but one case, the first-stage F-statistic on the excluded IV is well above the critical threshold value (of 10) that is suggested by the literature. Hence, we conclude that our instrument is also a valid one.

The same image also re-emerges when we replace the Dalton with the MDP index of platform polarization. Albeit the coefficients are slightly smaller in magnitude, they are still positive (ranging from 2.1 to 5.3) and statistically significant at any conventional level. The smaller magnitude is nevertheless expected and consistent with our hypothesis of abstention due to indifference. Clearly, the MDP index measures the platform divergence of the two most extreme parties which sometimes can be marginal or frictional parties and therefore less relevant in the eyes of prospective voters who might care less about the platforms of such frictional parties who play little role in policy formation. Similarly, the coefficients on the first-stage regressions are again negative (with a range from -0.6 to -2.1) and statistically significant at any conventional level in all specifications (as are the first-stage F-statistics). Thus, our IV results conclusively provide strong evidence in favour of our first hypothesis. The same is also true if one also looks at the reduced form regression results presented in Table 4.

[16] Our first-stage estimates can be interpreted as saying that a change in the electoral rule from pure PR to an FPTP system with SMD can be associated with almost two standard deviations increase in the polarization index.

Table 4 Reduced form OLS regressions of the 2-SLS model (Table III) replacing polarization with electoral rule disproportionality

Dependent variable	Voter turnout (%)					
	Model 4.a		Model 4.b		Model 4.c	
Explanatory variables	(1)	(2)	(3)	(4)	(5)	(6)
(H.1) First-past-the-post ER dummy	−4.301 (1.236)**	−7.114 (1.095)**	-.-	-.-	-.-	-.-
(H.1) Majoritarian bias of ER (“)	-.-	-.-	−2.796 (0.556)**	−3.144 (0.398)**	-.-	-.-
(H.1) Log of mean electoral district magnitude	-.-	-.-	-.-	-.-	1.459 (0.360)**	1.644 (0.264)**
(H.2) Margin of victory (in %)	−0.081 (0.067)	−0.143 (0.046)**	−0.086 (0.077)	−0.149 (0.042)**	−0.086 (0.076)	−0.148 (0.043)**
(H.3) Log effective number of parties	−0.108 (2.931)	−4.409 (2.318)	−1.390 (2.815)	−4.644 (2.344)*	−1.554 (2.845)	−4.842 (2.264)*
Other controls?	No	✓	No	✓	No	
Country dummies (fixed effects)?	✓	✓	✓	✓	✓	✓
Year dummies (fixed effects)?	✓	✓	✓	✓	✓	✓
R^2	0.93	0.95	0.94	0.95	0.94	0.95
N	302	235	253	235	253	235

$^{*}p < 0.05$; $^{**}p < 0.01$

Note: Robust standard errors clustered at the country level reported in parentheses. Other controls include: a dummy variable to indicate the frequency and incidence of coalition governments (coalition habits dummy), the number of parties participating in government/cabinet and its interaction with log ENR the type of political regime (presidentialism vs. parliamentarianism), the degree of institutional constraints, the years of consolidated democracy and a dummy variable indicating government change. In Model 4.c, the log of mean electoral district magnitude (Carey and Hix 2011) measures the proportionality of the electoral rule (larger districts imply more proportional rules) instead of the disproportionality

Concerning the remaining two hypotheses, we do find some support for the competitiveness pivotality one (H.2) as our results indicate that the closer a race is the higher is voter turnout. In all specifications the coefficient is negative (ranging from −0.1 to −0.2) yet it fails to be statistically significant even at the 10 % level in half of those (nonetheless it is statistically significant at the 5 % level in those specifications where additional control variables are included). The point estimates on the coefficient indicate that a decrease in the closeness of the race by 10 percentage points is associated with an increase in turnout by 1–2 percentages points. This is certainly a non-negligible effect. Yet, as our estimates indicate this mechanism that was previously championed by the literature does not appear to be the most predominant one. It rather seems that the missing link that we have uncovered through platform polarization can substantially explain the proportionality-turnout nexus.

Finally, we fail to find any support for our third hypothesis (party-system size) under almost all alternative specifications. Moreover, in those two instances (columns 7 and 8) where the coefficient on the ENP variable is statistically significant, its sign is the opposite than what was hypothesized. That is, contrary to H.3 an increase in the effective number of parties is associated with a decrease in voter turnout (coefficient ranges from −10.7 to −8.7). While somehow surprising, this finding is in accordance with previous findings in the literature (e.g., Powell 2000; Blais and Aarts 2006) which suggest that the positive relationship between proportional electoral rules and turnout, a quite robust empirical regularity, is not because there are more parties but, in fact, it could be despite the presence of more parties. As a result, we are left with the conclusion that the platform polarization mechanism seems to be the most robust amongst the three proposed links that connects electoral rule (dis)proportionality and voter turnout.

5 Concluding Remarks

Our study has uncovered a missing link in the proportionality-turnout nexus. We have shown that as more majoritarian (less proportional) rules tend to generate centripetal forces and drive parties' platform to converge (less polarization) voters become indifferent between the options available to them and thus are more inclined to abstain. Hence, there appears to be a strong and positive relationship between polarization and turnout.

In light of this finding, perhaps a less gloomy view on the recent trend of declining turnout in much of the industrialized world is permitted. If higher turnout is an outcome of more polarization (as our causal IV estimates indicate), then the

recent decline in turnout observed in much of the western world could also be a positive sign of more political moderation. Perhaps voters feel less compelled to vote when all alternative seem to be converging, which in turn is no reason for excessive worry but rather a signal of political maturity. That is, in more mature democracies, which are characterized by more moderation and less tensions, voters realize that old-fashioned partisan politics cannot have a dramatic impact in their lives. This need not necessarily be a negative thing as mature democracies tend to develop other channels of political participation and civic engagement than simple participation in partisan politics and elections. Contrary to that, it comes as no surprise that in countries where political tension and polarization is high voter turnout is also extremely high.[17] It is exactly the case that in less mature democracies political polarization and tension are very high and thus voters are more inclined to participate in partisan politics. Hence, as our work indicates low voter turnout rates do not constitute a good proxy for the quality of a democratic polity. It is therefore important to devote more effort into identifying and understanding the causal factors that drive voter turnout in order to be able to identify whether increased turnout is an outcome of more electoral competition (positive) or increased polarization (negative).

Finally, our research can also speak to another puzzle in politics: the declining rate of voter turnout in the majority of EU states (both in their national and also pan-European elections). As further European integration tends to foster convergence in a series of different policies it is not surprising that major European political parties have converged (in terms of their political platforms) with each other. In turn, if one is to believe our link between platform convergence and turnout, this can potentially lead to higher rates of abstention due to indifference as the major political parties, increasingly so, look alike as a result of deeper European integration.

Appendix

Proof of Proposition 1 The proof of this proposition can be split in to five distinct parts.

Part 1 Since the behavior of voters is unambiguous in this model we should focus on understanding the dynamics which determine candidate behavior. Given n we have that party L decides p_L in order to maximize

$$u_L(\hat{p}(p_L, p_R, n)) = -(\pi_L - \hat{p}(p_L, p_R, n))^2 = -\hat{p}(p_L, p_R, n)^2$$

[17]For example in the 2014 Turkish local elections, which were characterized by an unprecedented level of polarization and the political discourse was dominated by issues of national political agenda, voter turnout reached a staggering (by any standard) 91 %.

while party R decides p_R in order to maximize

$$u_R(\hat{p}(p_L, p_R, n)) = -(\pi_R - \hat{p}(p_L, p_R, n))^2 = -(1 - \hat{p}(p_L, p_R, n))^2.$$

Hence, $u_L(\hat{p}(p_L, p_R, n))$ is strictly decreasing in $\hat{p}(p_L, p_R, n)$ for every $\hat{p}(p_L, p_R, n)$ between zero and one and $u_R(\hat{p}(p_L, p_R, n))$ is strictly decreasing in $\hat{p}(p_L, p_R, n)$ for every $\hat{p}(p_L, p_R, n)$ between zero and one. Letting aside mixed strategies, this means that our two-player game is strategically equivalent to the two-player zero sum game in which one player (party L) decides p_L in order to minimize $\hat{p}(p_L, p_R, n)$ and the other player (party R) decides p_R in order to minimize $\hat{p}(p_L, p_R, n)$. Therefore, if we characterize the equilibrium set of this zero-sum game, we will have the equilibrium set of the game we are interested in.

Part 2 We notice that in equilibrium it has to be the case that $\hat{p}(p_L^*, p_R^*, n) = \frac{1}{2}$. As said our game is strategically equivalent to the described zero-sum game. Therefore, it has to be the case that the equilibrium implemented policy (which coincides with the value of the zero-sum game) is unique; all equilibria should deliver the same implemented policy. Imagine that in this unique equilibrium implemented policy is such that $\hat{p}(p_L^*, p_R^*, n) < \frac{1}{2}$. If party R deviates and proposes a platform $1 - p_L^*$, it will switch the implemented policy to $\frac{1}{2}$; this is obviously profitable for party R as it will bring the implemented policy nearer to its ideal policy. An equivalent argument rule out possibility of $\hat{p}(p_L^*, p_R^*, n) > \frac{1}{2}$. Therefore, in equilibrium it has to be that $\hat{p}(p_L^*, p_R^*, n) = \frac{1}{2}$.

Part 3 If the equilibrium set is non-empty, then an equilibrium should exist such that $p_L^* < \frac{1}{2} < p_R^* = 1 - p_L^*$. If an equilibrium exists and $p_L^* \geq \frac{1}{2}$ then $\hat{p}(p_L^*, p_R^*, n) = \frac{1}{2}$ suggests that $p_R^* \leq \frac{1}{2}$. This implies that (a) if $p_R^* = \frac{1}{2}$ party L can deviate to the policy $p_L = 0$ and, given our parameters restrictions, receive some votes and thus induce $\hat{p}(0, \frac{1}{2}, n) < \frac{1}{2}$ and that (b) if $p_R^* < \frac{1}{2}$ party L can deviate to the policy $p_L = p_R^*$ and thus induce $\hat{p}(p_R^*, p_R^*, n) < \frac{1}{2}$. This rules out possibility of an equilibrium such that $p_R^* \leq \frac{1}{2}$ too. Moreover, since our game is strategically equivalent to a zero-sum game it has to be the case that every equilibrium strategy is a minimaximizer strategy and the other way round. This along with the fact that our game also satisfies a symmetry notion ($\hat{p}(\mu, \nu, n) = 1 - \hat{p}(1 - \nu, 1 - \mu, n)$) suggests that if p_L^* is a minimaximizer strategy for party L then $1 - p_{L:}^*$ must be a minimaximizer strategy of party R.

Part 4 We observe that when $p_R > \frac{1+v}{2}$ there exists $\varepsilon > 0$ such that $\hat{p}(p_L, p_R, n)$ is differentiable in $p_L \in (1-p_R-\varepsilon, 1-p_R+\varepsilon)$. Routine algebraic manipulations

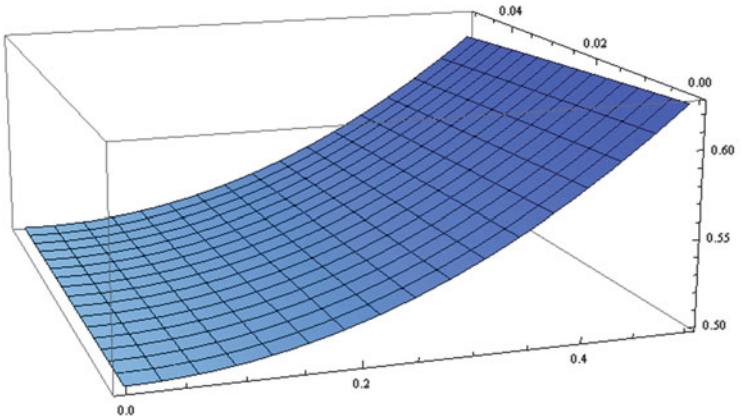

Fig. 3 Implemented policy—height—as a function of the policy platform of party $L, p_L \in [0, 1/2)$—length—and abstention parameter $v \in [0, 0.05]$—width—when $p_R = \frac{1+2n+\sqrt{1-4vn}}{4n}$ and the electoral rule is purely proportional ($n = 1$)

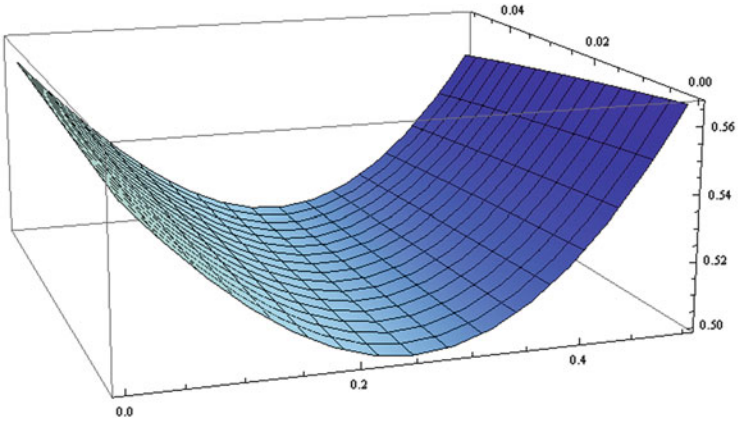

Fig. 4 Implemented policy—height—as a function of the policy platform of party $L, p_L \in [0, 1/2)$—length—and abstention parameter $v \in [0, 0.05]$—width—when $p_R = \frac{1+2n+\sqrt{1-4vn}}{4n}$ and the electoral rule is mixed ($n = 2$)

show that $\frac{\partial u_L(\hat{p}(p_L, p_R, n))}{\partial p_L}|_{p_R=1-p_L} = 0$ if and only if $p_L^* = \frac{-1+2n-\sqrt{1-4vn}}{4n} < \frac{1-v}{2}$ (in which case $p_R^* = 1 - \frac{-1+2n-\sqrt{1-4vn}}{4n} = \frac{1+2n+\sqrt{1-4vn}}{4n}$). That is, $(p_L^*, p_R^*) = (\frac{-1+2n-\sqrt{1-4vn}}{4n}, \frac{1+2n+\sqrt{1-4vn}}{4n})$ is candidate for an equilibrium. By plotting $\hat{p}(p_L, \frac{1+2n+\sqrt{1-4vn}}{4n}, n)$ we notice that it admits a unique minimum for any admissible pair of parameter values (see Figs. 3, 4 and 5) and hence

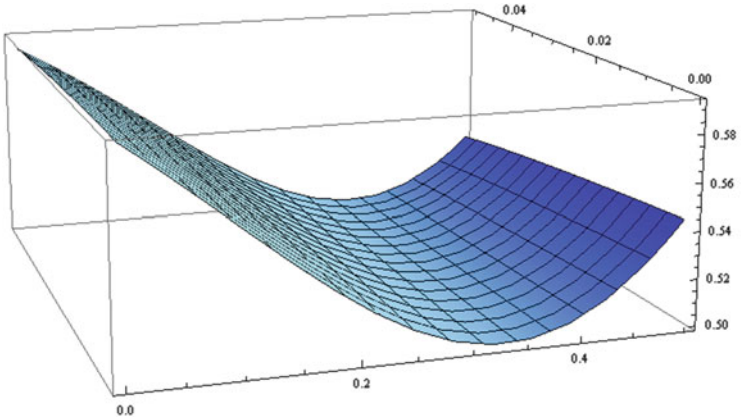

Fig. 5 Implemented policy—height—as a function of the policy platform of party $L, p_L \in [0, 1/2)$—length—and abstention parameter $v \in [0, 0.05]$—width—when $p_R = \frac{1+2n+\sqrt{1-4vn}}{4n}$ and the electoral rule is majoritarian ($n = 3$)

$u_L(\hat{p}(p_L, \frac{1+2n+\sqrt{1-4vn}}{4n}, n))$ admits a unique maximum too. That is party L has a unique minimaximizer strategy $p_L^* = \frac{-1+2n-\sqrt{1-4vn}}{4n}$ which suggests that our game admits the unique equilibrium $(p_L^*, p_R^*) = (\frac{-1+2n-\sqrt{1-4vn}}{4n}, \frac{1+2n+\sqrt{1-4vn}}{4n})$.

Part 5 It is straightforward that $\frac{\partial(p_R^*-p_L^*)}{\partial n} < 0$ and hence the distance between the equilibrium platforms is decreasing in the level of disproportionality of the electoral rule.

□

Proof of Proposition 2 This is straightforward as $\frac{\partial T^*(n)}{\partial n} < 0$ for every strictly positive and admissible value of the parameters. □

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Fiscal Deficits and Type of Government: A Study of Spanish Local Elections

Joaquín Artés and Ignacio Jurado

1 Introduction

Budget deficits are a common phenomenon in industrialized economies. However, we still know little about what determines whether countries or other political units run deficits. As public spending can be a countercyclical instrument, a recession or an increase in unemployment, like the ones currently experienced in Western economies, could justify temporary budget deficits (Alesina and Roubini 1992). The key question is therefore why certain governments have used them systematically, following a pattern that led many countries to reach unsustainable levels of debt (Grilli et al. 1991).

It is widely believed that this phenomenon cannot be fully explained by economic variables (Volkerink and de Haan 2001). Therefore, there has been research studying other political causes such as the electoral system (Grilli et al. 1991), the number of parties with parliamentary representation (Volkerink and de Haan 2001), or the partisanship of government (Carlsen 1997). Among these political determinants of deficits, the type of government has been a usual suspect. Since Weingast et al.'s (1981) seminal contribution, most theoretical models predict that when spending decisions have to be agreed by several actors, the result would be overspending. Therefore we should observe higher deficits under minority or coalition governments than under single party majority governments. However, empirical evidence on this issue has been quite mixed.

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In this chapter we argue that the inconclusiveness of the empirical evidence is related to problems of standard regression models to accurately capture unobserved heterogeneity. We use data from Spanish municipalities for the period 2004–2011 to compare the results of four typically used estimation methods: mean comparison, OLS, FE and matching. We argue that out of these models, matching deals better with unobserved heterogeneity and selection bias of the type of government. In addition, matching allows us to reduce estimating error.

Our matching model finds that minorities run lower surpluses. This result did not arise in simple mean comparisons or OLS models, or even in the FE specification. We believe that the lack of effect found in those models is due to a problem that is common to proportional representation systems, which is that the group of municipalities that have minority governments is likely to be fundamentally different than those that have majority governments across a range of characteristics that are relevant for fiscal outcomes. While our matching model is not free from problems, it provides a simple way to soften some of the most common empirical concerns that arise when estimating the effects of the type of government and it does so in a more efficient way.

This chapter proceeds as follows. The next section provides an overview of the current state of the art with regard to the effect of the type of government on fiscal outcomes. We also point out which are the limitations of previous research. Section 3 presents the Spanish case. In Sects. 4 and 5 we discuss the methods used in this chapter and the data. Section 6 displays all the empirical analyses, and discusses the results. Finally, Sect. 6 concludes and gives some notes on directions for future research.

2 Literature Review

What's the relation between fiscal outcomes and the type of government? This question has attracted the attention of a large theoretical and empirical literature. In the theoretical public choice literature, it is normally expected that coalition governments will lead to higher expenditure and deficits. This claim owes much to Weingast et al. (1981) and Shepsle and Weingast (1981) seminal formalization of the common-pool problem. According to their theoretical model, Weingast et al. (1981) suggest that when public policy decisions are made with the agreement of several decision-makers (as in coalition governments and minority governments that need parliamentary supports), all actors have incentives to pursue their policy agenda and overspend. Each actor internalizes the (electoral) benefits of expenditure in those policies that favour their constituency. However, the costs of financing them are shared among all actors, so they only internalize the fraction of the cost that their constituents will have to pay (Scartascini and Crain 2001). This leads to the 'law of

1/*n*'. Assuming that public programs are financed by general taxes, each party will support a level of expenditure for her constituency, such that the marginal benefit equals 1/*n* of its marginal costs, where *n* equals the number of actors (Weingast et al. 1981).

This theoretical argument suggests that minority governments, in which the incumbent party either forms a coalition or looks for supports in the legislature, would cause greater deficits and public debt. These straightforward theoretical predictions, however, have not found strong empirical support.

The usual approach is based on Roubini and Sachs' (1989a) seminal contribution. These authors created a political dispersion index for 15 OECD countries with four categories—one party majority government, coalition government with two or three coalition partners, coalition government with four or more coalition partners and minority governments. Based on an OLS analysis, they concluded that more fragmented governments lead to higher deficits. Since these first empirical studies, other research on deficits has yielded results in a similar direction, concluding that fragmented governments, in a variety of forms, solve the common-pool problem causing more spending and higher deficits (Roubini and Sachs 1989b; Borrelli and Royed 1995; Franzese 2000; Balassone and Giordano 2001; Woo 2003; Bawn and Rosenbluth 2006; or Falcó- Gimeno and Jurado 2011, among others).

Other research has been critical with the outcomes of this literature, describing it as inconsistent and not robust to slight changes of the model (de Haan and Sturm 1997). This line of research refutes the view that more unified governments are less prone to deficits (Alt and Lowry 1994) or that divided governments systematically run budget deficits (de Haan and Sturm 1994, 1997; de Haan et al. 1999).

Most of this research tends to rely on country-level data. Given that elections do not take place every year, analyses tend to draw on few country-level observations. Only recently, the literature has turned to analyse the political determinants of budget deficits by using data at the sub-national level. Ashworth and Heyndels (2005)—for the case of Flemish municipalities—Le Maux et al. (2011)—for the case of French Departments—and Baskaran (2013)—for the German Länder—find that coalition governments are associated with more spending.

In this chapter, we contribute to the growing body of research that studies the effects of the type of government at sub-national levels by studying its effects on fiscal outcomes of Spanish municipalities. We show that standard regression models may not be enough to control for significant differences in the characteristics of municipalities that have majority governments compared to those that have minority or coalition governments. Having several periods of study allows controlling for unobserved heterogeneity through fixed effects. However, when the number of periods is small and there are few municipalities that change their type of government from one election to the next, fixed effects models may yield either unreliable or inefficient results. We discuss the results of matching model as a simple alternative that may reduce estimation error.

3 The Spanish Case

Spain has three levels of government: National, Regional and Local. Elections at the local level, which are the focus of this study, follow a proportional representation system that assigns votes to representatives according to the D'Hondt rule. In order to obtain representation a party has to obtain more than 5 % of the valid votes. The number of representatives that each municipality elects depends on the population of the municipality and ranges between seven for municipalities of less than 1,000 inhabitants to more than 50 for larger municipalities such as Madrid and Barcelona.

There are two main parties in Spain. The main left-wing party is the Partido Socialista (PSOE), while the main conservative party is the Partido Popular (PP). Combined, the two main parties usually obtain approximately 70–80 % of the national vote on local elections. In many municipalities, however, neither PP nor PSOE obtain enough support to form a majority so they have to negotiate the formation of a government with one or several of the many smaller parties that obtain representation in the municipality. In addition, in some regions like Catalonia and Basque country there are nationalist parties such as PNV and CiU that are strong in their geographical areas of influence. Spain has a proportional representation system and a multiparty system. As a result, in many municipalities the strongest parties do not have enough electoral support to form an absolute majority government. This provides us with useful variation.

Fiscal autonomy of local governments in Spain comes from two sources. First, they have taxing powers on certain areas. Second, they also have spending powers, particularly in social care, security, environment protection, and local events. Thus, despite the fact that a share of the municipality's revenues is obtained through transfers from either the national or the regional governments, municipalities have room to increase/decrease their expenditure or raise/lower their taxes. In addition, during our period of study (2003–2011), Spain had no balanced budget rule to limit their fiscal autonomy.

4 Methods

Our empirical strategy consists of comparing and discussing the results from four different methods of estimation of the effects of the type of government on fiscal outcomes. We first use a simple mean comparison and a *t*-test. Secondly we estimate an OLS regression. We proceed then to run fixed effects models, to exploit within-municipality variation. Finally we propose a matching estimation as a way to overcome some of the empirical problems that arise when using the previous methods, in particular when the goal is to address effects related to elections.

In order to explain the advantages and disadvantages of each method of estimation we follow the impact evaluation literature and distinguish between treatment and control observations. Control observations are municipalities where

the incumbent party won a majority of the seats in the local assembly and therefore can form a single party majority government. Our treatment observations are those where the winning party could not form a majority by itself (it did not reach 50 % of the councilors of the municipality council). These are municipalities where the winning party had to find support of other parties to pass the budget, either by forming a government coalition or by seeking for support in the assembly. Ideally, if we want to isolate the effect of the treatment (having a minority government) on the outcome variable of interest (fiscal deficit), we would want the treatment (being a minority) to be randomly distributed across municipalities. If this was the case, a simple mean comparison of fiscal deficits in municipalities with a majority government and those without, would give us an unbiased estimate of the causal effect of the treatment. This is because, in that case, due to the random assignment (and if the sample is large enough), the characteristics of the population can be assumed to be equally distributed across treatment and control municipalities.

Obviously, the problem is that minority governments are not randomly assigned across municipalities. Municipalities with minority governments are likely to be fundamentally different than those in which the mayor forms a majority government. When analysing fiscal outcomes in proportional representation systems like the Spanish one, there are several characteristics that are likely non-random across majorities and minority governments. Let us discuss some of them and their implications for our analysis.

First, it is reasonable to think that mayors that were perceived as good managers in the previous election have a higher probability of forming a majority government in this election. Therefore, if we compare the mean deficit across majorities and minorities, we may find statistically significant differences that could not be attributed to the type of government but could rather be explained by the different ability levels of the mayors across treatment and control groups.

Similarly, if smaller municipalities are more likely to enjoy a majority government—which is the case when seats are allocated using the D'Hondt rule—and also have different taxing and spending powers compared to larger municipalities, we may find that a simple mean comparison yields a difference in fiscal deficits between majorities and non-majorities. This difference, however, could be due to either the type of government or the different fiscal powers of municipalities in the control group compared to those in the treatment group.

Finally, another example relevant for our case would be that of ideological differences among majority and minority governments. Conservative parties could be more likely to form majority governments than left-wing parties (or vice versa) if it were harder for them to find partners to elect a mayor when they do not obtain more than 50 % of the seats in the municipality council, or if they have support that is more concentrated geographically. Then differences in mean fiscal deficits between majorities and minorities could be due to either the treatment or more conservative governments running higher or lower deficits. This example is particularly relevant for the Spanish case because in many municipalities the Popular Party is the only conservative party that obtains representation on the municipality council while there are several parties on the left side of the political scale.

All three examples discussed above are relevant for the Spanish case and in all three (as well as in other examples), a *t*-test of the differences in means in the outcome variable of interest would not be useful as a tool to identify the causal effect of the treatment. Due to the problem originating from non-randomly distributed characteristics of the population of interest across majorities and minorities, one possibility could be to simply run an OLS regression to control for observable characteristics such as size, or ideology of the mayor. We could then estimate a model of the form:

$$Y_{it} = b_0 + b_1 \text{Treatment}_{it} + b_2 X_{it} + e_{it}. \quad (1)$$

Where Y would be the fiscal outcome of interest (either deficit, expenditures or revenues) in municipality i and year t; *Treatment* would take value 1 for municipalities that have minority governments; and X would be a vector of observable characteristics that we believe are non-random across treatment and control observations such as municipality size, the ideology of the major, local economic conditions, election year and several others). Note that in this specification we would be using mostly between variation,[1] which implies that our counterfactual—our estimate of the fiscal outcome that treatment observations would have had if they had not received the treatment—is given by the fiscal outcomes of municipalities with similar observable characteristics. If the simple model of Eq. (2) is saturated so that we include all relevant differences between treatment and control municipalities, b_1 would give us an unbiased estimate of the effect of the type of government on fiscal outcomes.

One problem of an OLS model like the one presented in Eq. (1), however, is that the ability of the model to correctly estimate the effect of the treatment relies on all relevant characteristics that differ across the treatment and control groups to be included in the model. If there are unobservable characteristics that differ between groups, then the estimates of b_1 could be far from the true treatment effect. A potential improvement upon the OLS estimation is to add a vector of individual fixed effects, which is possible in our case given that we have two electoral terms in our database. We can therefore estimate the following equation:

$$Y_{it} = b_0 + b_1 \text{Treatment}_{it} + b_2 X_{it} + \lambda_i + e_{it}\,. \quad (2)$$

where λ_i is the set of municipality fixed effects and all the other variables are the same as in (1). The fixed effects vector controls for unobserved time-invariant characteristics. This specification uses within variation, which implies that in this case identification arises from comparing the same municipality both when it has a minority government and when it has a majority one. The counterfactual of each treatment observation would be given by the fiscal outcomes of the same

[1] Unless there were few municipalities and many years, in which the variation would be mostly over time. However, this is less likely to occur in voting data.

municipality but in periods where the mayor did not form a majority government. Because of the ability of this model to control for both time-varying observable characteristics and unobservable time-invariant characteristics, this model is more likely to approximate better the average treatment effect. It has several problems, however, that prevent us from considering it ideal for our purposes. First, as with the OLS estimation of Eq. (1) it relies on all relevant observable *time-varying* characteristics being included and correctly parameterized. Second, if the number of municipalities that change their treatment status from one period to another is small, the effect would be identified from a small number of observations, which increases estimation error. Therefore, if it is relatively rare that municipalities change between minority and majority, it may be not just that we are identifying effects off of few observations, but that we are identifying effects off of rarities or unusual cases that behave differently than most. Third, there might be time-varying unobserved characteristics that could differentially affect treatment and control observations (e.g. ability level of the candidates, voter's information) that could still be related with fiscal outcomes and that could, therefore, confound the effect of the type of government on fiscal outcomes.

A fourth possibility that we explore in this chapter is to estimate a matching model. Matching methods (see, for example, Stuart and Rubin 2007, or Stuart 2010) aim to approximate the randomization ideal by selecting among non-treated observations, those that are more similar to treated observations across all observable characteristics. In particular, matching methods choose for each treated observation, a control observation that closely resembles or is even equal to the treated one in terms of observable characteristics. This is a key advantage for our purposes because we can use a matching algorithm to select control municipalities that have the same size, that have similar starting economic situation or electoral support for the mayor, and in which mayors belong to the same party. Therefore, the matching algorithm would allow us to avoid having treatment and control groups that are not balanced, which in turn avoids confounding the effect due to the type of government with the effects due to size, ideology or pre-existing economic conditions. In addition, matching requires much less modeling assumptions than standard regression methods. An additional advantage is that matching may also reduce estimation error (see Stuart and Rubin 2007; Smith 1997) because, even though matching uses less observations—e.g. it only uses a subsample of non-treated observations that are good controls—the fact that there is a better balance among treatment and control allows improving efficiency.

Matching, however, only assures balance on observable characteristics. The identifying assumption is that unobserved characteristics of control and treatment observations are similar. This is a plausible assumption in many cases because it is reasonable to think that if two municipalities are very similar across a wide range of observable characteristics, unobserved characteristics may also behave similarly in both places. While this argument is frequently used also to justify OLS estimation, the goal of matching is precisely to assure balanced observations while in a regular regression framework covariates control for general differences across all observations.

In our particular case, we present the results of two different matching models: a propensity score matching and matching based on Mahalanobis distance. In practice both methods lead to similar results but, given that both rely on different assumptions, they both together demonstrate the robustness of results. Our propensity score matching uses a logit regression model to estimate the probability of each observation belonging to the treatment. The covariates in this model are the same as those included in vector X in the OLS and FE models (Eqs. (1) and (2) described above). We then match each observation in the treatment group to the observation or observations in the control group that have the closest propensity score (nearest neighbour matching). Matching based on Mahalanobis distance is similar except that it uses a different measure—Mahalanobis distance instead of a propensity score—to select which observations are close to each other in terms of observables. In the results section we show that our matching method achieves a reasonable balance across groups.

5 Data

We estimate the four models described in the previous section using data from two Spanish local elections. The two periods of study are the electoral term from 2003 to 2007 and the one from 2007 to 2011. The two periods under study include a period of economic expansion (2003–2007) and a period of economic downturn. In both elections the two main parties obtained similar aggregate results overall, with PSOE obtaining 34.83 % of the vote share in 2003 and 34.92 % in 2007 and PP obtaining 34.29 % in 2003 and 35.62 % in 2007.

We use three sources of data. Our dependent variables (fiscal outcomes) were obtained from the Ministry of Public Finance. More specifically, they come from the *Base de Datos Presupuestarios de los Entes Locales* database, which provides very detailed information both on total expenditures and revenues of municipalities and on different types of expenditures and revenues. In this chapter we focus mainly on deficit or surplus, but we also use total expenditures and revenues to show how deficits or surpluses are produced.

Data on electoral results in each municipality were obtained from the *Electoral Results Database* collected by the Ministerio del Interior (Ministry of Internal Affairs). This database has information on the number of registered voters in each municipality, the number of valid votes and the number of votes obtained by each party in each election. We also obtained data on the party of the mayor that was finally elected.

Data on other characteristics of the municipality such as overall population and local economic conditions were obtained from *La Caixa Database*. This database offers information on unemployment, and several other indicators of economic activity in the municipality. This database only has information on municipalities that have more than 1,000 inhabitants, so we had to drop municipalities below that threshold. Although this reduces the sample size, municipalities that have more than 1,000 inhabitants represent more than 70 % of the total population of Spanish voters.

6 Results

Our first results are a set of *t*-test analyses on differences in fiscal outcomes between municipalities with a minority government and a single party majority. Results are shown in Table 1. It can be observed that mean differences between types of government are small. At a first glance, minority and majority governments generate very similar levels of fiscal deficits. While minority governments fall into an average per-municipality surplus of 1.11 %, majority governments produce an average per-municipality surplus of 1.106 %. This means that, although the level of surplus/deficit is lower/higher in minority governments, the mean differences are negligible and not significant.

This first analysis points to minority governments not showing a different fiscal behaviour compared to majority governments. However, as indicated in the methods section, a *t*-test analysis does not allow us to take into account the existence of characteristics that can alternatively explain deficit levels. In Table 2, we run OLS regressions on our dependent variable including a set of covariates that allow us to control for potential alternative explanations of higher deficits that might correlate

Table 1 Type of government and fiscal outcomes: *t*-tests

	Total sample	Majority government	Minority government	*t*-test
Deficit per capita	1.109	1.1063	1.1136	−0.0073^{ns}
Observations	5,785	3,709	2,166	

ns not significant
$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Table 2 Minority government and fiscal outcomes: FE and OLS regression. Dependent variable: surplus

Variables	OLS	FE
Minority government	−0.006 (0.205)	0.309 (0.381)
PP incumbent	0.900*** (0.271)	−0.0751 (0.659)
PSOE incumbent	0.328 (0.246)	−0.623 (0.579)
Size assembly	−0.0908*** (0.0291)	0.651*** (0.239)
Market share	0.00122 (0.00177)	0.188** (0.0736)
Increase in market share	0.0423 (0.0399)	0.0515 (0.138)
Unemployment	0.0152 (0.0377)	−0.731*** (0.212)
Increase in unemployment	0.115 (0.0866)	0.853*** (0.202)
2007–2011 electoral term	3.504*** (0.250)	3.943*** (0.433)
Constant	−2.545*** (0.413)	−13.08*** (3.522)
Observations	5,546	5,546
R-squared	0.069	0.129
Number of municipalities	2,869	2,869

Clustered and robust standard errors in parentheses
$^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

with the type of government. As discussed in an earlier section, a straightforward control is the partisan colour of the government. To account for these effects, we include two variables that capture if the municipality's major belongs to any of the main right- and left-wing parties in Spain: *PP government and PSOE government*. Right wing governments are presumed to be fiscally conservative and therefore we should expect them to run lower deficits. On the other hand, it is expected that the effect of left-wing governments will go in the opposite direction.

We also include several economic variables that control for the propensity to spend more at the local level. First, we include the effects of the *unemployment rate* on fiscal outcomes with two variables: the average unemployment rate in the municipality during the electoral term and the increase in unemployment over the electoral cycle. The former controls for the structural need of social spending in the municipality. The latter accounts for the impact of increases in social need that might have occurred in the specific electoral term and which might have put the local budget under pressure. Secondly, we also include the local market share, also as a level and increment. Unfortunately, we do not have GDP data at the local level. However, the *local market share*, taken from *La Caixa Database*, measures the normalized purchase capacity of the municipality relative to the total national market, and it is a good proxy of the level of economic activity.

Finally, at the institutional level, we also include the *size of the local assembly*. The rationale is twofold. First, as we explained above, majority governments might be more likely to be formed in small municipalities. When the assembly magnitude is low, the D'Hondt rule over-represents bigger parties that will be able to form a majority with lower vote shares. In addition, small municipalities have fewer competencies allocated and they have fewer areas of responsibility. Therefore, they might be less in need of spending and perhaps could be able to run more consolidated budgets.

Taking these variables into account, we run OLS models with clustered and robust standard errors and including a dummy for the second electoral term to consider different structural levels in the period 2008–2011 compared to 2004–2007. Column 1 of Table 2 shows the results. We find that our variable of interest—*minority governments*—is non-significant. This specification, therefore, points to conclusions that are similar to those obtained when looking at mean comparisons and seems to indicate that minority governments do not spend more than majority governments. Drawing upon our standard regression results, we cannot say that minority governments are more (or less) fiscally irresponsible.

These results, however, cannot rule the existence of unobserved heterogeneity. These models assumed that the characteristics of the population are equally distributed across treatment and control municipalities. As we explained in the methods section, there might be alternative variables not included in the model that might correlate with minority governments and that alternatively can also correlate with fiscal deficits. In order to control for that unobserved heterogeneity, the standard solution in the literature has been to exploit within unit variation with the inclusion of fixed effects. The results using this procedure are included in column 2 of Table 2. In this specification some of the control variables drop

their significance levels, as they basically explain between municipality differences, instead of within-municipality variation. As regards our main variable of interest, now we do obtain a positive coefficient that points to minority governments running 0.3 percentage point higher surpluses than majority governments, which contradicts the theoretical predictions of a large part of the literature. However, this coefficient is non-significant. Both the unexpected sign and the non-significance in this case, given that we are using within variation, could be due to the pool of municipalities that change their type of government status from one regression to another being relatively small and very heterogeneous.

So far, we have performed the standard analyses found in the literature. Drawing upon them, we cannot conclude that minority governments produce larger deficits. This finding is in line with the mixed evidence in the literature. As we explained above, in all these analyses we have tried to control for local level conditions that may bias the likelihood of receiving benefits. However, we cannot completely rule out that unobserved heterogeneity or endogeneity of the main independent variable distorts our results. Minority governments are still likely to be fundamentally different than those that have majority governments across a range of characteristics that are relevant for fiscal outcomes.

As a potential solution, our last set of analyses use matching methods to account—in a different way than regression methods—for those conditions that make minority governments more likely. More importantly, matching methods restrict the analyses to a subset of observations that are more comparable, reducing the estimation error. In addition, this method does not require establishing a further multivariate analysis between fiscal outcomes and the type of government. Matching equivalent observations already controls for contextual conditions, so a bivariate relation can be established (Ho et al. 2007).

We use a propensity score matching as our benchmark model. In the first stage we match observations according to the same set of observables that were included as covariates in the OLS and FE specifications of Table 2. In addition, we use a bootstrapping algorithm with 100 replications to nuance the effect of outliers. This first stage yields a very balanced set of observations. Figure 1 shows that there are a large number of treated and untreated observations with similar propensity scores. This can be seen as our sample having leverage for the analysis.

Once we estimate the propensity of each municipality to be a minority, we use both the nearest and the two nearest neighbour methods to compare fiscal outcomes of municipalities with different treatments, but similar propensity scores. Results are displayed in columns 1 and 2 of Table 3.

The most relevant finding of Table 3 is that once we tackle the non-random assignment concern through matching we do find significant differences on the generation of balanced budgets, which did not arise in more standard regression techniques. Minority governments produce fiscal deficits/surpluses between 0.57 and 0.64 perceptual points higher/lower than majority governments. These are differences of a relevant magnitude. The mean surplus in the sample is 1.1 %. This means that minority governments can run budgets with just around half of the total surplus of majority governments.

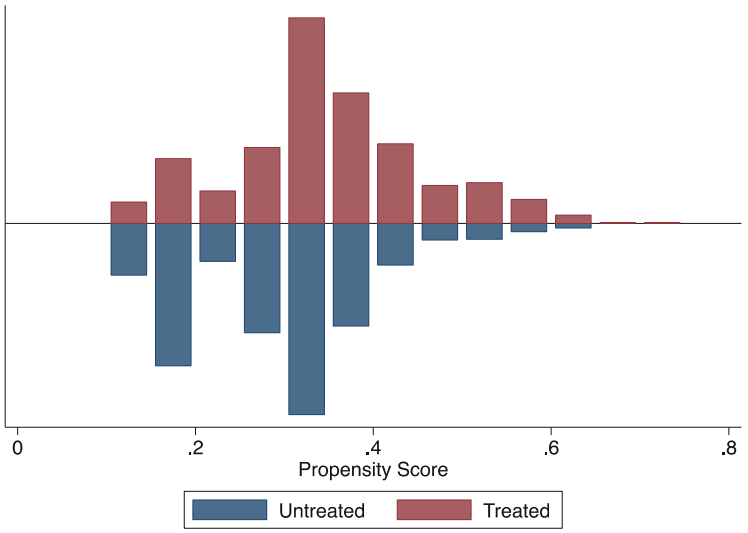

Fig. 1 Propensity scores and treatment distribution

Table 3 Matching estimates of surplus

Deficit per capita	PSM nearest neighb (1)	PSM nearest neighb (2)	Mahalanobis distance neighb (1)	Mahalanobis distance neighb (2)
δ_{ATE}	−0.64** (0.35)	−0.571* (0.331)	−0.846*** (0.302)	−0.726** (0.307)
N	2,512	2,512	2,512	2,512

Bootstrapped standard errors in parentheses
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$

To account for the robustness of these results, we have replicated the analysis using the Mahalanobis Distance as the criterion to match treated and untreated observations. The results are displayed in columns 3–4 of Table 3 and are basically similar to the propensity score matching analyses. In fact, the significance and magnitude of the results actually increase, confirming the previous conclusions. Minority governments run larger fiscal deficits than majority governments.

Altogether, the matching estimations have shown that the standard methods used in the literature on the political economy of fiscal deficits might not be enough to disentangle the relation between type of government and fiscal outcomes. OLS regressions and fixed effects models did not yield significant effects of the type of government on budget deficits. Tackling the problem of non-random assignment through matching, we have found evidence that minority governments run more unbalanced budgets than majority governments.

7 Conclusions

This chapter provides two main results that we think are a contribution to the literature on the political economy of fiscal deficits. First, we have shown the importance of going beyond standard regression techniques to analyse the effect of the type of government on fiscal outcomes. In order to identify correctly the impact of minority governments on policy-making, we need to understand that minority governments are not randomly assigned across municipalities. Municipalities with minority governments are likely to be fundamentally different than those in which the mayor forms a majority government. This violates the assumptions of standard regression techniques yielding biased estimators. In this paper we have shown that when we do not account of the non-random assignment, the type of government has no effect on fiscal deficits. However, we have shown that by using matching techniques, we can estimate the effect more precisely and show that minority governments are likely to produce more unbalanced budgets than majority governments.

We think this chapter also contributes to set up an agenda for future research. We believe that this chapter shows that some of the assumptions necessary for the regression models to hold are actually implausible when using electoral or government data. This would require applying other research designs and techniques that allows us to track down causality better and rule out the risk of unobserved heterogeneity, confounding explanations and endogeneity (see, for instance Artés and Jurado 2014). Here we have proposed a matching estimator as a step in that direction. However we are aware that the matching model used in this chapter also has drawbacks because the identifying assumption is that unobserved characteristics of control and treatment observations are similar. Future research should investigate other methods that can potentially eliminate that concern.

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Federalism, Proportionality, and Popular Will in US Presidential Elections: Did Colorado Have the Right Idea?

Jose M. Pavía and Fernando Toboso

1 Introduction

Almost all presidential democratic countries elect their head of state by direct election. The United States of America is among the exceptions. A small club in which Germany, Italy, South Africa, Greece, Bangladesh, or Latvia are also included. The President of the United States is elected by a body called Electoral College, composed of 538 members (since year 1992). Each state sends to the Electoral College a number of delegates equal to its total number of representatives and senators in Congress and, by virtue of the 23rd Amendment of the US Constitution, the District of Columbia also elects three additional electoral votes, even though it has no members of Congress.

The system employed to elect the President of the United States has been catalogued as unique (Thomas et al. 2013). The reason is that although some other western democracies also use indirect procedures, they all include, if they organize the election in large constituencies, some kind of proportionality in the allocation of the representatives in charge of nominating presidents. Indeed, despite the US being a reference worldwide, the US Presidential electoral system could be considered singular in the current international electoral scene. The winner-take-all rule employed in almost all the US constituencies combined with the large number of electors in contest in each state have a cumulative disproportional effect that frequently yields to highly asymmetric outcomes (see Fig. 1). For instance, in 1980 Ronald W. Reagan obtained 90.9 % of representatives of the Electoral College with 50.7 % of popular votes and in 1992 William J. Clinton reached 68.8 % of electors

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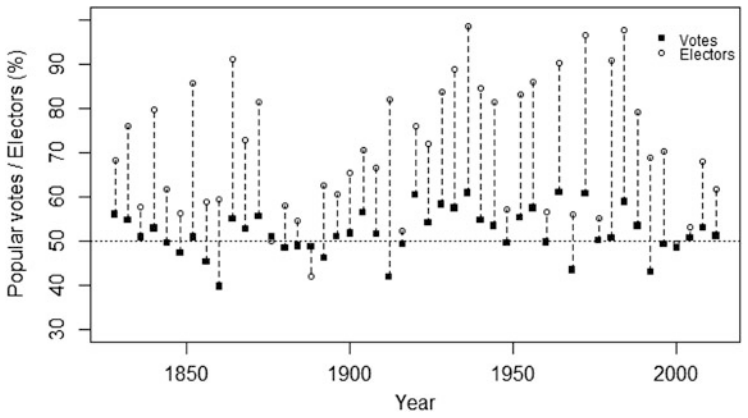

Fig. 1 Percentages of votes and electors gained by the candidate winning in popular votes in the US presidential elections from 1828 to 2012. *Source*: own elaboration

with a mere 43 % of popular votes. More recently, in 2012, Barack H. Obama obtained 61.7 % of representatives with 51.1 % of popular votes.

This cumulative disproportional effect seems to rekindle interest in possible reform of the Electoral College system every election, with the debate peaking each time a candidate who does not obtain the most popular votes is elected President (Pavía 2011). This last scenario happened following the 2000 US Presidential election outcomes, when George W. Bush was proclaimed President with 47.9 % of popular votes when Albert Gore Jr. had obtained 48.4 %.

Although an electoral system is defined by a large list of features, the two elements most influencing election outcome proportionality are the particular rules used to convert votes into representatives and the number of representatives elected in each constituency (Blais 1988, 1991; Lijphart 1994, 2012).[1] Despite this, almost all US electoral system analyses have been focused on studying the impact of modifying the number of constituencies. More specifically, it has been proposed that the winner-take-all method should be replaced by the so-called congressional district system or that the Electoral College system should be abolished.[2]

The abolishment of the Electoral College, electing the President by popular vote, has been a modification regularly suggested by detractors of the current system (e.g., Longley and Peirce 1996; New York Times 2004). However, this reform looks

[1]On the many other institutional-organizational aspects influencing electoral results see, for example, Lijphart and Grofman (1984), Cox (1997), Schofield and Sened (2006), Toboso and Arias (2006) or Schofield and Caballero (2011).

[2]As exceptions, Neubauer and Zeitlin (2003) study how different sizes for the Electoral College might have affected the outcome of the US Presidential election in 2000 and Pavía (2011) investigates how different allocating formulae, based on the d'Hondt rule, would have impacted on US Presidential election outcomes for historical elections.

an ambition really difficult to envisage since it would entail states giving up part of their powers, when they are not divisions created from the United States but, on the contrary, the Union was originated by a political integration of the states. Indeed, according to US Constitution each state is free to determine how to allocate its electoral votes and "... nothing in this Constitution shall be so construed as to Prejudice any Claims of the United States, or of any particular State." (Article IV, Section 3 of the US Constitution).

Proposals to modify the Electoral College system within individual states, however, are not uncommon (Thomas et al. 2013). For example, in 2013 Pennsylvania and Virginia legislators offered up bills to switch to the district system (Jacobson 2013), prior to the 2008 presidential election a group proposed a referendum in California to switch to the district system (Thomas et al. 2013), and during 2001 and 2002 twenty-seven state legislatures also suggested switching to the district system as response to the unpopular outcome of the 2000 US Presidential elections (Drage 2001).[3] Fortunately, according to National Popular Vote (2007), they were not passed. Had this strategy been adopted across the entire country, even more biased results would have been produced (Longley and Braun 1972; Johnston et al. 2006; Thomas et al. 2013), further magnifying the shortcomings of the current system.

Between both extremes (abolishing the Electoral College and status quo), nevertheless, there are intermediate solutions that, while continuing to respect the spirit of a federal nation like the US, enable proportionality to be incorporated into the process. This was, for example, the idea behind Amendment 36 to the Colorado Constitution proposed in 2004 (LCCGA 2004), which nevertheless was rejected. Thus, after studying the advantages and drawbacks of the current US Presidential system, we recalculate the outcomes of the US Presidential elections from 1828 to 2012 under the Colorado approach and analyze their consequences. The elections held between 1789 and 1824 were not included in this study due to the lack of records of popular votes before 1824 and because in 1824 more than a quarter of the Electoral College were appointed directly by state legislatures (Delaware, Georgia, Louisiana, New York, South Carolina and Vermont) and not by popular vote.

[3]The district system considers the congressional district division of each state and selects one Electoral College delegate by the popular vote within each congressional district and the remaining two electors by a statewide popular vote. This system reform, which implies an increase in the number of constituencies, is the only proposed Electoral College modification that has actually been tested in the United States (Peirce 1968), having been historically used in Illinois (1820, 1824), Kentucky (1792, 1796, 1800, 1804, 1808, 1812, 1816, 1820, 1824), Maryland (1796, 1800, 1804, 1808, 1812, 1816, 1820, 1824, 1828, 1832), Michigan (1892), Missouri (1824), North Carolina (1796, 1800, 1804, 1808), Tennessee (1804, 1808, 1812, 1816, 1820, 1824, 1828) and Virginia (1789, 1792, 1796), and being currently employed in Maine (since 1972) and Nebraska (since 1992).

The rest of the paper is organized as follows. Section 2 briefly outlines the current US Presidential election system and summarizes its pros and cons. Section 3 describes the Colorado proposal. Section 4 presents and analyzes the results of applying the method studied nationwide. Finally, Sect. 5 summarizes and concludes the paper.

2 US Presidential Election System: Advantages and Drawbacks

The President of the United States of America is elected by the Electoral College. The Electoral College system was established in Article II of the US Constitution, was amended (by the 12th Amendment) in 1804 (Kelly et al. 1991) and since then it has not further altered its fundamental workings, despite the changes involving the way states choose their representatives and affecting the magnitude and territorial distribution of the representatives.

The Electoral College currently comprises 538 members. Each state elects a number of members equal to the number of its Senators (always two) plus its number of Representatives in Congress. The District of Columbia, additionally, is afforded three more members since 1961. The 435 Representatives in Congress are apportioned among the states (with a minimum of one per state) in a fashion proportional to their population size, which is updated every 10 years with census figures. This makes smaller states have more power per capita (Dahl 2002) and reflects the will of guaranteeing every state a voice in the election process despite its size. Indeed, in the case that no candidate wins a majority of electoral votes or when the top two candidates are tied, the election is decided by the House of Representatives, where each state's delegation has one vote.

According to the US Constitution, each state has exclusive and plenary control over the manner of awarding their Electoral College members (Article II, Section 1, Clause 2: "Each State shall appoint, in such Manner as the Legislature thereof may direct, a Number of Electors, . . . "). The winner-take-all system, which awards all electoral votes to the candidate that receives the most popular votes, is currently used in 48 states and the District of Columbia, while the district system is used in the two remaining states (see Footnote 1 for details). Hence, the Electoral College system had been observed as a hybrid of popular voting and indirect systems to elect a President through a mechanism by which the results of separate elections in each state and the District of Columbia are aggregated to produce a nationwide outcome (Pavía 2011).

The main criticism to the Electoral College system focuses on the possibility that a candidate who gains most popular votes nationwide can lose the election; an issue that has happened three times along the years. Why is therefore such a system maintained? Beyond tradition and interests, some advantages must have a system with a history of more than 200 years to have survived the criticisms.

In whatever electoral system there is always a latent tension between choosing a clear winner and accurately reflect the wishes of voters, and it seems that the US system primes the first issue. The winner-take-all method (usually) exaggerates the margin of victory, frequently converting plurality in popular voting into a landslide electoral triumph, giving the impression of a mandate and national unity. Furthermore, supporters of the Electoral College (e.g., Kimberling 1992; Shelley 2002) have pointed out that the current system: (1) adds to the cohesiveness of the country by requiring a distribution of popular support to be elected President; (2) maintains the federal character of the country and the separation of powers; (3) encourages a two-party system, contributing to the political stability of the country by reducing the possibility of a third-party upstarting by winning enough electoral votes to throw an election; (4) enhances the status of minority groups boosting their integration in the two-party system; (5) quarantines election problems (as, for instance, suspicion of fraud in one state); (6) neutralizes turnout disparities among states; and, (7) prevents excessively heavy concentrations of power in larger states.

On the other hand, according to Kimberling (1992) and Edwards (2004), those against the Electoral College and supporting direct popular election focus their complaints on: (1) the possibility of electing a minority President (a candidate that does not win in terms of popular votes); (2) the risk of so-called faithless electors (electors pledging to vote for a candidate but voting for a different candidate); (3) the depressing voter turnout role of the Electoral College; and (4) the failure of the system to accurately reflect national popular will by amplifying voting power of rural populations and by reducing electorate choices (discouraging independent candidates which ultimately prevents to reproduce minority desires). Additional drawbacks of the current system have been also pointed out by Abbott and Levine (1991), Shelley (2002), Neubauer and Zeitlin (2003), Burden (2005) and Pavía (2011), including: (5) the exclusion in the discourse of the "non-in-play" state populations (those states where one political party conceded victory to its opponent because the estimated margin between them is considered to be too large to be recovered during the election campaign); (6) its reinforcing of an exclusionary two-party system; (7) its production of votes with unequal value; and, (8) its dependence on Electoral College size and on the formula used to distribute Electors among states.

Although supporters of the Electoral College system have tried to provide arguments against the criticism—considering faithless electors as isolated events that have never changed the outcome of an election, denying the effect of the Electoral College in discouraging participation, assessing the two-party system as a strength and considering as incorrect the common belief that the Electoral College pays more heed to smaller states than larger states (Banzhaf 1965; Longley and Dana 1992)—the truth is that, according to polls (Richie 2007; National Popular Vote 2011), the institution of a national popular vote system has remarkable popular support—with nevertheless unbalanced partisan support (Newport 2001), although converging (National Popular Vote 2011)—and could respond to the main arguments against the current system: the possibility of electing a candidate who does not achieve the most popular votes and the unequal value of citizens' votes.

The establishment of a national popular vote system, however, is hardly difficult. Today it is almost impossible to reach a broad enough consensus to modify the US Constitution in order to abolish the Electoral College system. It would result in a path of no return that individual states would hardly accept. Hence, the focus should be placed on finding a reform of the system that respects the federal character of the country preserving the current system's advantages and attenuating its weaknesses.

Before considering any proposal, however, it is important to be aware that (1) the winner-take-all rule is not in the US Constitution and that (2) some of the shortcomings credit to the Electoral College indeed should not be; they are more a consequence of the winner-take-all rule used to allocate electors than a consequence of the Electoral College itself. Certainly, under the winner-take-all formula, what is the value of the ballots casts in a state in favor of those candidates not reaching the plurality in the state? How a state population's will is reflected when only the state plurality opinion is observed? Or, in a state where opinion polls point to a clear victory on behalf of one candidate: What incentive would candidates have to visit and campaign on that state? What incentive would supporters of alternatives candidate have to vote?

The National Popular Vote proposal consisting in awarding in each state its Electoral College delegates to the candidate who receives the most popular votes in the entire United States tries to surround the amendment of US Constitution that entails to elect the President directly by popular vote, but it looks difficult to be accepted by states as it could be disrespectful with the individual state population will. On the other hand, the adoption in each state of the district system would not resolve the issue, but it would only change the spatial scale of the problem. The "non-in-play" states would be now replaced by a much larger number of "non-in-play" districts, with more population involved.[4] The electoral campaigning would change from battleground states to battleground districts. The likely of more biased outcomes would increase (Longley and Braun 1972; Johnston et al. 2006; Thomas et al. 2013). A major number of ballots would have had no value after the scrutiny. And, the risk of electing a minority president would also rise (Pavía 2011).

As an alternative solution, without eliminating the Electoral College, to the challenges posed by the winner-take-all rule, it emerges the proposal behind the 2004 Amendment 36 to the Colorado Constitution (LCCGA 2004). Although adopting a proportional method to allocate electors within each state would not be free of difficulties and might have flaws of its own, according to Pavía (2011), it would undoubtedly reduce many of the weaknesses of the current system. Voter turnout would more than likely be higher (Endersbyand and Krieckhaus 2008). More advertising and campaigning would occur nationwide and, as a consequence, more Americans would be included in the national election-year dialogue, increasing turnout figures (Holbrook and McClurg 2005). Every state will would be reflected more accurately. No candidate would have reason to completely concede a state

[4]Nowadays, about seven-eighths out of the population of the US live in non-competitive congressional districts, compared to two-thirds who live in non-competitive states (Pavía 2011).

to an opponent. The asymmetries among the value of the vote of citizens from different states and from the same state would be reduced. It would weaken the likely of electing a minority President (a candidate that does not receive the majority of popular votes). And, it would make it impossible to reach a majority in the Electoral College without a significant proportion of total national ballots. Obviously, as we can see below, this approach is not free of problems and also shows several drawbacks. Some of which, nevertheless, could be reduced introducing some small modifications on Colorado proposal.

3 Colorado Proposal

In this section, we present the proposition made in 2004, within the Colorado ballot proposals of that year, to amend the Colorado Constitution regarding the way its electoral votes are allocated and we show through several examples how it works. The text of this section reproduces almost literally the technical details of the proposition as this was presented to Colorado voters by the Legislative Council of the Colorado General Assembly (LCCGA 2004, pp. 33–35).

According to this proposal, the total number of electoral votes to which a state is entitled shall be divided among the presidential tickets on the general election ballot, based upon the popular proportional share of the total statewide ballots cast for each presidential ticket, subject to (1) and (2).

(1) The allocation of a presidential ticket's popular proportion of the state's electoral votes shall be in whole numbers and shall be made in the following manner:

   (1a) The total number of ballots cast in the state for each presidential ticket at a general election shall be divided by the total number of ballots cast for all presidential tickets that receive votes at that general election; and
   (1b) The proportion of a presidential ticket's popular vote, as determined in paragraph (1a), shall be multiplied by the number of electoral votes to which the state is entitled.

(2) The number of electoral votes that is attributable to the ballots cast for any presidential ticket, as determined in (1), shall be rounded to the nearest whole number, subject to the following limitations.

   (2a) No presidential ticket shall receive any electoral votes from the state if its proportion of the total ballots cast for all presidential tickets would reflect less than a full electoral vote after rounding to the nearest whole number.

(2b) If the sum of electoral votes allocated pursuant to paragraph (2a) is greater than the number of electoral votes to which the state is entitled:

(i) The allocation of electoral votes to the presidential ticket receiving at least one electoral vote and the fewest number of ballots cast shall be reduced by whole electoral votes until only that number of electoral votes to which the state is entitled have been allocated; and

(ii) The process set forth in (i) shall be repeated if, after the reduction of electoral votes as set forth in (i), the total number of electoral votes allocated to all presidential tickets remains greater than the total number of electoral votes to which this state is entitled, and such process shall be applied to the presidential ticket receiving at least one electoral vote and the next fewest number of ballots cast until the total number of electoral votes allocated to all presidential tickets is equal to the total number of electoral votes to which this state is entitled.

(2c) If the sum of all electoral votes allocated would be less than the number of electoral votes to which the state is entitled, the presidential ticket receiving the greatest number of ballots cast shall receive any unallocated electoral votes until all of the electoral votes to which the state is entitled have been allocated.

(2d) If two or more presidential tickets receive the identical total number of ballots cast for all presidential tickets and the allocation of electoral votes to which the state is entitled cannot be proportionally allocated in whole electoral votes to these presidential tickets, the secretary of state shall determine by lot which of these presidential tickets will have their number of electoral votes increased or decreased by a whole electoral vote until all of the electoral votes to which the state is entitled have been allocated.

Now, in order to better understand the Colorado formula, the above rules have been applied to some hypothetical distributions and displayed in Table 1. In all examples it is assumed that a total of 18 electors must be allocated among six presidential tickets (A, B, C, D, E, and F). In the first example, we show a situation in which after rounding the sum of electoral votes allocated is greater than the number of electoral votes to which the state is entitled. In the second example, it is exemplified a case in which after rounding the sum of electoral votes allocated equals the number of electoral votes to which the state is entitled. Finally, the third example presents how the formula works with a distribution of share of popular votes in which after rounding the sum of electoral votes initially allocated is less the number of electoral votes to which the state is entitled.

In short, the Colorado proposal to allocate electors works as follows. The proportion of votes cast for each ticket is multiplied by the total number of available electors and rounded to the nearest whole number to provisionally allocate electors. If the sum of the total provisionally allocated electors is less than the total number of available electors, the presidential ticket receiving the greatest number of ballots

Table 1 Examples of Colorado proposal performance for some hypothetical shares of votes

	Presidential tickets						
	A	B	C	D	E	F	Total
Example 1							
% popular votes	8.5	14.0	39.0	14.0	21.5	3.0	100
Initial allocation	1.53	2.52	7.02	2.52	3.87	0.51	18
Allocation after rounding	2	3	7	3	4	1	20
Final allocation	1	3	7	3	4	0	18
Example 2							
% popular votes	8.5	12.5	41.7	13.4	23.4	0.5	100
Initial allocation	1.53	2.25	7.51	2.41	4.21	0.09	18
Allocation after rounding	2	2	8	2	4	0	18
Final allocation	2	2	8	2	4	0	18
Example 3							
% popular votes	12.5	12.5	41.5	12.0	19.0	2.5	100
Initial allocation	2.25	2.25	7.47	2.16	3.42	0.45	18
Allocation after rounding	2	2	7	2	3	0	16
Final allocation	2	2	9	2	3	0	18

Source: own elaboration

is granted the remaining unallocated electors. If the sum of the total provisionally allocated electors is greater than the number available to be appointed, then the total electoral votes for the candidate(s) having received the fewest number(s) of ballots (which is provisionally receiving at least one electoral vote) is reduced by one. The subtracting process is repeated while the sum of the provisionally allocated electors is greater than the number of electors entitled to be appointed.

4 Applying Colorado Proposal to US Historical Presidential Elections

This section shows the outcomes that would have been attained in the US Presidential elections held from 1828 to 2012, had Colorado proposal been used in each state to allocate electors. It is obvious that many factors would have changed under such an occurrence. For example, voters would have voted in a greater number and candidates would have campaigned differently nationwide and across states. It is impossible however to know and quantify such possible differences. So, in line with Thomas et al. (2013), as this is a historical evaluation of a hypothetical system, we leave the debate of how such a change would affect to campaign strategies and voters' behavior to others, and we focus only on the direct effects on the mapping of popular to electoral votes. Consequently, the data used have been the outcomes actually registered at state level in the elections studied. In particular, the ones

available on Wikipedia (http://en.wikipedia.org/) in the webpages devoted to the US Presidential elections (Wikipedia 2014).[5]

Table 2 compares the actual results with the outcomes that would have been achieved if the Colorado rule had been used in each state in the 1828–2012 US Presidential elections. Candidate differences are narrower than actual results. This is no surprise, since as previously stated the winner-take-all method tends to exaggerate the margin of victory. The most striking result is the one obtained for the 1860 election, when Lincoln gained (in a Union with 32 states) 180 electoral votes (59.41 %) after collecting 39.65 % of popular votes with no votes in ten states and only around 1 % of votes in Kentucky and Virginia. However, had the Colorado method been used to allocate the electors, Lincoln would have been penalized for his really unbalanced state distribution of votes, gaining even a small share of electors (34.32 %) than of popular votes (39.65 %). Anyway, in general, as can be easily observed comparing Figs. 1 and 2, the differences between the percentages of votes received nationwide and the percentages of electors gained are, as expected, significantly reduced.

As a positive outcome of the system, in all elections a desired coincidence between the presidential ticket gaining the most number of votes and electors is obtained. Furthermore, in the 1876, 1888, and 2000 elections, when the winner-take-all system thrown a minority President, the candidates that received the most votes would have become President. In 1876, Tilden won in terms of popular votes with 50.92 % and would have beaten Hayes in the Electoral College after obtaining 189(+3) electoral votes. In 1888, Cleveland (48.63 % of popular votes versus Harrison's 47.80 %) would have been President after gaining 205 electoral votes. In 2000, the most recent controversial election, Gore (48.38 % of popular votes) would have also triumphed over Bush (47.87 %), gaining the majority of the Electoral College with 269 electors. In this last case, Nader, the third candidate (after collecting 2,883,105 popular votes), would have been the referee of the election, because he would have been added his electoral votes to those gained by Bush to provoke a draw in the Electoral College. A draw which would have favored Bush given that he had advantage in the House of Representatives.

As a negative outcome, however, the method had introduced instability in the election of the President. As many as in nine elections, the White House might have had a different resident than the one with the most electors and popular votes. Applying the Colorado method in the 1836, 1848, 1856, 1860, 1892, 1900, 1912, 1992, and 2000 elections would have yielded more open Electoral Colleges. No candidates would have reached a majority in the Electoral College and the correlation of power among candidates would have forced them to seek a deal to become President. Although in all elections the plurality in the Electoral College would be obtained by the most popular-voted candidate, in these elections a

[5]Denoting by XXXX the year of the election, for example 1952, the url address of the pages from which the data have been taken are http://en.wikipedia.org/wiki/United_States_presidential_election,_XXXX.

Table 2 Colorado rule president election estimates and real results

Election	Colorado method[a]	Actual results
1828[b]	Jackson 141 (+11) Adams 106 (+3)	Jackson 178 Adams 83
1832[c]	Jackson 169 Clay 88 Floyd (+11) Wirt 20	Jackson 219 Clay 49 Floyd 11 Wirt 7
1836[c]	Van Buren 145 Harrison 88 White 42 Webster 8 Mangum (+11)	Van Buren 170 Harrison 73 White 26 Webster 14 Mangum 11
1840[c]	Harrison 150 Van Buren 133 (+11)	Harrison 234 Van Buren 60
1844[c]	Polk 132 (+9) Clay 130 Birney 4	Polk 170 Clay 105
1848[c]	Taylor 135 Cass 122 (+9) Van Buren 24	Taylor 163 Cass 127
1852[c]	Pierce 151 (+8) Scott 127 Hale 10	Pierce 254 Scott 42
1856[c]	Buchanan 136 (+8) Frémont 84 Fillmore 68	Buchanan 174 Frémont 114 Fillmore 8
1860[c]	Lincoln 104 Breckenridge 73 (+8) Douglas 67 Bell 51	Lincoln 180 Breckenridge 72 Bell 39 Douglas 12
1864[d]	Lincoln 128 McClellan 105	Lincoln 212 McClellan 21
1868[e]	Grant 153 (+3) Seymor 138	Grant 214 Seymor 80
1872	Grant 208 Greeley 158	Grant 286 Greely 66
1876[f]	Tilden 189 (+3) Hayes 176 Cooper 1	Hayes 185 Tilden 184
1880	Garfiled 184 Hancock 182	Garfiled 214 Hancock 155
1884	Cleveland 203 Blaine 194 Butler 3 St. John 1	Cleveland 219 Blaine 182
1888	Cleveland 205 Harrison 188 Fisk 5 Streeter 3	Harrison 233 Cleveland 168
1892	Cleveland 209 Harrison 186 Weaver 44 Bidwell 5	Cleveland 277 Harrison 145 Weaver 22
1896	McKinley 228 Bryan 219	McKinley 271 Bryan 176
1900	McKinley 223 Bryan 221 Woolley 2 Barker 1	McKinley 292 Bryan 155
1904	Roosevelt 252 Parker 210 Debs 7 Watson 5 Swallow 2	Roosevelt 336 Parker 140
1908	Taft 243 Bryan 229 Benson 6 Watson 2 Hisgen 2 Chafin 1	Taft 321 Bryan 162
1912	Wilson 260 Roosevelt 134 Taft 111 Debs 23 Chafin 3	Wilson 435 Roosevelt 88 Taft 8
1916	Wilson 291 Hughes 227 Benson 9 Hanly 2 *Progressive* 2	Wilson 277 Hughes 254
1920	Harding 306 Cox 207 Debs 11 Christiansen 3 Ferguson 3 Watkins 1	Harding 404 Cox 127
1924	Coolidge 298 Davis 192 La Follete 41	Coolidge 382 Davis 136 La Follete 13
1928	Hoover 299 Smith 231 Thomas 1	Hoover 444 Smith 87
1932	Roosevelt 334 Hoover 191 Thomas 6	Roosevelt 472 Hoover 59
1936	Roosevelt 349 Landon 175 Lemke 6 Thomas 1	Roosevelt 523 Landon 8
1940	Roosevelt 315 Willkie 216	Roosevelt 449 Willkie 82

(continued)

Table 2 (continued)

Election	Colorado method[a]	Actual results
1944	Roosevelt 300 Dewey 227 Southern Democrat 1 Texas Regulars 3	Roosevelt 432 Dewey 99
1948	Truman 262 Dewey 225 Thurmond 38 Wallace 6	Truman 303 Dewey 189 Thurmond 39
1952	Eishenhower 291 Stevenson 240	Eishenhower 442 Stevenson 89
1956	Eishenhower 296 Stevenson 232 Nominated by petition 2	Eishenhower 457 Stevenson 73
1960	Kennedy 270 Nixon 261 Unpleged Democratic 5 Crommelin 1	Kennedy 303 Nixon 219 Unpleged Democratic 15
1964	Johnson 320 Goldwater 215 Unpleged Democratic 3	Johnson 482 Goldwater 56
1968	Nixon 240 Humphrey 225 Wallace 73	Nixon 301 Humphrey 191 Wallace 46
1972	Nixon 337 McGovern 200 Schmitz 1	Nixon 520 McGovern 17 Hospers 1
1976	Carter 274 Ford 264	Carter 297 Ford 240
1980	Reagan 285 Carter 222 Anderson 30 Clark 1	Reagan 489 Carter 49
1984	Reagan 324 Mondale 214	Reagan 525 Carter 13
1988	Bush 292 Dukakis 246	Bush 426 Dukakis 111
1992	Clinton 235 Bush 204 Perot 99	Clinton 370 Bush 168
1996	Clinton 273 Dole 227 Perot 37 Nader 1	Clinton 379 Dole 159
2000	Gore 269 Bush 263 Nader 6	Bush 271 Gore 266
2004	Bush 278 Kerry 260	Bush 286 Kerry 251
2008	Obama 289 McCain 249	Obama 365 McCain 173
2012	Obama 273 Romney 264 Johnson 1	Obama 332 Romney 206

Source: own elaboration using data from Wikipedia (2014)

[a]In brackets the electors directly appointed by the state legislature. It is assumed that electors assigned by a party will support, in the Electoral College, the candidate of that party

[b]In Delawere and South Caroline, electors were appointed by the state legislature and not elected by popular vote

[c]South Caroline electors were appointed by the state legislature and not elected by popular vote

[d]Alabama, Arizona, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia did not vote due to Civil War

[e]Mississippi, Texas, and Virginia did not vote due to reconstruction. Electors from Florida were appointed by the state legislature

[f]Electors from Colorado were appointed by the state legislature

coalition of the rest of electors belonging to the other presidential tickets might have moved away these candidates from the Presidency. An easy modification of the Colorado method would significantly reduce this contingency occurring. This could be attained by fixing at state level (as, for instance, Spain and Sweden do) a barrier that each presidential ticket should surpass to be entitled to gain electors. The issue translates to deciding the threshold. For example, without thresholds in California (currently, 55 electoral votes), a minority candidate would need less than 2 % of the state votes to gain at least one electoral vote. In contrast, a minority candidate would

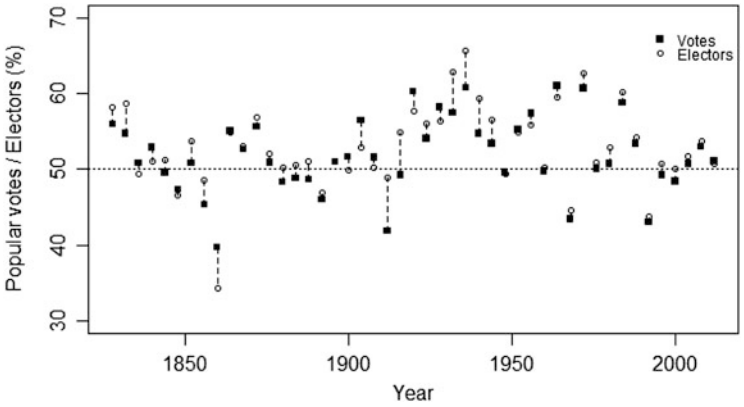

Fig. 2 Percentages of votes and electors gained after applying the Colorado method by the candidate winning in popular votes in the US presidential elections from 1828 to 2012. *Source*: own elaboration

need a quarter of Montana's votes (in an election with three candidates) to claim one of its currently three electoral votes. The probability of this potential drawback occurring, nevertheless, is not be completely eliminated using state thresholds and the likely of third candidates emerging would be significantly higher than with the current system.

5 Concluding Remarks

Whatever electoral system is a compromise between efficiency in choosing a clear winner and accuracy in reflecting public will (Turner 2005). The US Presidential electoral system is no an exception. The winner-take-all rule chosen by almost all states to allocate electors among presidential tickets is designed to increase the influence of states in the Electoral College by rewarding efficiency in producing a clear winner in the state. On the other hand, the Electoral College could be seen as a compromise between the one-person-one-vote and one-state-one-vote ideals,[6] which ensures regional balance between both large and small states in electing the President of such a large and diverse nation as the US. These two key elements of the current US Presidential electoral system, however, frequently act in the same direction, making results biased and even converting a slight majority in popular votes into a landslide. This becomes a major problem when, as occurred in 2000, a candidate that does not win the most popular votes is elected President. In these

[6]Indeed, the Electoral College system was the result of a compromise over whether the legislature or the people ought to elect the President. A compromise on how much power the people should have and how much power small and large states should have (Walbert 2014).

cases, the whole system is questioned and a debate ensued about the goodness of the system. According to Walbert (2014), the fairness of the system has been debated for more than 200 years, and it doesn't appear that the debate is going to die down anytime soon.

In order to amend the inefficiencies of the system, mainly derived from its shortfalls in translating popular will, two major changes have been recurrently proposed: to switch from the winner-take-all rule to the district formula and to abolish the Electoral College. The first option has been repeatedly shown as inappropriate in the literature. It would more than likely magnify the shortcomings of the current system, increasing: (1) the risk of electing a minority President, (2) the number of ballots with no value after counting the votes, and (3) the possibility of more biased outcomes. On the other hand, abolishing the Electoral College and electing the President by popular vote, although theoretically reasonable, would eradicate some of its undoubtable merits. The Electoral College (1) contributes to the cohesiveness of the country by requiring a regional distribution of popular support to be elected President and maintains the federal character of the nation, and (2) ensures that all the citizens have a say in selecting the national leader, even those of the smallest states (Kyvig 1996).

Hence, adopting a proportional rule (such as the Colorado proposal) at state level could be a good midway alternative to diminish some of the abovementioned winner-take-all shortcomings at the time that many of the strong points of the Electoral College are retained. This would be respectful with the federal character of the country and would contribute to preserve the territorial cohesiveness of the US by requiring a geographical distribution of popular support to be elected President. In addition, it would reduce the problems derived from possible suspicion of fraud in one state and from concentration of power in larger states.

Proportional rules are not, however, a panacea. They would open the door to minority party candidates and would lead to situations where an elector or a small group of independent electors might have the keys to the White House. Indeed, allocating votes proportionally would certainly increase the probabilities of events of this type happening. Thus, because of nobody would be happy with a potentially unstable system, including state thresholds could be a proper way of mitigating the chance of this adverse consequence happening. Thresholds, however, would pose a new question: What would the limits be? How many votes would a candidate need statewide in order to reach representation? As an alternative to setting thresholds, a formula whereby electors were allocated only between the top two tickets could be suggested. This option looks simpler, although seems less respectful to minorities, and helps to convert the two-party system into an inevitable scenario.

The drawbacks mentioned above, unfortunately, are not the only shortcomings that adopting the Colorado rule nationwide could entail. Since this option conserves the Electoral College, the risk of electing a vote minority President would not be completely eradicated. The two-vote bonus given to each state as part of the "Great Compromise" between large and small states implanted in 1787 (Kyvig 1996)

makes it impossible to exclude the chance of this happening. Replacing the winner-take-all method with the Colorado formula would unquestionably produce Electoral Colleges with a correlation of power better adjusted to the national correlation of votes and, therefore, it would theoretically diminish the probability of a minority winner. Therefore, it would satisfy many critics of the current system and would temper their criticisms, but would not silence them completely. Indeed, they could even come back stronger if a candidate who does not win the plurality of votes nationwide obtained a majority of electors.

In addition to the abovementioned potential shortcomings of the Colorado rule, there are other (maybe more powerful) political and historical beliefs, deeply internalized by American elites and population, which would be a likely insurmountable obstacle in the pathway of adopting such a formula. Since Thomas Jefferson claimed that Virginia should switch to a statewide winner-take-all system from its then-existing district system and argued that it was a political disadvantage for the state to split its electoral votes (Risjord and DenBoer 1974), it has been widespread assumed in the American *imaginarium* that splitting state electors implies a decrease in the relative influence of the state in the Electoral College as its total number of electors has been reduced. Thus, under this general conviction, any method that involves a split of electors would only be accepted in a scenario in which all states would switch to the Colorado approach simultaneously. It would be really very difficult for states to begin adopting the Colorado approach unilaterally on a piecemeal basis, since under the previous assumption each additional state switching to the Colorado rule would increase the influence of the remaining states in the Electoral College and, according to game theory, this would discourage them from adopting it. In fact, while partisan considerations prime over a proper translation of state citizens' will, it will be really difficult to evolve from the winner-take-all rule to other systems more minority and individual-friendly (Pavía 2011).

The winner-take-all system is the linchpin of the current US political system. As such, any change would have wide ramifications in all features of its political system: presidential campaigns, political participation, electoral coalitions, and the two-party system. Thus, recognizing that the winner-take-all system reinforces the existing power structure, which benefits the two major parties, and that it is commonly accepted that it maximizes the power of each individual state, it is politically unfeasible that the current system can change. The above *what-if* exercise and the arguments wielded, therefore, should be seen as a contribution to informed debate, which helps to comprehend the strengths and weaknesses of the current US Presidential election system.

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