Chapter 3
Social Choice

3.1 Introduction

A major theme in the pronouncements of the Reagan administration in the United States and of the Thatcher government in Britain during the 1980s was that Keynesian economic theory provided an excuse for the previous governments of these countries to intervene in their own economies in a way which lead eventually to high unemployment and inflation. One version of this argument, due to Buchanan and Wagner (1977), asserts that, once a government implements Keynesian deficit spending strategies, it becomes susceptible to various special interests in the economy. In an attempt to remain in office, the government adopts policies which result in an increase in the money supply and thus in the rate of inflation. A related argument, presented in the literature on the so-called "political business cycle," suggests that governments will seek to bring about those combinations of inflation and unemployment which are "politically optimal" in terms of electoral response at the time of an election, in an effort to assure re-election. These politically optimal combinations will not coincide with economically optimal combinations, but instead will generate, in the long term, increasing rates of inflation and levels of unemployment.

Keynesian economics was based on the assumption that inconsistent expectations of producers and consumers are persistent features of free market economies. The privileged role of benevolent dictator was given to government, so that its spending strategies might off-set the inconsistency of expectations, encourage investment, and increase output and employment. The new conventional wisdom of the 1980s rejected Keynesian economic theory and returned to pre-Keynesian assumptions. In its simplest form, the neoclassical theory asserts that free markets will tend to be in a state of Pareto optimal equilibrium, as long as government restricts itself to a minimalist strategy. Such a strategy includes increasing the money supply at a constant and declared rate, equal to the long term expected rate of economic growth, reducing the government budget deficit to zero, and if possible bringing about a drop in the government share of GNP. This "disentanglement" of government from the

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Table 3.1 Twelve developed polities July 2010*

Country (Gov[g])	G[a]	B[b]	E[c]	U[d]	C[e]	T[f]
Corporatist						
Sweden (67)	31.0	−2.1	1.8	9.1	+6.6	+10.9
Denmark (62)	32.0	−5.8	1.2	4.2	+2.6	+12.3
Austria (52)	34.0	−5.0	1.1	4.9	+1.6	−4.8
France (53)	30.2	−8.4	1.5	10.1	−2.1	−60.2
Average (59)	–	−5.3	1.4	7.0	–	–
Mixed						
Belgium (56)	32.9	−6.0	1.3	11.6	−0.1	+19.3
Italy (54)	28.0	−5.3	0.7	8.3	−2.6	−9.6
Germany (49)	30.7	−5.6	1.6	7.8	+5.3	+207.2
Netherlands (54)	35.1	−6.2	1.2	5.8	+5.5	+51.3
Average (53)	–	−5.8	1.2	8.4	–	
Liberal/Plurality						
UK (43)	32.8	−12.8	1.3	8.0	−1.0	−131.6
Canada (48)	34.0	−4.3	3.1	8.1	−1.8	−2.8
US (34)	41.8	−11.0	3.1	9.9	−3.3	−546.4
Japan (34)	30.8	−7.9	2.1	5.0	+3.2	+71.9
Average (40)	–	−9.0	2.1	7.75	–	
Overall (51)	–	−6.7	1.6	7.7	–	

[a] G = GDP/capita in thousand US dollars
[b] B = Budget balance deficit (−) or surplus (+) as a percent of GDP
[c] E = Estimated change in GDP, over previous year
[d] U = Unemployment, average percent, over previous year
[e] C = Current account as a percent of GDP
[f] T = Trade balance (merchandise) in $billion
[g] Gov = Government spending as a percentage of GDP
*Source: OECD: http://www.oecd.org/linklist

economy would reduce the politically induced inefficiencies in the economy and bring about higher rates of economic growth. As agents and coalitions realize that they cannot expect assistance from government on terms which are economically irrational and politically motivated, they will increasingly accept their "legitimate" returns, from the free market. According to Usher (1981) this should reduce the level of distributional conflict in the political economy.

Garrett (1998) has compared the "corporatist democracies" with the polities based on plurality, in order to see which of them proved adept at maintaining economic growth in the so-called "global world economy" since 1980. Table 3.1 uses Garrett's typology of three different categories of countries for 2010 to present macro-economic data on twelve developed polities.

The four corporatist polities tend to have quite powerful social democrat parties that have been in office at least at some time during the 1980s. (Garrett also includes Finland and Norway in this first category, but places France in a mixed category.) In the four liberal/plurality polities, the left was out of power in the 1980s. While it

is not evident that the twelve countries can be so readily classified, nonetheless Table 3.1 is suggestive. There does seem to be a tendency for governments of corporatist democracies to absorb a greater share of GDP. Unemployment in the 1980s in the Scandinavian democracies tended to be lower than in the OECD as a whole, while growth was somewhat lower and inflation somewhat higher than in the United States. Table 3.1 shows that the two Scandinavian countries, as well as Germany and the Netherlands, have current account and trade surpluses. Indeed, in August 2010, it was announced that Germany's economy grew 2.2% in second quarter of the year. The United States and the United Kingdom both have very substantial trade and budget deficits, as well as high unemployment rates of 9.9 and 8.0% respectively.

The boom years up to 2007, were associated with a new wave of technological innovations: container ships, satellite communications, computers and the internet. As Reich (2010a,b) points out, these changes contributed to an increase in productivity, but contrary to economic theory, these productivity increases had little impact on the median male wage.[1] Just as we have noted in Chap. 1 for Britain at the beginning of the Industrial Revolution, inequality in the US has increased over the last 30 or 40 years.[2] King (2010) observes that the Gini coefficient of income in the US increased from 0.397 in 1967 to 0.463 in 2007, due to the higher proportion of income going to the highest quintile. Higher inequality because of a shift to an industrial society (as in Britain in the nineteenth century, or China at present) is consistent with the work of Kuznets (1965). Presumably the same holds true in the shift from a manufacturing economy to an advanced service economy.

To cope with these changes, more women joined the labor force, and men and women worked longer hours, they borrowed more from the increasing value of their homes, while they saved less.[3] The crisis in confidence associated with the collapse of the housing bubble and the recession, starting in late 2007 has induced fear of the future, and brought the savings rate back up to over 6% in the US, as of June 2010.[4]

It is probable that technological changes have induced a change in the balance of comparative advantage between the developed economies of the "North" and the developing or less-developed economies of the "South," resulting in the fairly high unemployment rates in the OECD countries in general, and the increase in inequality in the more market oriented polities of the UK and US. The old-established political balance between efficiency and equity has been disturbed in all developed polities.

The contraction in economies from the peak in late 2007 to the trough in mid 2009 was a world wide phenomenon. The worst hit were the counties in the

[1] Reich comments that the median male wage is less, when adjusted for inflation, than 30 years ago.

[2] Forty years ago the richest 1% gained 9% of total income in the US. In 2007 they gained over 23%.

[3] The savings rate for the US had been about 9% of disposable income over the long run from say 1965 to 1985, but dropped to −0.4% before the crisis.

[4] In September 2010, the Federal Reserve estimated that total household liabilities had dropped about $200 billion to $13.9 trillion while credit card debt had dropped $83 billion to $830 billion, both in a year.

former Soviet bloc. From peak to trough some of these economies fell over 25%.[5] Ireland and Iceland fell 14 and 16%, respectively, while even the Asian tigers like Taiwan (−10%) and Singapore (−9%) contracted. The resulting difficulties have been exacerbated in Europe by the adoption of the euro. As a consequence, unemployment rates in the European periphery are currently very high (19% in Spain, and 16% in Greece). These two countries had high budget deficits of 11.5 and 9.4% of GDP, respectively. Greece was the recipient of a rescue package of about 110 billion euro. With total external debt about 170% of GDP debt of the order of 160% of GDP, Greece was forced in late June 2011 to seek another bailout of order 120 billion euro. The austerity plans of the Greek government have been opposed by protests, raising the possibility of a default. Possibly the worst hit country was Ireland. The *Economist*, on November 18, 2010, estimated the Irish budget deficit to be 15% of GDP for 2009, rising to 32% for 2010. Total debt had increased from 65% of GDP for 2009, to an estimated 98% for 2010, while unemployment had risen to 14%. In December 2010, the Irish government obtained a loan of about $93 billion from the IMF, the European Commission and the European Central Bank. Brian Cowen, the prime minister of Ireland, had said on Monday, November 22, that he would dissolve his government and hold an election once a new national budget was enacted. Cowen's coalition government, with a narrow majority in the Dail, the Irish parliament, was threatened by the reluctance of independent and Green Party members to back an austerity budget. Eventually, on December 7, the 2011 budget, involving spending cuts and tax increases of 6 billion euros was passed by a vote of 82 to 77. Cowen first resisted demands to resign, and attempted to reorganize the cabinet, but the Greens refused to agree, On January 22, 2011, Cowen was forced to resign as leader of his party, Fianna Fail, and Parliament was dissolved on February 1, and an election held on February 26. From 78 seats in 2007, Fianna Fail only took 25, and Enda Kenny of the opposition party, Fine Gael, became Taoiseach (Prime Minister) of Ireland on 9 March.

By January 2011, it was clear that Portugal was also in a bad way. Even with its cost cutting efforts, the budget deficit was about 7%, with total government debt about 118% of GDP. It seemed likely that it would need to obtain an aid package of 40–80 billion euro. Prime Minister Jose Socrates, of the Socialist Party, resigned on March 23, and his caretaker government obtained a bailout of $116 billion on May 3, 2011. In the election of June 5, the center right Social Democrats, under Pedro Passos Coelho, took 39% of the vote to 28% for the Socialists and 12% for the Popular Party. Coelho will lead a coalition with the Popular Party, and promised austerity measures to deal with the crisis.

Belgium had an election in June 2010, Yves Leterme has led a caretaker government, since then, but Bart de Wever, leader of the opposition New Flemish Alliance has been unable to form a coalition. With a debt load of nearly 100% of GDP, it began to experience difficulty in financing its debt and was also looking for assistance of the order of 50 billion euros. Spain was also lining up for a package,

[5]Latvia −26%, Ukraine −20.4%, Estonia −20.3%, Russia −10.9%.

estimated at 400 to 500 billion euros. Even Italy, with a debt load of 118% of GDP could require up to 1 trillion euros. Germany refused to increase the 750 billion euro ($1 trillion) financial fund set up to help euro members that run out of money, and was joined with France in refusing to set up a system of euro zone bonds.

In 2008, Iceland had become bankrupt, but had negotiated a bail-out, and because its currency, the krona, was not tied to the euro, it was able to escape some of the severe consequences that the EU economies experienced in 2010. Iceland had let its banks fail, but made $2 billion of taxpayers money available to new banks. The bank debt owed to British and Dutch depositors was $5.8 billion, about 46% of Iceland's GDP. Government debt is about 100% of GDP, and Iceland is being sued by Britain and the Netherlands in EFTA.

From peak to trough the EU economies dropped about 7%. Iceland had let its banks fail, but made $2 billion of taxpayers money available to new banks. The bank debt owed to British and Dutch depositors was $5.8 billion, about 46% of Iceland's GDP. Government debt is about 100% of GDP, and Iceland is being sued by Britain and the Netherlands in EFTA.[6] Greece for example lost 6.6%, and even in the second quarter of 2010 Greece experienced a 1.5% contraction in its economy. Germany also lost 6.6% but by mid 2010 had begun to grow again, and its budget deficit was only about 5.6% of GDP. As a result the overall economy of the euro area was able to manage a 1% growth in 2010.

Britain lost 6.6% and has not yet recovered, while the US lost about 4%. As Table 3.1 suggests, the US budget deficit for fiscal year 2010 is about $1.5 trillion (about 11% of GDP), bringing its total debt to $17 trillion (about 120% of GDP).[7] The equivalent figures for the United Kingdom are a deficit of £140 billion (about $240 billion) and a total debt of £927 billion (or 68% of GDP). These partial recoveries have done little to reduce unemployment and budget deficits, and all these countries face severe political difficulties as a result. It is very likely that other coalition governments in Europe will fall, the result of the economic restrictions imposed by the euro together with the political effects of a proportional electoral system.

Shapiro (2008) argues that the continuing expansion of outsourcing of skilled services through globalization will increase and lead to continuing increases in unemployment in the developed counties. This may be ameliorated as the population ages, but then a smaller working population has to provide for a growing population of retirees, leading to increasing budget deficits. As we note in Chap. 6, the government of the United Kingdom announced in October 2010 that its budget deficit had forced it to cut child allowances and financial support for Universities. These difficulties may prove more difficult for the economies of the European Union in the long run than for the United States.[8] Many commentators fear that Europe will

[6] Sweden −7.5%, Denmark −7.3%, Italy −6.8%.

[7] Total US debt had increased from about $12.9 trillion (90% of GDP) in 2008.

[8] One reason may be that the United States has a very diversified trade regime with many countries. Indeed, Leontief observed the paradox that the US, the country with the world's highest

fall into the deflationary trap that has perplexed Japanese political leaders since the 1990s: a flat GDP of $5.7 trillion and growing government debt that is now nearly 200% of GDP.[9]

The adoption of a theory which assumes free market optimality makes it very difficult for government to focus on ways in which to ameliorate the effects of these transformations in the "global economy." In Britain in particular, older-established industries, such as shipbuilding, automobiles, textiles, steel, etc. contracted rapidly, and this raised fears of de-industrialization (Blackaby 1979). Similar fears in the United States have raised the possibility of increased trade protection and limits on immigration.[10] Just as in the 1930s, there is the beginning of competitive currency devaluation by countries as they attempt to maintain exports and limit the increase of unemployment.

The questions we wish to raise here may be listed as follows.

(1) Is there any evidence that western governments have, in the past, intervened in the macro-economy for purely electoral reasons, in ways which, in the long run, may be deemed economically irrational?

This is different from asking whether particular macro-economic decisions can be seen, with hindsight, to be economically irrational. It asks whether the logic of the "political marketplace" is such as to produce economically suboptimal consequences. The literature that dealt with the question was based on a simple economic theory that supposed that inflation and unemployment could be traded off against one another in a fairly obvious fashion. This is clearly false; macro-economic intervention always produces unintended, and frequently surprising consequences. Even if governments wished to achieve "socially optimal" unemployment-inflation combinations, they would be unable to do so. Secondly, the analysis supposed that, in terms of electoral response, there were favorable unemployment–inflation combinations. This is equivalent to the assumption that the vote response can essentially be regarded as a social welfare function, and that "socially optimal" government behavior is the optimization of this social welfare function within the feasible macro-economic possibilities.

The model presented in Chaps. 5 and 6 suggests that although voters respond to economic choices by government, the policy responses by government include non-economic features, particularly the influence that activists exert. This implies that the vote maximizing functions of political agents incorporate many different

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capital/labor ratio has a lower capital/labor ratio in exports than in imports. See also Helpman and Krugman (1989).

[9]The European levels of total public debt/GDP are not as high as Japan (225%), but are larger than has been typical: Italy 115%, Greece 130%, Iceland 124%, Germany 77%, Ireland 94%, Spain 60%, Sweden 43%. Total external debt (both public and private) is generally higher: about 100% of GDP for the US, maybe 400% for the UK, 180% for France, 154% for Spain, 174% for Greece, and 217% for Portugal. It is external debt that has generated the euro crisis.

[10]See Galiani et al. (2010) for a political model of activist group responses to such changes in comparative advantage.

components. Electoral response to government behavior is also affected by transitory political events (as the current situation in Iraq illustrates).

(2) Is there any evidence that political logic forces governments to accede to special interest groups, to the extent that they over-regulate, over-bureaucratize, over-provide public goods and welfare, etc.?

The general mode of argument of the literature that addresses this question is essentially that the political and economic cost benefit analyses are quite different and that the political calculus leads to an underestimation of the true economic costs of, for example, a public goods project. The difficulty with this kind of argument is that in order to allege overprovision it is necessary to give an indication of the "optimal" level of provision and a method for attaining it. For example, is there a procedure by which public goods could be created and distributed within a free market context and without the intervention of government, in such a way that the outcome is Pareto superior to the outcome when government intervenes? While a number of authors (Nozick 1974) have argued that public goods can be provided by protective associations, these arguments simply replace the Hobbesian world of every man against his neighbor with one of every coalition (or neighborhood) against every other. In any case, all such arguments depend in one way or another on an equilibrium optimality result. The arguments made by policy makers during the Reagan and Thatcher governments were that instead of intervening in the political economy it was much better to leave the operation of the economy to market forces. But the global market crashes that have occurred since then have left us in the current predicament. This leads us to the next question.

(3) Is it reasonable to suppose that a free market economy will generally be in a state of Pareto optimal equilibrium?

At the heart of economic theory is the general equilibrium result, that the consequences of rational self-seeking behavior by agents is a Pareto optimal outcome. If this theory had any relevance at all for economic affairs, then one would expect market adaptation to the presence of unemployment not only to eliminate involuntary unemployment but to do it in such a way that the welfare of every individual increases. There is no strong empirical evidence that this is occurring, and it is worth asking whether there is a major flaw in the theory. The assumptions of the theory are of course very restrictive. The preferences of individuals are supposed to be defined on private goods-whether consumption bundles or production outputs. Secondly, complete Arrow and Debreu (1954) markets are assumed to exist in all commodities, so as to eliminate, or rationalize, all future risk. Finally, and most importantly, economic agents are assumed to treat prices parametrically, in the sense that agents treat prices as fixed and optimize on the fixed budget or production sets. This is a reasonable assumption when all agents are "small" relative to the economy. That is, if any agent is removed, then the others may move to a new equilibrium which they prefer at least as much as the original. If this strong "no-surplus" condition fails, for even one agent, then that agent may manipulate the economy to bring about outcomes that the agent prefers (Ostroy 1980). What this

means is that the manipulator attempts to compute the effects its own behavior has on the eventual equilibrium outcome and then behaves in such a way as to produce a different outcome which it prefers. This notion of manipulation developed out of social choice theory and is proving to be of interest to general equilibrium theorists. It seems reasonable to believe that there will be at least one manipulator in any economy, in which case there is no reason to suppose that even a perfect market in private goods will achieve Pareto-optimality. Hahn (1980) has called this feature "the canker at the heart of the theory."

At the same time the notion of manipulation may prove of considerable value in economic theory. It provides a theoretical mode of access to the analysis of monopoly or oligopoly behavior – such as transfer pricing and the construction of entry barriers. Using this theoretical notion, one may analyze national strategies of manipulation, including the erection of tariffs, and domestic redistribution of income to pick up the increasing returns to scale or the benefits of trade of a national economy.

(4) In which aspects of the economy might one reasonably argue that government intervention is necessary for the attainment of long term optimal performance?

Schofield (2006a) suggests that the fundamental argument in Keynes (1936) was that markets in commodities, especially traded goods, may very well be governed by equilibrium theory, by the law of supply and demand. What concerned Keynes, however, was the degree to which instability or speculative bubbles in asset markets (by which he meant markets in stocks, currencies and houses, etc.) could undermine the stability of commodities markets. Given the events that had occurred in Keynes' lifetime, his preoccupation was with effects of this kind not only in the labor market (where the result is persistent unemployment), but also in the international polity (leading to competitive devaluations).

Keynes accepted this weak version of the equilibrium hypothesis (only for commodities markets), because he saw a terrible danger to the Atlantic democracies. In a world of speculative disorder, the returns to capitalists and the wages of labor would have no legitimate basis. To escape this chaos, the citizens of a nation could rationally choose to give up their freedom to the agents of the state. Bound by such a Hobbesian contract to an autocrat, the citizens could at least hope for some certainty in their lives. Keynes was keenly aware that authoritarian state systems could solve the problem of unemployment, by paying the price of efficiency while necessarily depriving their citizens of their freedom. It seemed all too probable in the 1930s that citizens would be willing to pay the double price of inefficiency and loss of freedom to avoid the great and apparent risks of unemployment. We can also speculate that the disorder exhibited by the Russian political economy in the 1990s led the way to the electorate's willingness to accept Putin's concentration of political power in the early part of the twenty-first century. Keynes' fears of market disorder seem quite justified in view of the currency crash of the late 1990s, the "dot-com" crash of 2000 and the problems in the "sub-prime" mortgage market in the United States in 2007 and early 2008.

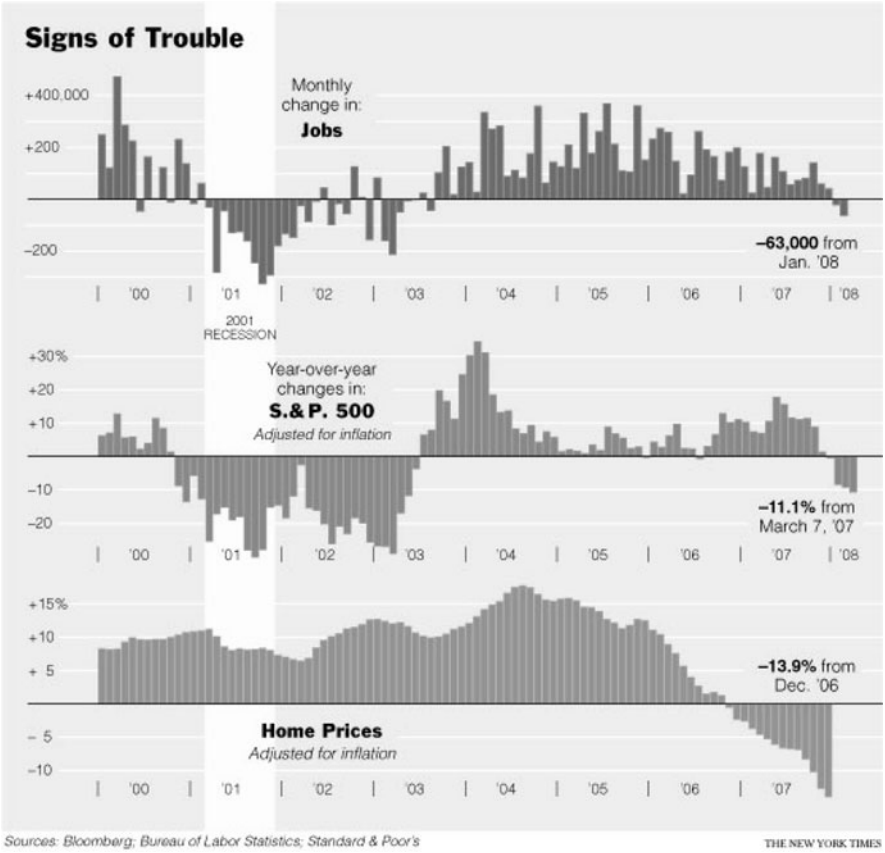

Fig. 3.1 Bubbles (*New York Times,* 8 March 2008)

In December 2007, Central Banks were desperately making capital available for fear of a liquidity crunch. Figure 3.1 illustrates the extent of the drop in house prices and in the stock market in 2008 while Fig. 3.2 contrasts the loss in confidence in January 2008 with other crashes in the period from 1973 on. On January 21, 2008, the DAX index in Germany closed down 7.16% while the CAC 40 in France lost 6.83% and the London stock market index, the FTSE 100, lost 5.48%. The Federal Bank cut its key interest rate to 2.25% in March, and then to 2% on April 30, 2008, in the face of the possibility of stagflation (see Fig. 3.3). Figure 3.4 shows the fall in the Dow from the peak in late 2007 to the bottom in early 2009. In March, the investment bank, Bear Stearns, faced bankruptcy and was bought by JP Morgan for next to nothing, while Lehman Brothers did file for bankruptcy on September 15, 2008. A week before, the Federal Housing Finance Agency (FHFA) placed the Federal National Mortgage Association (nicknamed Fannie Mae) and the Federal Home Mortgage Corporation (nicknamed Freddie Mac) under the conservatorship

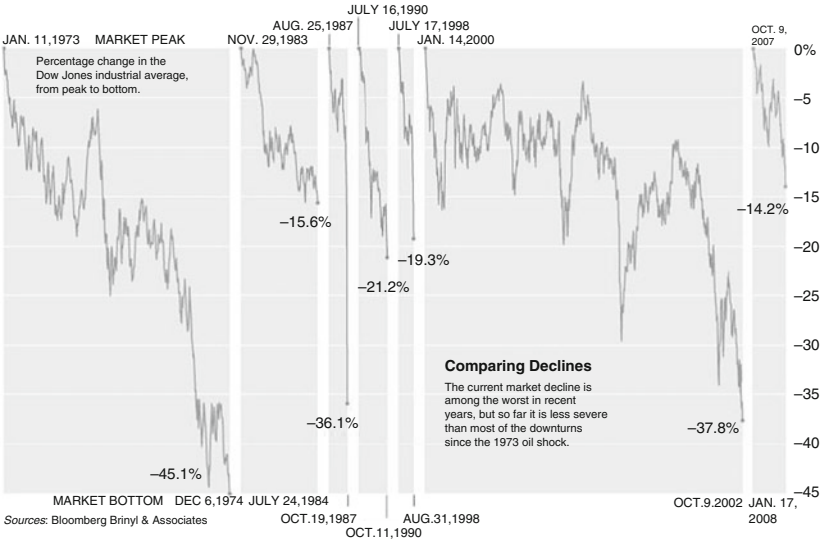

Fig. 3.2 Market crashes (*New York Times,* 18 January 2008)

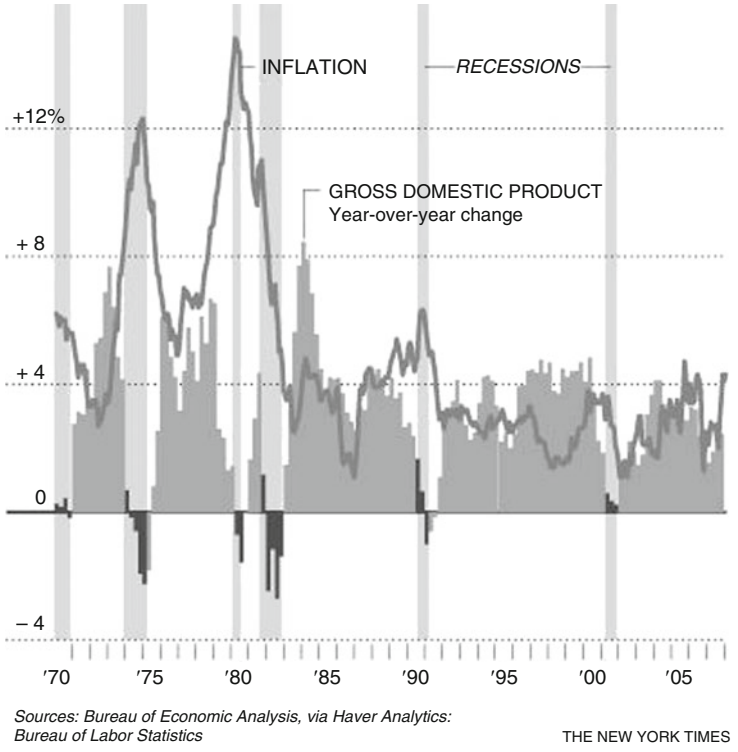

Fig. 3.3 The possibility of stagflation (*New York Times,* 21 February 2008)

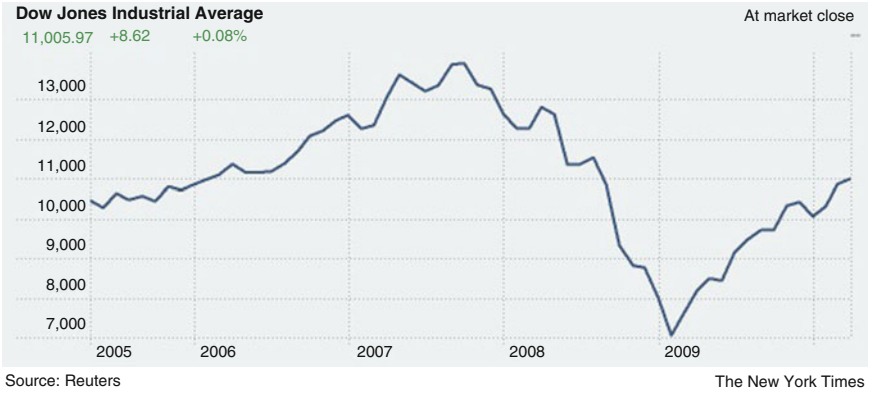

Fig. 3.4 The Dow from 2005 to 2010

of the FHFA.[11] The collapse of the companies, followed by that of the Lehman Brothers are often seen as starting the panic.[12] Eventually the Dow rebounded in 2010, but Fig. 3.5 shows the singularity in the Dow that occurred on May 6, 2010. Rising oil prices (illustrated in Fig. 3.6) seemed to suggest in 2008 that the 1970s had returned. See Phillips (2006, 2008) for comments on the causes of the interlinked problems of oil and debt.

From this Keynesian perspective, the fundamental purpose of government is to ameliorate the chaos of the marketplace, and to promote the human and economic opportunities available to citizens by curbing the degree of risk that they must face. This suggests that government does have a significant interventionist role to play. We concentrate on two related aspects of such intervention.

The most important characteristic of a developed economy is the level (and rate of change) of productivity. This depends, we would argue, on two structural features of the economy – the social organization and quality of labor and the level of technological innovation and utilization. Both features have fundamental public goods aspects. One important aspect of labor is the level of problem solving capacity that is exhibited – the ability to respond in subtle fashion to the micro-difficulties that any economic activity necessarily faces. This depends, in turn, on the quality of the human resources (education in the broadest sense) and on the way labor organizes itself. There have been concerns recently that the United States is falling far behind its competitors in the provision of education, and in the race to develop the new clean technologies that are appropriate in a period of climate change.

[11]These two entities had operated since 1968 as government sponsored enterprises (GSEs). Although the two companies are privately owned, they are protected financially by the support of the Federal Government. These protections include access to a line of credit through the US Treasury, exemption from state and local income taxes and exemption from SEC oversight.

[12]Kaletsky (2010) argues that the decisions by government regulators to let this happen was the cause of the ensuing panic.

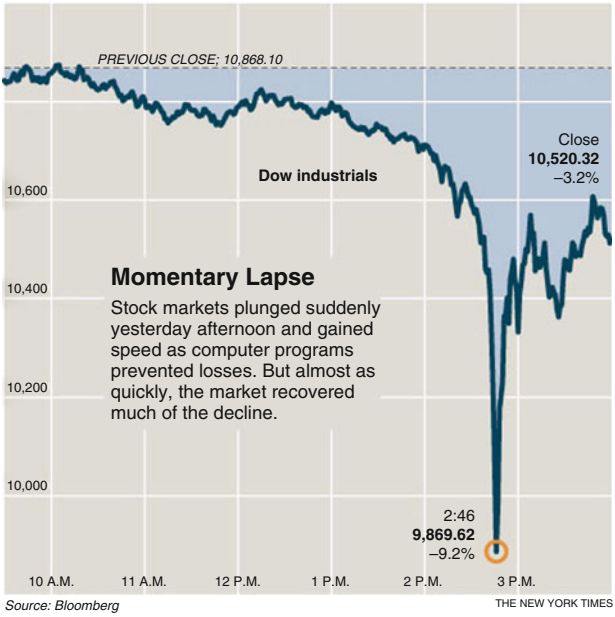

Fig. 3.5 The singularity in the Dow on May 6, 2010

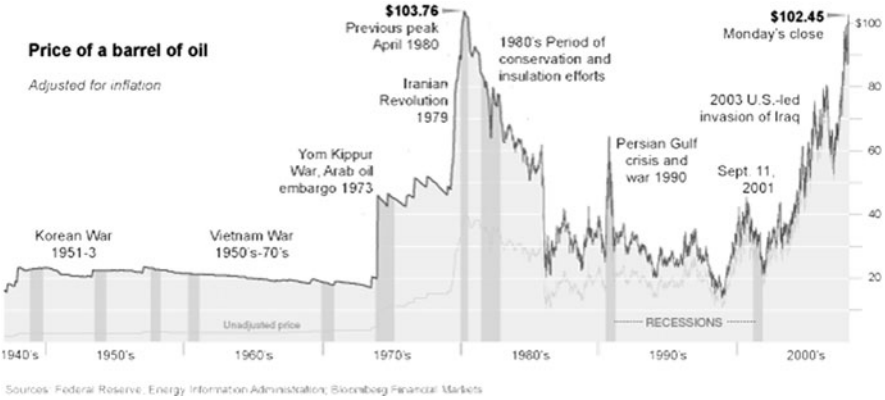

Fig. 3.6 Real price of oil (*New York Times,* 4 March 2008)

As regards education, an economist might argue that it is up to each individual to compute the extent of that individual's level of education, given the likely costs and anticipated returns. Since there are high social benefits from education, the aggregate of individuals' calculations need not be socially optimal. Consequently, there is an important role for government to intervene, so as to facilitate the enlargement of education, particularly in an era of intense technological competition.

As regards technological innovation, theoretical analysis by Reinganum (1981) and Kamien and Schwartz (1981) indicate that it is unlikely that the socially optimal rate of investment in innovation will occur naturally. In a completely competitive market, with many small firms, almost no investment will occur, since each firm will leave it up to the others and hope to pick up the benefits later. In an oligopoly, firms will invest but keep the benefits, in a socially non-optimal way, for themselves. The logical conclusion is for government to guide investment by subsidies, grants, etc., along the lines that it deems socially profitable. One problem, of course, with such a strategy is that it is not obvious that there is any connection between government preferred and socially optimal patterns of investment in research and innovation. A strong case can be made that there has been excess concentration by Britain and the US on defense related industries (see, for example, Freeman 1979, and Block 1975). In the future, if climate change does turn out to be the major problem facing humanity, then socially necessary technological innovation to reduce greenhouse emissions will become vital.

These arguments suggest that government has an obligation to offset the suboptimal social choices of the marketplace. The "debate" between the European Union and the "Anglo-Saxon" polities of the United States and the United Kingdom concerns the degree to which intervention in the global economy by government is acceptable.

As the next chapter discusses, we face potentially unknown problems over climate change. New understanding about the effect of climate change on world food production as illustrated in Fig. 3.7 suggests that the future may bring massive social unrest and population movement.

Keynes was concerned not just about speculation and market chaos, but about the degree to which uncertainty made the equilibrium theorems invalid. As he wrote

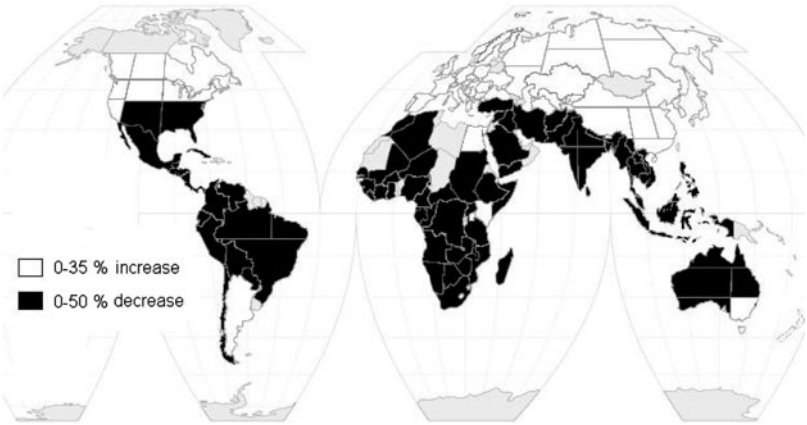

Fig. 3.7 The possible effects of climate change on regional agricultural output (W. Cline, 2007)

> By "uncertain" knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable ... Even the weather is only moderately uncertain. The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest 20 years hence. (Keynes 1937).

The possibility of positive feedback effects associated with human activity, particularly the rapid increase of energy utilization by growing economies such as China and India, has increased the uncertainty that is presented by the future. The concern that Keynes had about the difficulty of controlling market disorder is now even more pronounced, as controlling climate change will need the cooperative action of all states. This difficulty is made worse, because of the changes brought about in the beliefs of political leaders about the feasibility of controlling the global market. Bobbitt (2008) suggests that the constitutional order has changed since the 1980s. The nation state has begun to give way to what he calls "the market state." The next two sections of this chapter consider attempts by political leaders to moderate the effects of market forces.

3.2 The Political Economy

The essential ideas underlying the literature on the Political Business Cycle are threefold:

1. The popularity of a government at some time is effectively determined by the level of unemployment and inflation at that time or in the recent past.
2. Government itself can manipulate various aspects of the macro-economy to effect changes in unemployment and inflation within some feasible range.
3. Incumbent governments will in fact manipulate the economy to bring about levels of unemployment and inflation which at election times are "socially optimal" in terms of resulting in the maximum number of votes for the party in government.

In their early paper, Goodhart and Bhansali (1970) first correlated government popularity (or the lead over the opposition) in Britain against unemployment and inflation, but were forced to add in cyclical dummies like euphoria and backswing, to account for apparently non-economic changes in popularity between elections. By stimulating the economy in the appropriate manner before an election, the "optimal" combination of unemployment/inflation on the Phillips curve could be attained. However, once inflation was induced into the system, this would trigger inflationary expectations and move the Phillips curve to the right.

As Brittan (1978) has observed,

> over a run of political cycles the short term Phillips curve will drift upwards ... democratic myopia and economic time lags will land the economy with an excessive rate of inflation.

Indeed as the Phillips curve moved to the right the socially optimal combinations would result in fewer votes, and each incumbent government would find itself

defeated. According to Goodhart and Bhansali, "a pure democracy, with all parties seeking to maximize public support, is doomed to increasing inflation and political disintegration."

Further extensions by Nordhaus (1975), MacRae (1976) and Tufte (1978) postulated the existence of a political business cycle (PBC), in which government stimulates the economy near election time and then deflates to increase unemployment and bring inflation under some degree of control in preparation for the upswing at the next election.

These views have clearly been highly influential. The McCracken report to the OECD, for example, put the blame for the high levels of inflation in 1973–1974 on the bunching of elections in 1972 and the irresponsibility of governments in excessively stimulating their economies in 1971.

These models have been criticized from a number of different perspectives. Of course, it could well be the case that governments attempt to manipulate economic variables for political advantage, but find themselves unable to do so successfully because of events outside their control. However, the relationship between government popularity and economic variables appears to be extremely tenuous. Whitely (1979, 1984), on the basis of statistical analysis of poll data in Britain, has argued that government popularity is best modeled by a process of random fluctuation round a level which is itself subject to external shocks. As he says,

> [A] whole series of adverse events have to occur to change government popularity drastically for the worse. Public opinion is 'driven' by a series of on-off events which act like shocks to the system over time. The inertia of opinion ensures that when a government enjoys above average popularity, it will retain that position for several months. If adverse events make it lose popularity, it will in turn remain unpopular for several periods. In this way irregular cycles are generated but they have no substantive significance of a political nature (Whiteley 1980).

To pursue this however, we have to leave the macro-political economic framework and consider individual responses to changing economic circumstance. Fiorina (1981) has used survey data to analyze these individual responses. He assumed "That in making a voting decision the citizen looks at the incumbent's performance, the alternative platforms of the incumbent and challenger, and (perhaps) imagines a hypothetical past performance term for the previous challenger." In his analysis Fiorina regressed voting behavior on party identification or PID (essentially a proxy for past individual evaluations), current comparative evaluations and future expectations. As he says, "Personally experienced and/or perceived economic judgments affect more general economic performance judgments, both types of evaluations feed into evaluations of presidential performance, and the more general judgments, at least, contribute to the modification of party identification."

Fiorina's micro-political economic analysis indicates that individuals behave in a rational way in using their own experience to interpret the political environment and to make evaluations of policy makers. Further research on the US by Kiewiet (1983) makes it clear that individuals' personal experiences do matter, in that these affect evaluation of how an incumbent President is handling the situation. This, in

turn, influences the way the individual votes. The importance of this observation is that personal experience is something unique to the individual, and thus one might reasonably expect "idiosyncratic" response to government behavior, in a sense of a weakening of the relationship between class and voting. This phenomenon of "partisan dealignment" has been noted in Britain. A related phenomenon is the considerable decline of electoral support for the two main parties in Britain, even though the political consequence of this has been reduced because of the operation of the electoral system (Clarke and Stewart 1998; Clarke et al. 1997, 1998).

With the decay of partisan voting, the variation in individual experience and evaluation of government policy is likely to be sufficient to produce a kind of instability compatible with Whiteley's interpretation of government popularity. Since individual learning is a continuous experience, the popularity of government could be expected to change fairly continuously, but in directions that are largely indeterminate. Recent work on Britain, Canada and the US has focused on electoral response to the valence (or perceived competence) of party leaders. (Clarke et al. 2009; Clarke et al. 2004, 2006, 2009). Chapters 5 and 6 continue with this research programme.

For the moment we note that there appears to be no stable relationship between macro-economic variables by themselves and government popularity. It is true however, that government behavior does appear to produce very different changes in unemployment and inflation rates in the United States, depending on whether there was a Democrat or Republican administration. Mueller (2003) estimates that unemployment rates dropped and inflation rates increased during Democrat administration (unemployment down by 1.9% and inflation up by 3.2% in 1960–1968; unemployment down by 3.5% and inflation up by 0.3% in 1992–2000). Since Democrat voters are likely to be more sensitive to unemployment increases, and Republican voters more sensitive to inflation, these observations are compatible with the electoral model presented below in Chap. 5. In that model, although individual preferences depend partly on the economic axis, on tax rates and the like, they also depend on voter perceptions about the policy declarations that candidates or party leaders make on social issues. Thus the electoral model of Chap. 5 would imply a weak relationship between macro-economic outcomes and government popularity, rather than the determinate relationship indicated by something like the Phillips curve.

The literature discussed above essentially concentrated on developed political systems, where interest focuses on the macroeconomic manipulation by government concerned with the results of infrequent elections. A separate research program has concentrated on the populist mode of government (Riker 1982a), generated by the rational self seeking behavior of political actors as they attempt to deliver "public goods" to particular constituencies. The classical justification of government was that public goods such as defense, etc., cannot, in general, be supplied by the competitive economy (Baumol 1965). The point here is that a good which is to be supplied to all is subject to various forms of manipulation, the most obvious of which is the free-rider problem-the tendency of recipients of the good to disguise

their desire for the good so as to avoid some or all of the costs of production (Olson 1965).

However, very few of the activities of government are concerned with the provision of "pure" public goods, and even then public goods have associated private effects. For example, any public project (a dam, road, defense establishment or whatever) is likely to have geographically local effects on employment and factor costs, as well as more widespread general equilibrium effects. Since any government activity has some distributional consequences, Thurow (1980) is right in one sense to refer to the "zero sum society." While government activity is not entirely distributional, the conflicts of interest that are created are sufficient to bring about the instability effects mentioned above.

A number of authors have argued that political mechanisms, that are devised to deal with these public good conflicts, actually lead to an overprovision of the goods. The typical model has a political representative for each geographical constituency proposing a "pork barrel" project which if carried through, will benefit that particular constituency. The bundle of projects that are accepted are then paid for out of taxes levied on all. Formally this situation resembles a prisoner's dilemma, since each constituency will demand "too much" of its local public goods, since it does not have to meet the full costs of production. If all projects are approved, then the outcome is socially non-optimal. However, to pass any single project a legislator has to logroll with others to form a winning coalition. The instability results, mentioned above, may lead to the inference that, in the absence of formal party discipline, anything can happen.

Weingast (1979) however, has argued that "universalist" coalitions of all, or nearly all, legislators are likely under certain conditions, and this assumption has been used to show the universalist coalitions will over provide public goods (Weingast et al. 1981). Similar arguments can be made that government intervention, in such areas as regulation and pollution control, is excessive. However without a determinate theory of logrolling based on a good equilibrium notion it is difficult to accept the logical basis of this argument. The second problem is that in the absence of any procedure to truly determine "society's" preference it may as well be the case that public goods are under-provided. Indeed, Chap. 5 provides an illustration of how the Democrat and Republican parties in the United States are fragmented over some issues like immigration reform, which clearly is a public goods issue. Currently, in 2010 and 2011, there is considerable conflict between, and within, the parties over the relevance of maintaining tax cuts in the context of an unemployment rate over 9%.

As GNP increases, one might reasonably expect a greater than proportional increase in demand for public goods, and therefore an elasticity of government expenditure with respect to national income in excess of one. Chrystal and Alt (1979) argued that one should examine this problem only with respect to public expenditure G, excluding transfers. In their analysis of the case of Britain they find the elasticity of G with respect to national income, I, was significantly less than one. They note for example that government income tends to fluctuate more widely than

government non-transfer expenditure. In a many country analysis they found that the elasticity of G with respect to I was essentially unity.

In their original analysis of British government spending, Peacock and Wiseman (1961) suggested that there was a ratchet effect, with government expenditure increasing rapidly during wars, and remaining at a constant proportion to income between wars. Burton (1978) has contested this view and argued that the acceptance of Keynesian economics leads to an increasing budget deficit which was essentially politically motivated.

It is certainly true that government expenditure (G) as a percentage of GDP has tended to increase from an average of about 28% in 1960 in the OECD economies, to around 45% in 1996 (Mueller 2003). As Table 3.1 has shown, individual countries show wide variation. In France, G/GDP rose from about 35% in 1960 to 53% in 2010, while in Britain the increase was from 32% to 43%. The United States had a very low ratios in 1960 (27%) rising to 34% in 2010. Government spending also tends to be correlated with government deficits. The budget deficit in France was about 1% of GDP in 1960 but 8.4% in 2010.

Although the budget was in surplus in the United States in 2000, an increase of government expenditure on defence from 4.3% of GDP in 1999 to about 7.5% in 2010, and a decrease of tax revenue has led to an overall increase in government debt from 70% of GDP in 2000 to 117% of GDP in 2010. (These figures are discussed further in Chap. 4.) Thus a relatively small shift in the pattern of government expenditure and income, induced by politically motivated tax cuts and military expenditure, can cause fiscal difficulty.

As mentioned above, general (economic) equilibrium theory supposes that "small" agents respond to prices parametrically and shows that with sufficient price flexibility the outcome will be Pareto optimal with all markets cleared. It is obvious that this is an unrealistic assumption, since industrial economies contain organized "interest" groups which behave strategically with respect to the rest of the economy.

The general model proposed by Olson (1982a) supposes that the interaction of these interest groups is essentially a prisoner's dilemma in the following sense. A particular group, a trade union for example, will defend its interests by, say, pushing for higher wage rates or restricting the implementation of new technology to maintain employment for its members. Olson's argument is that such a strategy, while rational for the group, is socially "irrational" in that it effectively reduces total social output in the long run. Government has a small role to play in Olson's model, since government is viewed only as reacting to, or accommodating, these interest group strategies, by increasing the money supply and stimulating inflation. As Mueller (1982) has observed, economic ineffectiveness of this type is likely to lead to an intensification of distributional conflicts and thus to even more extreme socially irrational strategies.

Formally speaking, Olson's argument is based on an assumption that, with the complex externalities (or external effects) that exist in a modern economy, group strategies that are permissible within a pluralistic economy cannot generally result in an "efficient" outcome. This conclusion depends however on the nature of the coalition structure that holds in the economy. As Olson (1982b) says:

> interest organizations that are quite large in relation to the society of which they are a part, will "internalize" much of the benefit of any action they take in the interest of the society, or (more pertinently) much of the cost of any action they take that reduces efficiency, raises prices, or slows growth in the society.

This suggests that as the concentration of the interest group pattern increases from a purely atomistic one to a single centrally organized structure, the disparity between actual and socially optimal outcomes will widen first of all and then finally fall. Olson contended that those countries that have experienced a severe crisis – such as a defeat in war – will have weakened interest group structures, and therefore exhibit higher than average rates of growth.

An alternative form of analysis is to concentrate on the procedures by which interest groups can bargain together, to recognize the existence of externalities and thus ameliorate the socially harmful effects of non-cooperative strategies. Crouch (1985), for example, concentrates on two important variables: consociationalism (or the degree to which bargaining and compromise dominates in the political arena) and centralization (of the trade union structure). (see also Lehmbruch 1980; Lijphart 1976.)

Consociationalism is a term used to describe a political system where there is a tendency for no single party to command a majority. Crouch's argument is that trade union centralization will occur either in the context of a consociationalist political system or in one where there is a dominant social democratic party that has been in office for considerable duration. In both cases there may exist the possibility for binding contracts between the trade union system and the political system. In Crouch's view, therefore, qualitative characteristics of the political system bring about an institutional framework in the economic system which is conducive to economic "efficiency." One could go further in following Mueller's suggestion and infer that economic "optimality" is in turn conducive to the maintenance of the consociationalist features of the political system.

Any collective action coalition is intrinsically unstable, but under certain favorable conditions cooperation may be possible. Suppose that a relatively large coalition has, for some historical reason, come into existence. If this coalition is sufficiently large vis-à-vis the economy, then it will be forced to internalize the social externalities of its actions. Moreover, the coalition may be able to bargain with other "smaller, non-cooperative" proto-coalitions and which coalesce into cooperative coalitions. The more rapidly the economy is growing, or the less pronounced the distributional features within the social economy, the easier is this bargaining process and the more readily may a corporatist or centralized coalition come into existence. The point is that there is a crucial "size" (determined by "productivity") for a coalition above which it will behave cooperatively. If economic growth slows down, then a cooperative coalition might suddenly fragment. Since its relative productivity declines, it is obvious too that the parliamentary coalition structure is of vital significance in this bargaining process. Although a fragmented parliamentary system may be relatively stable in good times, it is likely to become unstable in bad times.

Table 3.2 Duration (in months) of government, 1945–1987

Country	Average duration	Effective number *ens*
Luxembourg	45	3.5
Ireland	39	2.6
Austria	38	2.2
Germany	37	2.9
Iceland	34	3.7
Norway	32	3.2
Sweden	28	3.2
Netherlands	27	4.5
Denmark	26	4.5
Belgium	22	4.0
Finland	15	5.0
Italy	13	3.5
Average	**26**	**3.7**

Table 3.2 presents some data on duration of governments in 12 European polities (Laver and Schofield, 1990, 1998). The effective number is a simple measure of the fragmentation of the legislature.[13] Because the electoral system is based on a method of proportional representation, government in these polities tends to be made up of a coalition of parties. Some of these polities have tended to have relatively short lived government.

The theory of elections presented in Chaps. 5–10 suggests that polities based on proportional representation will tend to encourage the formation of many heterogenous activist groups, linked to particular parties. These activist groups may exercise some degree of veto power, so that difficult policy choices (over such issues as protection, immigration and agriculture) may tend to be avoided. While this risk avoidance may be associated with somewhat lower growth when times are good, it can be a rational choice, when times turn bad. The cost is the difficulty of reaching agreement. "Globalization", or the integration of the global market, has brought about the economic growth in the past but this very interconnectedness has deepened the chaotic aspects associated with the collapse of asset bubbles. We now face increasing market uncertainty, and even greater long-run uncertainty because of climate change and global terrorism, In such an environment, attempts at risk avoidance are probably rational. The converse strategy of policy makers in the United States, of accepting risk by acquiescing to global market forces, while simultaneously exercising unilateral military force, could lead to catastrophe.

A theme of this book is that the purpose of social choice theory is to provide a grand theoretical framework for designing human institutions. Chapter 4 argues

[13]Fragmentation can be identified with the *effective number* (Laakso and Taagepera 1979). That is, let H_s (the Herfindahl index) be the sum of the squares of the relative seat shares and $ens = H_s^{-1}$ be the *effective number of party seat strength*. In the same way we can define *env* as the effective number of party vote strength using shares of votes.

that the theoretical work asserting that markets optimally aggregate preferences needs to be generalized to extend preference-based theories to include belief formation. A consequence of this change is that the theory is no longer purely axiomatic, but draws on insights about human behavior from other disciplines and empirical analysis of the role institutions play in determining beliefs. Chapter 13 also discusses recent attempts to determine the basis for moral beliefs.

In our view what gives rational choice theory coherence is precisely that it is an attempt to construct a grand theory of human behavior. That is to say, the theory is a conceptual framework through which to analyze the interplay and consequences of human incentives within institutions. This may explain why, long before rational choice theory migrated from economics into political science, it had been used by the Marquis de Condorcet in late-eighteenth-century France to provide a framework for the design of good government and society.[14] A universal theory of human behavior should be equally applicable in either politics or economics. To assess the merits of rational choice theory, then, requires an understanding of how it has evolved, regardless of which discipline served as the site of the various stages of its evolution.

We shall argue that the primary motivation for practitioners of rational choice theory, in the course of its evolution since the 1950s, has been to create an integrated, empirical theory of market and polity that would serve the normative purpose of designing good institutions. It has become increasingly obvious that to create such a theory, it is necessary to understand how individuals form beliefs about empirical reality and how they act in response both to their normative preferences and their beliefs. As this theory evolved, it led to changes in our understanding of how to devise good political and economic institutions, inasmuch as the economists' equation of good with Pareto optimal no longer appeared adequate. Given that people's beliefs – their empirical models of the world, their private information, and so on – vary so much, the aggregation of people's preferences (or values) so as to achieve Pareto optimality could no longer be the normative basis for design. This realization has led to a return to Condorcet's original desire to evaluate human institutions as devices both to aggregate preferences and integrate beliefs.

We shall discuss in some detail below how only one component of Condorcet's concern, namely preference aggregation, was developed by economists, and particularly Kenneth Arrow (1951), in laying the foundation for a rational choice theory of political economy. Whereas the work in the tradition of Downs (1957) and Olson (1965) had the virtue of simplicity in construction and prediction, the more recent

[14] As mentioned in the Preface, the period 1759–1788 saw the publication of major works on "social design" in Britain and the United States as well as France. These include Smith (1984 [1759], 1985 [1762]), Condorcet (1994 [1785], 1995 [1795]) and *The Federalist Papers* (1787). See Lasch (1991) for the notion of "progress" in Adam Smith. See also Commager (1977) for the influence of the French *philosophes* and Beer (1993) for the influence of Harrington (1992 [1656]) and other British writers on the debate in the United States. We emphasized the importance of Condorcet's *Essai* of 1785 in Chap. 1.

efforts have shown that the predictions of these preference-based models were not corroborated, in general, in the behavior of real polities.

In the following sections of this chapter we shall consider the various attempts to construct a closed (or consistent) preference-based theory of human behavior in both economics and politics and show, in each case, why there were logical reasons to extend the theory beyond preferences to beliefs. As the discussion proceeds, we hope to make it clear why the normative economic criterion of Pareto optimality began to appear less appropriate than the Condorcetian criterion of truth. We use "truth" as a shorthand for the property of a human institution to efficiently aggregate the dispersed information held by its individual members.

The earliest effort in this direction was Condorcet's demonstration that, among a jury judging the innocence or guilt of a defendant, a majority vote will more often be correct than the response of an average juror. As the size of the jury, or society, becomes very large, the probability that the majority will be right approaches unity. This theorem seems to justify democratic procedures for belief aggregation (of a certain kind) as optimal.[15] Below we shall mention attempts to derive analogous results for markets.

As rational choice theory has evolved, it has been obliged to become less axiomatic in structure. Indeed, the increasing emphasis on beliefs suggests that it will, of necessity, have to draw on insights from other behavioral sciences, including anthropology, linguistics, and psychology. Since the theory also includes the role of institutions in determining human choice, it is likely that there will be continuing interaction between empirical and theoretical research on this topic.

Let us amplify these remarks by briefly discussing how the rational actor theory employed by economists in the 1950s was later obliged to address larger questions of social choice that were anticipated by Condorcet.

Neoclassical economic theory can be viewed as the analysis of human incentives in a particular restricted context of fixed resources, private goods, and a given technology. As such, it is a theory of preference aggregation. The work of Arrow and Debreu (1954) and of McKenzie (1959) did assert, however, that, in this restricted context, the competitive price equilibrium would be Pareto optimal. In discussions of market behavior, economists often go on to assert (a claim that, as far as we know, is unproven) that only a competitive market can efficiently aggregate the diverse beliefs of the members of a heterogeneous economy. If this were true, then nonmarket, planned economies would be inadequate to the task of integrating the dispersed information that underlies these divergent beliefs.[16]

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[15] As discussed in Chap. 1, the theorem assumes that the average juror probability of being correct exceeds one-half, and that the jurors' choices are made independently. Recent results by Ladha (1992, 1993) indicate that the independence condition may be weakened, yet still preserve the Condorcet Jury Theorem.

[16] See, for example, the "calculation" argument of Von Hayek (1976). It should be noted that the recent collapse of the economic system of the USSR may be viewed as corroboration that such a system is, in the long run, not well adapted to the generation of technological innovation, one key aspect of information aggregation. This theoretical argument concerning markets is identical

Since the difference between preferences and beliefs is important, but subtle, it is worthwhile briefly discussing how market institutions do aggregate beliefs. Foreign exchange markets, futures markets, financial markets, and so forth may seem to be driven by the preferences of buyers or sellers, but in truth the motivations of the agents are derived from their own private information and their expectations of commodity price movements. Rational expectations, or the convergence of agents' expectational beliefs, can be thought of as the appropriate type of truth in markets. However, this convergence in beliefs need not occur.[17]

Thus, in an attempt to develop the analysis of human incentives, rational actor theory has been forced to go well beyond the preference-based study of private-goods markets. The intimate connection between preferences and beliefs has necessitated an attempt to reconstitute a general theory of rationality; this is exactly what game theory is about. Moreover, some goods are public, and jointly produced and consumed. Some such public goods (like technological innovation) may be produced and consumed within the economic system, but others, such as national defense and domestic security, are more traditionally created through the political system. Since one method of political choice is by some form of democracy, the need to extend the theory to public goods translates into a requirement to analyze democratic polities to determine not only preferences for such goods, but the incentives to produce them, given people's beliefs about others' willingness to pay for them. It should be noted here that the distinguishing feature of rational choice theory in its market-based form was its emphasis on the connection between preferences, equilibrium, and optimality. The attempt to enlarge the domain of the theory from economics to political economy retained these key concepts. Moreover, the non market institutions that constrain human behavior are obviously important for the way individuals construct their preferences and beliefs, and for the methods by which these are aggregated. The need to examine this question has become more important in the last few years, as research has attempted to model different political institutions. The general theme underlying this research has been, we believe, a desire to determine whether or not democratic political institutions are compatible, in some sense, with market efficiency.

A very extensive public choice literature, particularly in the 1970s and 1980s, argued that democratic political choice was not compatible with market efficiency. The various arguments are too numerous to list here, but in general they asserted that democratic polities created the context for political rent-seeking that constrained economic growth. Indeed, political representatives were viewed as creating rents for themselves, with the consequence that government growth was accompanied by deleterious economic consequences. The debate is, of course, still being carried on, and it underlies many of the tensions that exist between the Anglo-Saxon polities of the United Kingdom and the United States and the member states of the European

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in form to the Condorcetian argument concerning democracy. Thus the underlying question is how, exactly, different political economies aggregate information.

[17] Brian Arthur (1997) has recently shown the failure of models of rational expectations.

Union. The debate is even more intense in the United States, between Republicans who intend to reduce the size of government, and Democrats who believe that government should ameliorate the effect of the market.

The public choice literature, while influenced by theoretical, rational choice models, was also directed at explaining empirical facts. This mix of theoretical and empirical reasoning we shall term positive theory. Since positive theory attempts to explain facts of the world, it must address questions of empirical corroboration or falsification.

Early positive attempts to apply economic theory were based on a model of market behavior which assumed that agents are completely characterized by their preferences, and that they respond non-strategically to prices. To some degree the inferences of this model have been corroborated in relatively simple situations. However, this preference-based theory has had little success in either modelling choice under strong uncertainty[18] or explaining large-scale economic change over time.[19]

More importantly, the attempt to use rational actor theory as a basis for macroeconomics has not been particularly successful. Although macroeconomics purports to describe the real economic world, it often appears to be a tower of Babel, populated by Keynesians, monetarists, supply-siders, etc. On the other hand, most macroeconomists would accept, in general terms, the postulates of microeconomic theory, and the notion of rationality in particular. The empirical weakness of microeconomics has not led economists to reject this theory, but rather has led them to attempt to develop more complex models of rationality.[20] As we have suggested above, the imperative for game theory has been to extend simple models based on preferences so that agents' beliefs are made more explicit.

Is political science more like macroeconomics or microeconomics? Political science is driven by the age-old problem of how we are to be governed. The Founding Fathers and particularly the authors of *The Federalist*, were concerned precisely with the normative problem of the proper form of government. We would go so far as to suggest that Hamilton and the other Federalists were rational choice theorists of a kind. To substantiate this we might mention the recent observation of Gordon Wood (1991: 264) that the Federalist notion of government rested completely "on the assumption that most people were self-interested and absorbed in their private affairs." Of course, the Founding Fathers did not engage in empirical political science, as we would understand the term "empirical" today. Nonetheless, they were men of practical reason who made intelligent guesses about the way self-interested individuals were likely to behave under different systems of government. As discussed in Chap. 1, Madison argued in *Federalist X* that

[18] See Denzau and North (1994).

[19] See the discussion of the work by North et al. (2009b) in Chap. 2.

[20] Camerer (1999, 2003).

> the greater number of citizens and extent of territory may be brought within the compass of Republican, than of Democratic Government; and it is this circumstance principally which renders factious combinations less to be dreaded in the former, than in the latter.

Not only does Madison essentially apply a Condorcetian[21] form of argument in *Federalist X*, but he distinguishes between opinions (i.e., beliefs) and passions (i.e., preferences).

If we distinguish the normative political theory of the Founders from the current study of American, comparative, and international politics, and if we call the latter political science as opposed to political theory, then it is true that political science is now predominantly empirical, just as macroeconomics is. This by no means entails that empirical political science is epistemologically superior in any way to political theory (whether normative or rational choice). Our own view is that if political science focuses principally on empirical relationships rather than on the evaluation and design of government, then it is seriously wanting. An attempt within social choice theory to construct a normative basis for evaluation based on Pareto optimality will be discussed in the next section.[22]

Although rational choice theory is predominantly a theoretical discipline, the work presented in the later chapters of this volume is concerned with empirical corroboration. The mix of problem-based concerns and empirical testing displayed by rational choice theory has contributed significantly to its increasing importance in political science.

While Arrow (1951) was concerned with the normative task of aggregating preferences, the problem addressed by both Downs (1957) and Olson (1965) was to use microeconomic tools to explore the provision of public goods through voting and collective action. Neither Downs's prediction (that, in two-party competition, the parties will tend to converge) nor Olson's claim (about the failure of collective action when private incentives are absent) have been empirically substantiated. The reason is that while both Downs and Olson focused on preferences, it is evident that elections and collective action situations are games that cannot be fully described without modelling the beliefs of the participants.

More generally, it is important to model the way agents form beliefs about other agents' beliefs, and thus their behavior. This is often described as the common knowledge problem. In our view, it is at the heart of an understanding of economic as well as political behavior, and indeed all collective action.[23]

Preference-based models, whether of markets or elections, are relatively simple, with fairly clear predictions. Beliefs, on the other hand, are anything but simple: they involve, at the very least, some description of how people learn, update, and model

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[21] See also McLean and Urken (1992) and Urken (1991) for a different view on whether Condorcet influenced Madison.

[22] Important work in normative political theory by Rawls (1970) and Gauthier (1986), etc., is influenced, to some degree, by social choice theory. See also Binmore (1994) for an attempt to base normative political theory in game theory.

[23] See Schofield (1985a), Hinich and Munger (1994).

Table 3.3 A classification of economic and political theories

	Economics	Political economy	Politics
Normative	Welfare economics	Social choice	Normative political theory
Theoretical	Market (equilibrium)	Game theory	Rational choice theory
Positive	Public economics	Public choice	Theory of institutions
Empirical	Macroeconomics	Institutional political economy	Political science

the world they live in. Condorcet, known both for his work on the aggregation of beliefs (the so-called Condorcet Jury Theorem) and for work on the aggregation of preferences, was unable to combine these two modes of analysis. In his honor, we shall call the venture of developing an integrated model of politics that includes both preferences and beliefs the Condorcetian research program. In the next sections of the chapter we shall present our view of the evolution of the preference-based models (what we call the Arrovian research program, in honor of Kenneth Arrow) to incorporate beliefs.

3.3 The Arrovian Research Program

Table 3.3 sets out our view of the relationships between the various branches of economics, political economy, and politics. As the table suggests, rational choice theory as applied to politics is only one among a number of different research activities, all characterized by their varying degrees of emphasis on the normative, the theoretical, the positive and the empirical.[24] The table is also meant to emphasize the close connections between game theory and the adjacent theoretical and positive subfields.

Market theory utilizes the idea of equilibrium to relate economic parameters (resources, preferences, technology) to an outcome or choice. Welfare economics and public economics (research fields that are subsidiary to market theory) are designed to address normative and positive aspects of the relationship between government behavior and the economy. Public economics deals with the appropriate relationship between government and the economy, while macroeconomics covers the empirical aspect of this relationship.

In an attempt to provide a formal basis for public finance and government, the economist must determine whether the domain of market theory can be enlarged to include non-market phenomena, such as preferences for public goods. Arrow

[24]We distinguish here between empirical research and positive research. While the latter is based on theoretical arguments, it also attempts to make assertions about the empirical world.

took the first step in this program by asking if the preferences of the individuals making up a society could by aggregated to construct a measure of social welfare. Although his social choice theory addressed certain concerns that economists regard as essential, including the compatibility of the market and democracy, nothing about that theory restricts it to either welfare economics or political theory. Still, for an economist, the question of the compatibility of the market and democracy must be expressed in a formal language that is general enough to include economic theory.

Economic theory *ca.* 1954 used assumptions on the preferences and resources of individuals to demonstrate the existence of a market equilibrium. To enlarge its theoretical language so as to model democracy, the nature of citizen preference was extended from private goods to public goods. However, the fundamental concept of preference had to be retained. Since the question involved the degree to which the market equilibrium result could be generalized, it was necessary to pose it in terms of the existence (or otherwise) of equilibrium.

Microeconomics adopts the postulate that individual preferences are consistent. However, a variety of consistency axioms can be adopted. The most restrictive one, common in microeconomics, is that each individual's preference can be represented by a (numerical) utility function. This strong assumption implies that both strict preference and indifference are transitive: if a and b are equally preferable, as are b and c, then so are a and c. The standard example of non-transitive indifference, however, is a cup of coffee with no sugar, which is "indifferent" compared to a cup with a single grain of sugar, to one with two grains, and so on, but not to one with a thousand grains. A weaker consistency assumption is that of the transitivity of strict preference, but not of indifference. Even weaker is the assumption of acyclicity: if a is strictly preferred to b, b is strictly preferred to c, c to d, and so on to x, then x cannot be strictly preferred to a. Acyclicity guarantees that an individual may always make a "choice," that is, select an alternative, such that if a is chosen, none of the other alternatives can be preferred to a.

While economic theory concentrates on preferences, it usually adopts the postulate that individuals' behavior will be given by their choices (if such exist). Where the outcomes are uncertain, or involve risk, behavioral predictions may associate a list of probabilities with the final eventualities. Theorists often assume that preferences under risk behave as if they were weighted by these probabilities. Yet it is entirely possible that real individual preferences in the presence of risk may fail acyclicity, leading to apparently "irrational" or inconsistent behavior (Kahneman and Tversky 1984). In our view the postulate of acyclic consistency is reasonable in the absence of risk, but is less tenable in its presence.

Rationality postulates combine with various structural assumptions about the nature of the economic system to yield an economic equilibrium that is Pareto optimal in the sense that no other allocation of resources is preferred unanimously. In the absence of a price mechanism, as in politics, rational choice theorists utilized the notion of the "core." An outcome is in the core if no coalition of agents is able and willing to bring about a different state. The concept of a core was devised, in part, to cover situations involving public goods.

The genius of Arrow's result is that it suggests that, in general, a social utility function cannot be defined, negating the assumption that individual preferences could be aggregated so as to describe an optimal provision of public goods. In a sense, Arrow showed that the assumptions economists typically employ in modelling individual behavior are unlikely to hold where public goods are concerned. For while it is reasonable to assume that individuals prefer more rather than less of a private good, it is entirely possible that among them, individuals can have extremely complex preferences in the public domain. More of my public good may be more of your public bad. While we may want extensive military expenditure, you may loathe the military and prefer good schools, parks, environmental protection, and so forth. Since there is no obvious a priori restriction on the possible set of public preferences that individuals may have, Arrow adopted the unrestricted domain assumption. That assumption allows each individual to have any preference, as long as it satisfies transitivity of both strict preference and indifference. Under this assumption, the only social rule that satisfies the unanimity condition must be dictatorial. More generally, any social utility that can be used to make social choices based on individual preferences must necessarily be dictatorial.

If preferences could be equated with utilities, then social utility could be obtained simply by summing individual utilities. But economists believe in general that interpersonal comparisons of utility are scientifically meaningless, since it is impossible to "extract" the information required to construct such comparisons. Certainly markets and voting mechanisms, when viewed as methods of preference aggregation, do not provide the means of obtaining such information. However, if markets and polities are modelled as devices for aggregating both preferences and beliefs, then it is possible that the negative inferences of the Arrow impossibility theorem could be avoided. As Arrow (1986) himself observed, before this could be attempted, it would be necessary to deal with the question of *common knowledge* – the foundation of our beliefs about the beliefs of others.

Black (1958) reintroduced Condorcet's work to a modern audience and thus contributed to the extension of preference-based theory to include the analysis of beliefs. Almost all the elements of what has come to be known as spatial voting theory are present in Black's *The Theory of Committees and Elections.* Just as Arrow had investigated whether individual preferences could be aggregated into a social utility function, Black investigated the possibility of equilibrium in voting systems. In this context an equilibrium is a point or outcome that is unbeaten (although it need not beat every other conceivable point). Suppose that three voters have distinct preferred points on a left–right political continuum, and that each voter has single-peaked preferences (preferences that are maximized at a single point). Then the middle (or median) voter's preferred point cannot be beaten under majority rule, where a majority requires two out of three. Black called this equilibrium a "majority motion" in his book. In more recent work, the voting equilibrium is known as the *core*.

Suppose now that the decision problem involves more than a single continuum. For example, preferences for social liberalism or conservatism might be independent from preferences for economic liberalism or conservatism. Under such conditions,

even with single-peaked individual preferences, the likelihood of the existence of an equilibrium is negligible. As Black writes,

> the conditions that must be satisfied before there can be any majority motion are highly restrictive. The frequency of occurrence as a fraction of the total number of cases possible . . . is infinitesimally small or 'practically zero' (Black 1958:139).

Indeed, Black seemed to equate cases without an equilibrium with the occurrence of cycles, so he apparently took it for granted that when there is more than one-dimension to voters' preferences, voting cycles will occur. Economics postulates that any observed behavior must express an actor's preference. A voting equilibrium, therefore, would be expected to manifest collective preferences. If there is no equilibrium, however, the theorist can make no behavioral predictions.

In the absence of a behavioral prediction based on preference theory, the natural step was to account for observed outcomes by modelling the way beliefs influenced behavior. To be more specific, it appeared plausible that the outcome would depend on the expectations of agents, their ability to bargain by making guesses about other agents' behavior, and so on. One of the important results in the purely preference-based theory of voting was that voting cycles could, in principle, go everywhere in the policy space. Yet this occurrence of theoretical indeterminacy or chaos did not necessarily imply behavioral chaos, since there existed no belief-based model about what voters would actually do in the context of theoretical chaos. Indeed, experimental work by Fiorina and Plott (1978) and by Laing and Olmstead (1978) seemed to demonstrated that coreless games do not produce markedly more unstable outcomes than do games with cores. The empirical work did suggest that a rational choice theory that incorporates beliefs should smooth out the difference between games with and without a core.

The work on theoretical voting chaos[25] during the late 1970s induced a period of intense debate within rational choice political theory. Two of the protagonists in this debate, Riker (1980, 1982b, 1986) and Tullock (1981), drew quite different conclusions concerning the significance of chaos results for the study of legislatures (see also the essays in Ordeshook and Shepsle 1982). Our own criticism of Riker and Tullock is more fundamental. Formally, the chaos theorems on which they drew apply only to committees, where there is some foundation for supposing the voters have well-specified preferences. It is not at all clear that representatives in a legislature can be assumed to have "preferences" that are similar in kind to the members of a committee. It may be intuitively plausible that each legislator seeks to provide certain kinds of "goods" to constituency members. But until the voter-legislator connection is modelled in detail, there is no formal rational choice basis for the study of a US-style legislature.

Schofield (2008b) has argued however, that it is plausible that the models of committee voting are applicable to European-style legislatures involving well-disciplined parties. In particular, it appears reasonable to assume that party leaders

[25]McKelvey (1976, 1979), Schofield (1977a, 1978, 1980, 1983), Cox (1984), Rubinstein (1979), McKelvey and Schofield (1986, 1987).

in such legislatures do have preferred policy outcomes, and that they attempt to construct legislative majorities to implement these policies. There is an extensive empirical literature on coalition formation in European legislatures (Laver and Schofield 1990) and recent attempts to use rational choice theory in this context do produce empirical predictions that have been substantiated. One insight that comes out of this work concerns the possibility that a large non-majority party may form a minority government when its preferred point is at the core or equilibrium position in the policy space. In general legislative political games, however, there will be no core. Instead it is possible to extend the notion of the core to that of the "heart" (Schofield 1999c). The heart is always non-empty and is continuous, in an appropriate sense, in all relevant parameters.[26]

Rational choice theory also provides a logical framework within which to make some sense out of some well-established empirical relationships that have been noted in multiparty political systems. For example, as Table 3.2 suggests, the fragmentation of parliamentary systems into many small parties is highly correlated with government brevity in the European systems (Dodd 1976). It should be obvious that in the absence of a core or policy equilibrium, any government that does form may be defeated by another majority coalition with a counter-policy proposal. Thus a connection between political fragmentation and the remote probability of a core would give insight into macropolitical relationships. In our view, the United States Congress is fundamentally different from European multiparty systems for a number of reasons.[27]

There is a venerable tradition on the connection between proportional representation and political fragmentation (Duverger 1954). The empirical work by Taagepera and Shugart (1989), for example, provides a detailed examination of this connection. European polities in general use proportional representation and typically have more than two parties. Duverger (1954) and Popper (1945) argued that this tends to result in weak government. By the same token, there is some evidence that (plurality) systems based on single-member constituencies tend to produce two parties and thus a clearer electoral choice. The British electoral system, for example, which clearly is a plurality, or first-past- the-post arrangement, has always tended toward two dominant parties. While this is consistent with some rational choice models of elections, Duverger's argument, that small parties will wither away under plurality, is confounded by the continued presence of small British parties such as the centrist Liberal Democrat party in the United Kingdom. Indeed, this party became a member of the coalition government, with the Conservative Party, after the 2010 election.

On the other hand, although the United States is usually regarded as having a two-party system, its parties appear less disciplined, in general, than European-style parties. In particular, members of Congress are generally more heterogeneous in their voting behavior than one would expect within a European-style party system.

[26]These notions of the core and heart will be used in Chaps. 7 and 8 to study legislative bargaining in Israel, Turkey and Poland.

[27]Chapters 6, 7, 8 and 9 set out the argument.

The political science literature, from Duverger onwards, is even more inadequate in terms of the theoretical (rather than empirical) analysis of these relationships. Our own view is that the formal analysis of elections should start with a general conception of electoral laws and deduce facts about the number and nature of political parties.

There are two distinct classes of models of electoral competition. The first class assumes that voting is *deterministic*. That is, the candidates make promises and each voter picks a candidate depending on which promise the voter prefers. Within this class of models, policy blind models assume that the candidates gain no utility except from winning, and that they attempt, therefore, to gain the maximum number of votes. Just as in the committee model examined by Black, if the space of possible outcomes is one-dimensional, then two rational candidates will make the same promise, attempting to occupy the point at the median voter position.

As an economist, Downs (1957) could be justified in viewing this as a solution to the equilibrium problem in political economy. From the perspective of public finance, two-party competition could be assumed to provide a "median" tax schedule which could then be used to cover the provision of the public good in question. Obviously, however, government provides more than one public good, so individual voter preferences must be described in more than one-dimension. The results from the committee voting model imply that, in such cases, there will be no core. In other words, no matter what one candidate promises, an opponent can promise something else that will obtain a majority. From the perspective of non-cooperative game theory, the non-existence of a core means there is no pure strategy Nash equilibrium (PSNE) in the two-candidate game.

The obvious theoretical response is to develop a more general notion than the core. Kramer (1978) showed that there will be a mixed strategy Nash equilibrium (MSNE) where candidates make ambiguous promises. The nice feature of the so-called *uncovered set* (McKelvey 1986) is that the support of the MSNE will belong to this set. Thus, the political economist can assert that actual political outcomes will lie in the uncovered set. To some extent, at least, the theoretical problem of equilibrium is thus solved.

However, the motivation for this modelling strategy comes from economics, not political science. Its sole purpose is to solve the formal requirements of public economics, not to describe actual politics. Indeed, any model that predicts that candidates will make identical promises cannot be considered to have made any effort to characterize real politics. It was this realization, perhaps, that led Wittman to observe that "the research on formal models has been almost devoid of empirical content."

Wittman (1977, 1995), and others, have attempted to inject some political reality into the model by assuming the candidates are policy motivated, in the sense that the candidates' own policy preferences are reflected in the promises they make. A candidate may, for example, contract with a group of supporters to constrain his or her personal policy objectives in a certain way in return for campaign contributions. A policy-motivated candidate may find a way to be more credibly committed to supporters' objectives, and thus raise much greater campaign contributions, than a

pure election-seeking candidate. In any case, the possibility of a trade-off between contributions and voting suggests that a PSNE can exist where the candidates make quite different promises. The formal model of elections in the US, presented in Chap. 5, suggests that this is the case.

The second class of electoral models assumes that voters are *probabilistic* rather than deterministic. Once the candidate promises are made, a voter in the deterministic model chooses one of the candidates with certainty (except when the two candidates are identical in all respects). In the probabilistic model, on the other hand, the voter's behavior, after the candidate promises are known, is a random variable which is based on the voter's beliefs about the likely consequences of the choice. In particular, such beliefs should deal with the estimates each voter makes concerning the likelihood that the candidates will deliver on their promises.

The advantages of the probabilistic model are twofold. First, if voter preferences and candidate promises (or positions) are known, then it is possible to model the voter response econometrically. The early empirical work concentrated on two-candidate models (Enelow and Hinich 1982a), but recent research, discussed in Chaps. 5–11, has modelled multicandidate and multiparty competition (see also Schofield and Sened 2006).

It is important to note that the probabilistic model is continuous in voter and candidate positions, and the chaos theorems (mentioned above) do not apply. Because the total vote for each candidate is a random variable, it can be characterized by its expectation and variance. Probabilistic models typically assume "pure-election seeking" candidates who make promises to maximize their expected vote. The usual result in models of two-candidate competition is that there exists a PSNE where both candidates propose the mean rather than the median position (Lin et al. 1999; Coughlin 1992). This result solves the equilibrium problem of public economics very neatly.

However, there are a number of theoretical and substantive problems with this probabilistic model. Even policy-blind candidates make promises under risk, and the degree of risk depends not just on the expectation of voter response, but on the variance of this response. The models implicitly assume that the variance is independent of candidate positions, and this is untenable in the absence of a clear model of the formation of voter beliefs. The models also assume that each voter's behavior is statistically independent of the others'. This is unwarranted for the same reason. More importantly, however, the conclusions of the model are not empirically substantiated. The analysis presented in Chaps. 8 and 10 of elections in Israel, Turkey and Poland show the existence of a PSNE where the parties cluster into various groups. In fact, all the parties maintained separate identities and declared quite different policies to the electorate.

We infer that a more realistic variant of the probabilistic model must assume that candidates, or parties, are policy motivated, at least to the extent of choosing positions that balance their policy and electoral objectives. As one would expect, the Nash equilibrium causes party leaders to make very different promises (Cox 1997).

Our observations about these models are intended to highlight the differences in the requirements of public finance and formal political theory. For public finance, the motivation is to extract predictions about political choice that can be used to evaluate the optimality of public decisions concerning taxation and public goods provision. The need to add greater political verisimilitude has obliged political theorists to address questions of belief formation (particularly regarding what voters believe the winning candidate will do after the election) and candidate commitment. From the perspective of public finance, the more refined model appears untidy and less parsimonious. The political theorist, however, faces the quite difficult task not just of comparing predictions with reality, but of evaluating how reasonable the assumptions about belief formation are. It is only recently that these belief-based models have been developed to a degree sufficient to offer plausible predictions.

We have tried to suggest, in this section on elections, why the simple unidimensional two-candidate model of electoral competition is both theoretically and empirically inadequate. On the theoretical side, the attempt to base the analysis purely on techniques of preference aggregation has proved to be unsatisfactory. As we have implied above, Downs paid considerable attention to questions of risk or uncertainty in elections, but the formal techniques to address those problems were not available at that time. The observation that these simple models were also empirically unsatisfactory gives greater weight to the theoretical attempt to model both preferences and beliefs. In the next section, we shall attempt to enlarge the discussion about the nature of beliefs, and show the connection with Condorcet's Jury Theorem.

3.4 The Condorcetian Research Program

From the point of view of pluralistic political theory, no individual preference can be privileged over another. This could be taken to imply that no fundamental agreement may be reached among individuals who differ in their preferences. A Nash equilibrium in a game, or a voting equilibrium in a committee, specifies the nature of the compromise (rather than agreement) that individuals will accept given that they attempt to maximize what they prefer. In contrast to preferences, people with differing empirical beliefs about how the world works may come to agree with each other if they communicate and share information. Economists have recently attempted to model this process when beliefs are uncontaminated by preferences (Aumann 1976; McKelvey and Page 1986).

To some extent, political decision making is a matter of aggregating beliefs. Thus, while people may disagree about what action to take, debate may lead to an agreed solution. When two candidates offer differing courses of action (based on their own beliefs about the world), it is perfectly reasonable to suppose that the probability that a given voter chooses one candidate over the other is determined by the relative degree to which (s)he agrees with the two candidates' beliefs. From this point of view, the paradox of voter turnout does not exist, since voting is not based

on the desire to implement one's preferences but on the attempt to ascertain the truth. Moreover, convergence of candidates to the same (Nash equilibrium) position is no longer a problem but a virtue, inasmuch as the equilibrium position is the one that has the highest probability of being correct, given the distribution of beliefs in the society. Thus the Nash equilibrium result solves the optimality problem for political-economic theory.

Admittedly, this argument depends on the validity of the Condorcet Jury Theorem, which in turn depends on the assumption of the statistical independence of voter behavior (see Ladha and Miller 1996). This assumption may not be warranted when votes are determined by voters' beliefs. Moreover, if the candidates or voters are policy motivated, their policy concerns will contaminate the process of belief aggregation. Similarly, parties strong enough to impose policy objectives on candidates will also contaminate this process. Nonetheless, since the empirical evidence suggests that party discipline in the US Congress is weak, there may be a basis for inferring that successful congressional candidates at least approximate the belief optimum of their constituents.[28]

The Jury Theorem depends on beliefs that are, in turn, determined by the configuration of activist factions in the political economy. It should be possible, therefore, to use a more complex version of the theorem to resolve some of the questions raised by the Founding Fathers about the relationship between factions, institutional rules, and good government. On the other hand, the optimality question that formal democratic theory may now pose is whether institutional rules and legislators' and activists' private preferences will intrude on the formation of the outcome that best represents the diverse beliefs of the members of the society.

Pursuing these issues will require the development of rationality models that incorporate both preferences and beliefs. It is obvious that the interrelation between beliefs and preferences is fundamental in the context of social dilemmas. Olson's (1965) attempt to analyze the problem of collective action (including voluntary provision of public goods and voter turnout) adopted the simpler perspective of preference aggregation. In this context it is traditional to use game theory to model the situation, and indeed to describe it as a prisoner's dilemma.[29]

The paradox of the n-person prisoners' dilemma, of course, is that the dominant or best strategy for each individual is to defect rather than cooperate. This inference was used as the basis for the argument that public goods would not be provided, or that interest groups would collapse in the absence of private incentives. Recent work has suggested that it is far too simplistic to infer that defection will always occur. One possibility is that a dominant player may bribe or persuade the other members of a group to form a cooperative coalition. These theoretical observations provide the basis for the positive literature on hegemony in international relations (e.g., Gilpin 2001). However, the possibility that cooperative coalitions can form

[28]Chapters 5 and 6 present models of voting that shows how activists may affect voter beliefs about the character traits of presidential candidates in the US and political leaders in Great Britain.

[29]Hardin (1971, 1982), Taylor (1976), Axelrod (1984).

entails that they may also collapse. Indeed, Richards (1990) has demonstrated the occurrence of chaos, or unpredictability, in the experimental prisoner's dilemma. More recent analysis has emphasized the importance of modelling the beliefs agents hold about the beliefs of others.[30] Because the analysis of an agent's choice necessarily requires a model of what the agent thinks others will do and why they will do it, analysis of the relationship between beliefs and preferences must deal with the common knowledge problem. In general this common knowledge problem comes down to whether or not the members of the society have similar knowledge structures: that is whether they hold similar views about how the world works.

While capitalism and democracy were initially viewed by rational choice theorists simply as methods of preference aggregation, the more recent work has had to view rational agents not simply as preference maximizers, but as rational modelers of other agents and the world in which they live. To model another agent means modelling how that agent models others. The problem of common knowledge is whether there can be a formal basis for this hierarchy of individual knowledge. Although the question of why voters vote or why soldiers fight may seem very similar from the point of view of preference-based game theory, no plausible understanding of their behavior can ignore voters' or soldiers' beliefs. In these two cases, the relationship between beliefs and preferences could, in principle, be very different. In the next chapter we address some of the relationships between preferences and beliefs, and apply the ideas of chaos theory to economics and climate.

[30]There is now an extensive literature on a game theoretic analysis of the evolution of social norms. See Kreps et al. (1982), Sugden (1980), Young (1998), Binmore (1993, 1998, 2005), Nyarko (1997), Bicchieri (1993, 2006), Aumann and Bradenburger (1995), Skyrms (1996), Gintis (2009a,b).