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Institutional Quality and Generalized Trust: A Nonrecursive Causal Model

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Abstract This paper investigates the association between institutional quality and generalized trust. Despite the importance of the topic, little quantitative empirical evidence exists to support either unidirectional or bidirectional causality for the reason that cross-sectional studies rarely model the reciprocal relationship between institutional quality and generalized trust. Using data from the World Values Survey, World Bank, and other data sources in an identified nonrecursive structural equation model, results show that generalized trust and institutional quality form a positive reciprocal relationship, where the connection is stronger from generalized trust to institutional quality. The conclusion discusses implications for theory and policy in this area.

Keywords Institutional quality · Generalized trust · Endogeneity bias · Feedback effect · Structural equation model

1 Introduction

The individual propensity to trust strangers is a classic predictor of a prosperous and collectively vibrant country. This trust translates into confidence that people walking down the street will not steal from you or that if you leave your wallet on the ground some anonymous person will return it. Not surprisingly, research is finding that countries can expect economic performance (Knack and Keefer 1997), lower crime rates (Lederman et al. 2002), greater voter turnout (Almond and Verba 1963), civic liveliness (Brehm and Rahn 1997), and quality institutions (Putnam 1993) when their citizenry is willing to trust anonymous others.

Yet each of these relationships suffers from the problem of identifying causal order. In this paper I untangle and specify the direction and magnitude of one such bidirectional relationship, and answer the question: Is it institutional quality that produces generalized

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trust or is it generalized trust that produces institutional quality? In *Making Democracy Work*, what is now becoming a classic on neopluralism, Putnam (1993) argues that differential levels of civic culture through time can explain contemporary institutional performance across regions of Italy. According to this thesis, honest and effective political institutions are entirely dependent on informal societal factors, such as regional rates of civic engagement, volunteerism, and trust in generalized others. As Putnam put it: 'strong society; strong state (Putnam 1993: 176).' In contrast, Levi (1998) and other state-centered scholars (e.g., Freitag and Bühlmann 2009; van Oorschot and Arts 2005; Rothstein and Stolle 2008) argue for the opposite causal order in which institutional quality precedes generalized trust. According to these authors, generalized trust emerges because of fair, universalistic, power-sharing, incorruptible states that are effective at sanctioning noncooperative behavior and securing credible commitments.

Rectifying this debate is imperative since much of the research exploring this relationship is cross-sectional and finds that institutional quality is associated with generalized trust (e.g., Delhey and Newton 2005; Freitag and Bühlmann 2009; Herreros 2004; Herreros and Criado 2008; Knack and Keefer 1997; Knack and Zak 2002; La Porta et al. 1997; Paxton 2007; Robbins 2011; Rothstein and Uslaner 2005; Tsai et al. 2011). Although insightful, cross-sectional research has difficulty specifying whether an association is causal or spurious, and, as a result, the causal order between institutional quality and generalized trust remains empirically unclear (see Nannestad 2008). While some research does address this issue, such as Berggren and Jordahl (2006), Bergh and Bjørnskov (2011), Bjørnskov (2007, 2010), Brehm and Rahn (1997), Knack (2002), Paxton (2002), and Tabellini (2007), very little of this work uses structural equation models to reach a verdict concerning the relationship between political institutions and trust.

Thus, the primary goal of this paper is to disentangle the causal relationship between institutional quality and generalized trust by tackling endogeneity issues that plague much of the cross-sectional research. To accomplish this task, I will briefly review the theoretical debate over the causal order between government and trust and highlight the key empirical studies, with an emphasis on international cross-sectional survey research. Next, I will outline the data, the methods, and present the results of nested nonrecursive structural equation models that show a positive and reciprocating relationship between institutional quality and generalized trust, where the effect from generalized trust to institutional quality is stronger than the reverse. I will then finish with a discussion of the results, theoretical implications, and directions for future research.

2 Literature Review

2.1 Institutional Quality and Generalized Trust

The idea that government secures trust in anonymous others dates back to at least Hobbes, and the specter of such theorizing is found in recent works by Alchian and Demsetz (1972), Williamson (1985), North (1990), and Levi (1998). While commonalities exist among state-centered scholars in this area, they tend to stress three different trust-producing elements of the state: fairness and effectiveness, universality, and power-sharing capacity (Freitag and Bühlmann 2009; Nannestad 2008). The first perspective emphasizes the effectiveness of governmental monitoring and sanctioning mechanisms (Farrell and Knight 2003; Levi 1998). By increasing the costs of malfeasance, the state enhances the bilateral benefits of promise keeping. In this vein, if person A notices that the government

effectively applies appropriate sanctions for person B acting opportunistically, then person A is more likely to trust person B. Quality institutions, then, allow trust to extend to generalized others by reducing uncertainty. Yet scholars suggest that government enforcement alone cannot feasibly secure trust. It is too costly and inefficient to do so. Instead, others highlight how in addition to safety and security, institutional corruption sets the tone for generalized trust (Rothstein 2000; Rothstein and Stolle 2008; Rothstein and Uslaner 2005). If a state is corrupt, individuals dealing with government bureaucracy will recognize that corruption is the norm not only when interacting with political actors but also when exchanging with others, resulting in expectations that neither the government nor the citizenry can be trusted (Cook et al. 2005). Incorruptible governments, on the other hand, help cultivate informal norms of decency and honesty that promote the development of generalized trust not only toward political bureaucrats but toward fellow citizens as well.

Beyond fairness and effectiveness, the second key attribute of political institutions thought to promote generalized trust is the degree to which states provide universal social provisions for their citizens (Kumlin and Rothstein 2005; van Oorschot and Arts 2005; Rothstein and Stolle 2003; Rothstein and Uslaner 2005). Compared to systems that rely on private enterprises and markets to distribute scarce resources, universalistic welfare states acting on the basis of equal rights and equal opportunity reduce the stigmatization of those who receive assistance, and reduce the perception of being exploited by elites. The result of this process is less income inequality and a greater opportunity for all to succeed, which fosters generalized trust. The third element that state-centered scholars stress in fostering generalized trust is the degree of power-sharing capacity of political institutions (Freitag and Bühlmann 2009; Paxton 2002; Rothstein and Stolle 2003). The core argument here is that consensual political institutions and systems of proportional representation, such as democracies, provide all interest groups with a voice in politics. Because these types of institutions promote political integration, they help reduce the systematic exploitation of minorities by majorities. The result is a strong sense of trust among those who are politically integrated. Accordingly, generalized trust is most likely to occur in a vibrant democratic system that fosters equal rights and egalitarian access to the political decision-making process.

Although some of these explanations focus on parsimony versus complexity (i.e., formal versus formal and informal) or alternative mechanisms (i.e., institutions of contracting versus power-sharing capacity), what ties these diverse state-centered accounts together is a reliance on quality political institutions to secure generalized trust: government is clearly exogenous and causally prior to generalized trust in these models.

But is this always the case? Robert Putnam argues in his 1993 book *Making Democracy Work* that in some instances trust and other civic culture factors causally precede institutional quality. To test this proposition, Putnam investigated regions of Italy, specifically demarcating these regions as either northern or southern. He then analyzed the institutional performance of each region and found that, generally, northern and central portions of Italy were more institutionally robust than their southern counterparts. Drawing on classic works of civic culture (e.g., Almond and Verba 1963; Tocqueville 2000[1863]) he attributed these interregional variations in institutional performance to active participation in public affairs, interpersonal trust, and a vigorous associational life; what Putnam described as the "civic community". Poignantly, Putnam credited regional institutional performance in Italy not to economic development, but to current and, most importantly, historical rates of civic culture.[1]

[1] See Uslaner (2008) for a similar argument. In this article, Uslaner shows that current levels of trust in the US can, to a large extent, be traced back to the 1930s and 1940s. This suggests that at least a part of the trust

Putnam's original argument, however, remains theoretically unspecified. How or why does civic culture produce institutional performance? What are the processes, or mechanisms, that generate this effect? In an effort to solve this problem, Boix and Posner (1998) point to five aggregation mechanisms found in the literature that might link community cooperativeness to institutional quality. The authors first identify how voting institutions create situations in which the government is anxious to please voters and govern according to their wishes. Since those who are more willing to trust strangers are also more willing to engage in collective action and vote for political actors who abide by certain standards (Knack 1992, 2002), there will be greater accountability on the part of the individual politician so as to not be voted out of office, and, when taken aggregately, this produces a more effective government. Second, generalized trust may also contribute to institutional quality by minimizing the need for the state to intervene and sanction noncooperative behavior, which reduces the transaction costs associated with enforcing and implementing governmental policies. When actors are capable of cooperating with minimal government control, enforcement costs are reduced and the state becomes more efficient (Erikson and Parent 2007).

Third, generalized trust may also affect the nature of individuals and foster civic virtue among community members whereby citizens' preferences become more collective-oriented, rather than self-oriented, which enhances government participation and quality (Almond and Verba 1963; Inglehart 1988, 1990). In other words, a particular orientation toward political life must exist for the success of political institutions (Dahl 1971). For that to be the case, there should be some normative and value consensus within a nation concerning specific political standards, such as liberty, justice, and equality. Fourth, generalized trust may also increase the effectiveness of government bureaucrats to efficiently produce policy and reduce costs associated with political bargaining. This effect occurs because political bureaucrats that generally trust others are more intrinsically motivated to carry out the demands of the bureaucracy and the political processes regardless of extrinsic incentives to comply with the needs of the electorate (Arrow 1972; (Weber 1921[1978]). Fifth, and finally, Boix and Posner suggest that generalized trust may also facilitate communication within and among coalition party members and their leaders while creating communication channels between party leaders; thus, facilitating government effectiveness and responsiveness (Lijphart 1977).

With these models, the authors attempt to show how factors besides traditional variables such as economic development, electoral competiveness, political polarization, and bureaucratic capacity can produce institutional quality. In essence, Almond and Verba, Boix and Posner, Putnam, Tocqueville, and other pluralists argue that for governments to effectively and efficiently perform a requisite amount of generalized trust is necessary to 'lubricate' social interaction and 'glue' the citizenry together. Without this, governments will suffer and lose out to more effective competitors.

2.2 Previous Empirical Findings

Empirical cross-sectional studies that adjudicate between these two theoretical arguments tend to return consistent results. When using ordinary least squares (OLS) regression or

Footnote 1 continued
observed is prior to contemporary government. Moreover, considering that trust tends to be fairly stable across time (e.g., Bjørnskov 2007), then the trust-institutions relationship identified in prior research is, at most, bidirectional and, at least, unidirectional from trust to political-institutions.

hierarchical generalized linear models (HGLM), researchers generally find that measures of the state such as contract enforceability and corruption have a strong association with generalized trust (Delhey and Newton 2005; Freitag and Bühlmann 2009; Herreros 2004; Herreros and Criado 2008; Knack and Keefer 1997; La Porta et al. 1997; Muller and Seligson 1994; Paxton 2007; Robbins 2011; Tsai et al. 2011; Zak and Knack 2001). The association being observed, however, may represent a cause, effect, or a common cause. A key assumption in both OLS and HGLM is that all independent variables are exogenous. To the extent that generalized trust is treated as a dependent variable but in fact determines one of the independent variables in the equation (i.e., endogenizes the independent variable), then the assumption is violated. When this occurs, the returned estimates will be biased and inconsistent.

Recent research has started to address this problem, and overall these studies are pointing toward a bidirectional version of causality where institutional quality produces generalized trust (Berggren and Jordahl 2006; Brehm and Rahn 1997; Paxton 2002) and generalized trust produces institutional quality (Bergh and Bjørnskov 2011; Bjørnskov 2010; Knack 2002; Paxton 2002; Tabellini 2007), but with notable cleavages. Berggren and Jordahl (2006), for instance, find that institutional quality is a great stimulus to generalized trust, while Bjørnskov (2007) finds that the two social processes are statistically unrelated. A key factor that accounts for these disparate results is the operationalization of institutional quality. Many of the studies dealing with endogeneity bias only investigate specific elements of political institutions, such as fairness and effectiveness (e.g., Knack 2002), power-sharing capacity (e.g., Paxton 2002) and universality (e.g., Bergh and Bjørnskov 2011). This produces situations where some studies reveal a positive relationship between institutional quality and generalized trust, whereas others do not. An additional problem beyond comparability is that just three studies examine features of institutional quality that directly measure the ability of a state to effectively and efficiently apply incentives and sanction noncooperative behavior (Berggren and Jordahl 2006; Bjørnskov 2007, 2010), which is the classic feature of political institutions theorized to produce trust (e.g., North 1990).

What is common within this literature, however, is a reliance on 2SLS (two-stage least squares) estimation techniques. While 2SLS has its advantages (see Bollen 1996, 2001; Bollen and Paxton 1998), it also has its shortcomings. Luckily, structural equation modeling (SEM) deals with many of these limitations; three of the primary issues I will address here. First, the SEM apparatus is much more flexible than 2SLS. Instead of analyzing one structural equation for generalized trust with 2SLS and one for institutional quality, SEM estimates the parameters and both problematic causal variables simultaneously. By doing so, SEM overcomes problems of empirical underidentification that plagues single equation estimators such as 2SLS, and it provides additional information about plausible feedback loop parameter values. Second, SEM is able to estimate the model-implied correlations between disturbances, whereas 2SLS cannot. Correlating disturbances corrects the feedback loop parameter estimates for common causes of generalized trust and institutional quality. If the correlation between the errors is statistically insignificant, this suggests that generalized trust and institutional quality are the determinants of the observed relationship and there is likely no omitted variable bias. By not correlating the disturbances, as is the case with 2SLS, the parameter estimates will be potentially biased. Three, all variables suffer from measurement error, and although many OLS or 2SLS studies on generalized trust use summed scales, these scales simply state that error, or the lack thereof, may be present. SEM, on the other hand, makes adjustments for the implication of measurement error on parameter estimates, and can take systematic errors into account along with

unequal contributions of indicators. Without making these adjustments, we cannot tell to what extent prior studies are biased and inconsistent. In short, statistical analyses in the generalized trust literature largely rely on OLS, HGLM, or 2SLS estimation techniques, and very little work has taken advantage of the SEM apparatus to disentangle the causal relationship between generalized trust and institutional quality (see Paxton 2002 for an exception).

Thus, the goal of the present study is to contribute to, and hopefully rectify issues with, areas in the social capital literature that investigate problems of causality associated with institutional quality and generalized trust. To accomplish this task, I use a sizable country sample of 64; I use an identified nonrecursive structural equation model to specify the reciprocal relationship between institutional quality and generalized trust; I employ multiple variables of institutional quality used in prior studies that directly measure the structure of incentives for the citizenry, constraints on political leaders, and levels of corruption; and, finally, I estimate these models with an exogenous instrumental dimension—information technologies—not used in previous investigations.

3 Data

To determine the possible causal order between institutional quality and generalized trust, I measure generalized trust with data from the fourth wave (circa the year 2000) of the World Values Survey (WVS)[2] and place it in a model of institutional quality with relevant exogenous variables. I introduce three measures of institutional quality and then outline the IVs used to identify the nonrecursive structural equation model.[3]

3.1 Endogenous Variables

3.1.1 Generalized Trust

The most common survey item of generalized trust is the standard dichotomous question found in the General Social Survey and the WVS that asks, "Would you say that most people can be trusted or that you can't be too careful in dealing with others?" To measure generalized trust, I take the proportion of individuals in each country who answer 'yes' to this question (*trust*).[4] While the survey item is established and widely used, some researchers question its validity and reliability (e.g., Reeskens and Hooghe 2008; Sturgis

[2] The dataset has individual-level information for 66 countries (when considering missing data and the variables I use).

[3] I use multiple imputation techniques found in Stata 10.1 to maintain statistical power and a sizable country level sample. I imputed data for the legal property rights (Belarus, Bosnia, Moldova, and Saudi Arabia) and income inequality (Bosnia, Malta, Netherlands, Saudi Arabia, Serbia, and Slovakia) measures. Note that none of the imputed variables have greater than 10 percent missing cases. Also note that I created 1,000 complete data sets with the missing values filled in with different imputations. The values for the missing data were the mean of the 1,000 values across these data sets. Unlike traditional multiple imputation techniques, I did not take into account uncertainty as represented by the variation across the multiple imputations for each missing value since EQS does not permit such a procedure. I used this procedure instead of the maximum likelihood procedure found in EQS to reduce model complexity.

[4] I ignore particularized trust in the present analysis since the bulk of research in this area is primarily concerned with investigating the relationship between political institutions and generalized trust. For recent research exploring the determinants of particularized trust see Freitag and Traunmüller (2009), Glanville and Paxton (2007), Gleave et al. (2011), and Radnitz et al. (2009).

and Smith 2010). Some note how the question may be measuring "caution" (Miller and Mitamura 2003), cooperative preferences (Thöni et al. 2009), or trustworthiness (Ahn et al. 2003; Glaeser et al. 2000; Ermisch et al. 2009), and not if a respondent generally trusts strangers (see also Torpe and Lolle 2010). Others suggest that generalized trust is conditional (Cook et al. 2005), and that conditions in the WVS question are left unspecified leaving a number of cultural interpretations open to the respondent, potentially biasing cross-national comparative analyses. And others find that the measure does a poor job of predicting actual trusting behavior (e.g., Ermisch et al. 2009).

Although these results suggest that the WVS generalized trust question is invalid and unreliable, the findings are inconclusive (see also Dinesen 2010). Nannestad (2008), for instance, discusses how the unconditionality of the trust question may not trigger as much test–retest instability as intuitively thought, while others find that behavior in both trust games (Ostrom et al. 2009) and specific market conditions (Sapienza et al. 2007) is highly correlated with responses to the WVS trust question (see Holm and Danielson 2005). Based on these reports, I will interpret responses "…in the way which seems more consistent with a literal interpretation of the working of that question, namely, if the respondent believes that others can be trusted (Alesina and Ferrara 2002: 213)."

3.1.2 Institutional Quality

Following recent efforts by political scientists and political sociologists to categorize political institutions (Acemoglu and Johnson 2005; Kaufmann et al. 2003; Munck and Verkuilen 2002), Freitag and Bühlmann (2009) distinguish between three elements of institutional quality that likely have differential effects on generalized trust: fairness and effectiveness, power-sharing capacity, and universality. Although power-sharing capacity and universality are important, the present study focuses on elements of government dealing with fairness and effectiveness. This is done for three reasons. First, the social sciences have a long history of theorizing on the role that institutional fairness and effectiveness plays in producing trust (Alchian and Demsetz 1972; Levi 1998; North 1990). Second, indicators of fairness and effectiveness are the most common measures of institutional quality found in the generalized trust literature, which eases comparisons of the present findings with prior results (Berggren and Jordahl 2006; Delhey and Newton 2005; Herreros 2004; Herreros and Criado 2008; La Porta et al. 1997; Robbins 2011; Zak and Knack 2001). Third, the universality of social provisions and the power-sharing capacities of the state have been explored extensively with 2SLS (Bergh and Bjørnskov 2011; Bjørnskov 2010) and cross-lagged SEM panel designs (Paxton 2002).[5]

Thus, I use three common indicators of fairness and effectiveness to capture institutional quality: legal property rights protection, rule of law, and corruption. The first indicator, *legal property rights*, is a measure of a country's legal structure drawn from the Economic Freedom of the World project (Gwartney et al. 2000) where the lowest possible value of "1" indicates a total lack of property rights security and the highest possible value

[5] I also focus on elements of government dealing with fairness and effectiveness since the results of alternative investigatory and confirmatory factor analyses suggest that measures of government should be treated as three separate dimensions: fairness and effectiveness, power-sharing capacity, and universality. This indicates that including, for instance, (a) the Polity IV measure of democracy and the Freedom House measure of political rights (i.e., power-sharing capacity), (b) the World Bank measure of public health expenditures and income inequality (i.e., universality), and (c) the legal property rights and rule of law measures (i.e., fairness and effectiveness) into one dimension is unwarranted. In fact, these indicators should be used only for their respective dimensions. Results available upon request.

of "10" indicates full security. For the second indicator, *rule of law*, I use data from the Governance Matters data set provided by Kaufmann et al. (2003). This is a measure that takes on values from −2.5 to 2.5 where higher values suggest greater civil liberties protection and more efficient and effective sanctioning for abuses of power; lower values suggest the opposite: poor protection of civil liberties, a lack of interdependence of state powers, and rule by law. This measure attempts to capture the constraints on political leaders in a country to act in a trustworthy manner. Thus, the legal property rights and rule of law indicators measure the fairness and effectiveness of government in securing transactions, and if citizens and leaders will abide by the rules. The third measure, *corruption*, which is also drawn from the Governance Matters data set, varies from −2.5 to 2.5 as well, but higher values indicate a lower risk of corruption, or, situations in which political institutions do not reward those loyal to the ruler rather than the entire society.

All of these measures are used in prior 2SLS studies that examine the relationship between institutional quality and generalized trust. I use Cronbach's alpha to examine the reliability of responses. A value greater than or equal to 0.70 generally indicates good agreement within the factor. The overall institutional quality factor had an alpha of 0.935. Table 4 in the appendix gives the results of a confirmatory factor analysis for this and the information technologies construct.

3.2 Instrumental Variables

To sort out the endogeneity problem associated with institutional quality and generalized trust, I use instrumental variables and factors that are informed by the theory of new institutional economics, previous empirical research, and deep historical processes. Not only do these IVs have theoretical and historical roots, but they are also substantiated by common instrumental variable tests, which reveal them to be strong and only affect their respective endogenous variables (see the Sensitivity Analysis I section in the Appendix).

3.2.1 Instrumental Variable for Institutional Quality: Information Technologies

Although gross domestic product is frequently used as an instrumental variable for institutional quality in other 2SLS studies (e.g., Bjørnskov 2007, 2008), I use a measures of technology since it is seen as one of the key exogenous forces historically motivating institutional emergence and change (see Foreman-Peck 1995; North 1990; Obstfeld and Taylor 2003; Weber 1921[1978]). It does so through three critical processes. First, technologies alter the measurement and exchange of commodities. The advent of the scale, for instance, required new institutions to accommodate its precision in measurement. In addition, advances in transportation required the necessary institutions (often formal) to secure exchange among anonymous parties. Both of these developments cause changes in relative prices that drive organizations to implement incremental changes in institutions so as to abstract greater benefits from the institutional environment (North 1990). Second, technologies, specifically military technologies, increase geopolitical military pressure and the threat of land warfare that promotes the development of formal state structures (Tilly 1975). Third, and finally, technologies augment the enforcement capabilities of institutions. Observation technologies, such as video cameras, and transportation technologies greatly boost the monitoring capacity of state institutions to widen their range of control.

To assess the impact of technology on institutional quality, I use an information technologies dimension composed of two indicators from the World Bank. These indicators include the natural log bits of international internet bandwidth per person in a country

(*bandwidth*) and the natural log number of internet users per 100 people in a country (*internet users*). The basic requirements of an instrument, *Z*, are that it should be significantly correlated with the endogenous variables, *X* (institutional quality) and *Y* (generalized trust), but be uncorrelated with the error term in the explanatory equation and not have a significant direct effect on *Y* (generalized trust), conditional on *X* (institutional quality). The present instrument, information technologies, fulfills these basic requirements and passes other instrument validity checks (see Sensitivity Analysis I in the Appendix).

While Putnam (1993, 2000) proposes compelling reasons and observations for how information technologies might directly affect generalized trust, he does not explicitly embed this within a general theoretical framework for why this would be the case. In contrast, Cook et al. (2005), drawing on rational choice models, suggest that information enhancing mechanisms, such as technology, should not directly increase trust, but, instead, indirectly produce trust by increasing the perceived *trustworthiness* of others through institutions of contracting. Moreover, recent scholarship by Robbins and Grigoryeva (2010a, b) indicates that the effect of information technologies on generalized trust operates through, or is fully mediated by, institutional quality. All of this indicates that (a) information technologies spur the creation of formal institutions and strengthen institutional quality, and (b) there are theoretical and empirical reasons to treat information technologies as an instrument. The reliability of the measure was 0.870 (see Table 4 in the appendix).

3.2.2 Instrumental Variable for Generalized Trust: Monarchy

Following Bjørnskov (2007, 2008), who recently reinvigorated the study of the political institution of monarchy as a key element in the production of social capital, I use current monarchical status, be it absolute or constitutional, as an instrument for generalized trust (see Bergh and Bjørnskov 2011 and Bjørnskov 2010 for recent applications). This may strike some readers as odd, but there are numerous theoretical reasons for why monarchies might produce generalized trust. The first involves elements of national identity. Imperial and royal families might signify a strong sense of unity in the face of diversity, suggesting that although citizens may be of different economic, ethnic and linguistic heritage, they still fall under the imperial banner that carries with it a deep historical tradition. This is especially the case during dramatic economic shifts that generate political and societal turmoil. Under such conditions, a monarch might serve as an internal diplomat, or role model, that can be used to quell social and political distress and provide a symbolic element of social stability. Furthermore, regardless of prosperity or decline, monarchs represent a nation's collective and moral conscious. English and Danish heads of state, for instance, often reprimand their subjects during national holidays for a years worth of misconduct. The second reason relates to the deep historical roots of these political institutions. In many instances, the monarchs and their practices can be traced back for centuries, providing a depth of tradition that is absent in other forms of government. This further amplifies the contemporary effects of monarchs and their role in building and reinforcing national identity. In conjunction, these historical elements of national identity—collective unity, social stability, and moral conscious—should reduce social distance and instill a sense of belonging with others, which ought to foster generalized trust. Note that I, like Bergh and Bjørnskov (2011) and Bjørnskov (2010), use monarchy as an instrument in the empirical sense and do not necessarily derive a causal theory of institutional quality and generalized trust. Instead, I use monarchical status to statistically identify the causal relationship between institutional quality and generalized trust while simultaneously demonstrating (a) the historical origins of generalized trust through

monarchies, and (b) the econometric justification of monarchy as an instrument. Both of which are critical in the identification of valid instruments (see Sovey and Green 2011).

Monarchy, as a result, is a binary measure where "1" represents a country that is currently an absolute or constitutional monarchy and "0" represents otherwise. Like information technologies, the basic requirements of an instrumental variable still apply: Z (monarchy) should be significantly correlated with the endogenous variables, X (generalized trust) and Y (institutional quality), but be uncorrelated with the error term in the explanatory equation and not have a significant direct effect on Y (institutional quality), conditional on X (generalized trust). The sensitivity analysis in the Appendix reveals that monarchy fulfills these basic requirements, passes other checks of instrument validity, and is more robust than alternative instruments.

3.3 Control Variables

I also include a number of variables that consistently relate to generalized trust and institutional quality across a number of previous studies, especially those tackling the causality issue (Berggren and Jordahl 2006; Bergh and Bjørnskov 2011; Bjørnskov 2007, 2010; Knack 2002). First, I include the Gini coefficient from the World Bank to capture the effects of *income inequality*, where higher levels of the coefficient indicate greater disparities in a population's income distribution. Second, I include a measure of a country's communist heritage, *communist*, where "1" indicates a current or former communist country and "0" indicates otherwise. Third, I control for religious composition by including a variable that measures the percentage of a country's population that is Muslim, *percent Muslim*, found in the CIA World Factbook (CIA 2006). Fourth, and finally, I control for Scandinavian heritage, where "1" indicates a *Nordic* country (i.e., Denmark, Finland, Iceland, and Sweden) and "0" indicates otherwise. Note that both communist and Nordic were constructed by the author.

In sum, information technologies and monarchy are the exogenous variables that identify the nonrecursive structural equation model. To put another way, these are the IVs used to return unbiased estimates of the possible reciprocal relationship between institutional quality and generalized trust. Figure 1 details the configuration of the basic structural equation model tested below. Table 1 provides descriptive information for institutional quality, generalized trust and the IVs, as well as the covariances of the indicators.

4 Analysis and Results

In the first part of this investigation I use a confirmatory factor analysis (CFA) model to fit to the observed data. In the second part of this analysis I examine the model in Fig. 1 in comparison to the CFA and a model building sequence of nested structural models to gain information concerning the model that best accounts for the covariances observed between the IVs, endogenous constructs, and control variables (Kline 2005). I use EQS 6.1 (Bentler 2003) and maximum-likelihood throughout.[6] All analyses are done with robust standard

[6] It is often more desirable to use tetrachoric or polychoric correlation matrix estimation techniques instead of maximum-likelihood with dichotomous scaled data (Nunnally and Bernstein 1994). This is especially the case for CFAs and only the case for SEMs if the categorical measures are endogenous. Since the categorical indicators in the present article are exogenous, I conducted an alternative CFA with a polychoric correlation matrix estimation procedure. The alternative results parallel those presented here. As a result, I present the maximum-likelihood CFA estimates; results available upon request.

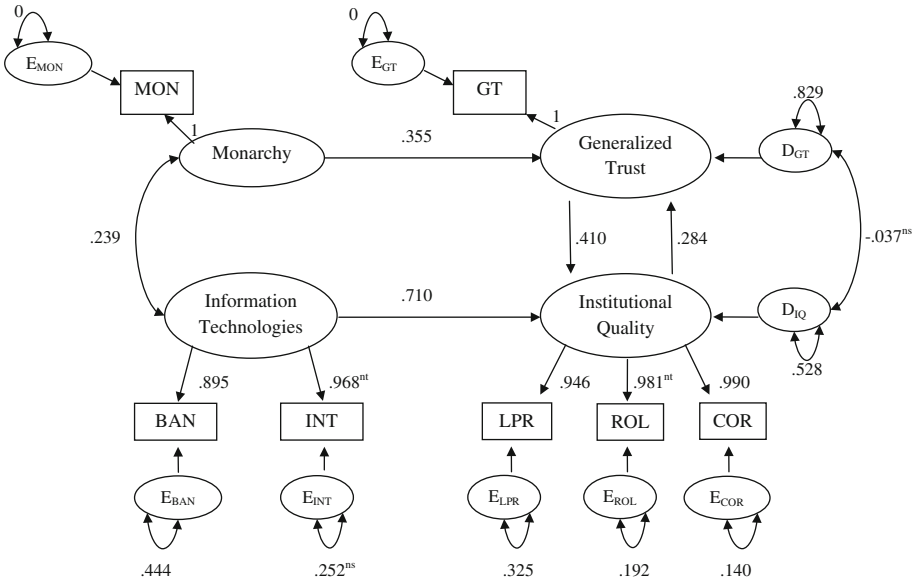

Fig. 1 Nonrecursive structural equation model. Standardized parameter estimates. $n = 64$. The above estimates are all statistically significant at the 0.05 level (one-tailed) except for those designated "*ns*," which means not significant, and those designated "*nt*," which means not tested (parameter is fixed to 1.0)

errors to remedy the presence of skewness and kurtosis. Although diagnostics reveal that multicollinearity does not bias the results, I follow Bjørnskov (2007, 2008), Paxton (2002), Robbins and Pettinicchio (2011), Rothstein and Uslaner (2005), and Uslaner (2002) and exclude China and Iran in all analyses as they are both strong outliers regardless of the model (i.e., the standardized and studentized residuals are larger than 3.0), which produces an overall country-N of 64.[7] The use of generalized least squares estimation techniques did not substantively alter the results presented below.

4.1 Confirmatory Factor Analysis

For both the CFA and SEM, I set a path for each latent and non-latent variable to 1.0 (Kline 2005). The error terms for each non-latent variable (i.e., generalized trust and monarchy) are set equal to 0.[8] Following Kline (2005), I use multiple criteria to assess the fit of the

[7] Although small samples are common in the SEM literature (see MacCallum and Austin 2000), there is little consensus on recommended sample sizes. Kline (2005) notes that "…with less than 100 cases, almost any type of SEM analysis may be untenable unless a very simple model is evaluated" (p. 15). In other words, technical problems, such as non-convergence, and issues of statistical power are more likely to occur with small samples. Note, however, that convergence and maximum likelihood solutions were not an issue in any Table 2 model; all coefficients in our final model were statistically significant (see Table 3); and all evaluated models were simple. This suggests that sample size likely did not bias the present findings.

[8] This is a routine practice in the SEM literature to assume zero measurement error for single indicator factors, especially when there are no prior estimates of measurement error in the literature to abstract and assume a reasonable non-zero measurement error. I did, however, analyze the models with varying levels of assumed measurement error estimates, from 0.01 to 0.3, for both generalized trust and monarchy. As expected, measurement error in generalized trust produced underestimation of the β coefficient. Also, as expected, measurement error in monarchy above 0.05 produced weak instrument effects, resulting in either

CFA and the nested structural equation models presented below. These include the Satorra-Bentler scaled chi-square (χ^2), comparative fit index (CFI), incremental fit index (IFI), standardized root mean square residual (SRMR), and the root-mean-square error of approximation (RMSEA). A hypothesized model that perfectly captures the observed data should produce CFI and IFI values equal to 1.0, and SRMR and RMSEA values equal to 0.0; CFI and IFI values greater than 0.9 and SRMR and RMSEA values smaller than 0.08 suggest adequate fit (Hu and Bentler 1999).

The values on the fit indexes of the CFA reveal adequate fit (χ^2 [$df = 10$, $n = 64$] = 13.14, CFI = 0.994, IFI = 0.994, SRMR = 0.025, and RMSEA = 0.071 with the 90% confidence interval 0.00–0.16). Note how the lower bound of the RMSEA confidence interval is below 0.05 and the upper bound of the confidence interval is above 0.08. This type of mixed outcome indicates a fair amount of sampling error, which suggests that the model might closely approximate the population *and* be a poor approximate fit. But since the CFI and IFI are well above the adequate fit cut-off value of 0.90 and the SRMR is well below the adequate fit-cut off value of 0.08, the model is likely a good approximate fit of the population.

For analysis of convergent validity and reliability (Hair et al. 1998) I find that each indicator of its respective dimension is statistically significant ($p < 0.05$), each standardized factor loading is greater than 0.895, each associated value of R^2 is greater than 0.80 (see Table 4 in the Appendix), each α is greater than 0.870, and each eigenvalue indicates that the proportion of the total variance accounted for each dimension is greater than 0.80. With regards to discriminant validity, I find that only one of the bivariate correlations among the dimensions is greater than 0.65 (Tabachnick and Fidell 1996). While the information technologies and institutional quality dimensions are highly correlated ($r = 0.87$), this is appropriate for IVs. From these findings, I conclude that problems of reliability and validity, either convergent or discriminant, will not likely bias the results.

4.2 Nonrecursive Structural Equation Model

In this section I make contrasts between a sequence of nested structural models to obtain information concerning the model that best accounts for the covariances among the observed variables. To gain a complete understanding of the relationship between generalized trust and institutional quality, I test six nested structural equation models using model building and model trimming techniques outlined by Kline (2005).

The first structural model examined (model 1, Table 2) is the instruments only model displayed in Fig. 1. This basic model accounts for 31% of the variance in generalized trust and 73% of the variance in institutional quality. Note that the R^2 presented are Bentler-Raykov R^2 that correct for the correlations between the disturbances and predictors since this occurs in all nonrecursive models (Bentler and Raykov 2000). As shown, this model has good fit (χ^2 [$df = 10$, $n = 64$] = 13.14, CFI = 0.994, IFI = 0.994, SRMR = 0.025, and RMSEA = 0.071 with the 90% confidence interval 0.00–0.16) and closely mirrors the CFA fit statistics. This indicates that model 1 conforms well to the observed data.

Footnote 8 continued
biased estimates, lack of bidirectional or even unidirectional significance between generalized trust and institutional quality, or maximum likelihood convergence issues. These results suggest that some minor unobserved measurement error in the generalized trust and monarchy indicators will not bias the results presented below. For instance, an assumed measurement error of 0.02 for both indicators yielded results similar to those found in Fig. 1.

Table 1 Covariance matrix of variables used in the analysis

	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11
Institution indicators															
1) Rule of law (ROL)	0.33	1.01	−1.25	1.89	1.016										
2) Legal property rights (LPR)	6.21	1.93	2.7	9.6	1.816	3.727									
3) Corruption (COR)	0.36	1.12	−1.17	2.39	1.1	2.027	2.027								
Technology indicators															
4) Bandwidth (BAND)	2.63	2.59	−4.13	9.19	1.979	3.677	2.261	6.68							
5) Internet users (INTUS)	1.57	1.57	−2.76	3.941	1.296	2.301	1.482	3.517	2.461						
Single indicators															
6) Trust	0.27	0.14	0.078	0.665	0.063	0.124	0.073	0.131	0.081	0.019					
7) Monarchy	0.19	0.39	0	1	0.186	0.365	0.213	0.482	0.217	0.027	0.155				
8) Income inequality	35.82	7.81	24.7	57.77	−2.067	−4.568	−1.903	−3.89	−1.508	−0.432	−0.332	61.013			
9) Nordic	0.06	0.24	0	1	0.095	0.193	0.119	0.192	0.130	0.020	0.020	−0.662	0.060		
10) Percent Muslim	20.65	34.76	0	99	−13.52	−30.474	−15.479	−23.064	−3.376	0.077	1.078	−3.376	−1.238	1208.403	
11) Communist	0.31	0.47	0	1	−0.161	−0.245	−0.188	−0.358	−1.458	−0.013	−0.06	−1.458	−0.020	−2.737	0.218

Table 2 Summary of fit indexes for contrasts based on the hypothesized model

Model	*df*	χ^2	CFI	IFI	SRMR	RMSEA (90% CI)	R^2 in institutional quality	R^2 in generalized trust	Unidirectional or bidirectional?
Instruments only									
Model 1	10	13.14[a]	0.994	0.994	0.025	0.071 (0.00–0.16)	0.73	0.31	Bidirectional
Model building									
Model 2: income inequality to institutional quality and generalized trust	13	21.34[a]	0.984	0.985	0.029	0.101 (0.00–0.17)	0.72	0.40	Bidirectional
Model 3: income inequality and Nordic to institutional quality and generalized trust	16	28.34*	0.969	0.970	0.027	0.111 (0.04–0.18)	0.71	0.52	Trust to institutions
Model 4: income inequality, Nordic and percent Muslim to institutional quality and generalized trust	19	46.76*	0.939	0.943	0.034	0.152 (0.10–0.21)	0.65	0.53	Bidirectional
Model 5: income inequality, Nordic, percent Muslim and communist to institutional quality and generalized trust	22	53.80*	0.943	0.947	0.039	0.151 (0.10–0.20)	0.74	0.53	Trust to institutions
Model trimming									
Model 6	22	51.18*	0.940	0.944	0.047	0.145 (0.09–0.20)	0.70	0.50	Bidirectional

I provide Bentler-Raykov corrected R^2 and Satorra-Bentler scaled χ^2. Directionality was determined by a one-tailed test with $p < 0.05$

[a] $p < 0.10$; * $p < 0.05$

Interestingly, model 1 reveals that the relationship between institutional quality and generalized trust is bidirectional: institutional quality significantly and positively produces generalized trust and generalized trust significantly and positively produces institutional quality. That is, model 1 provides evidence for a contemporaneous positive feedback effect between generalized trust and institutional quality.

Model 2 specifies the effects of income inequality on institutional quality and generalized trust, supporting prior work showing that income inequality is a negative predictor of generalized trust ($p < 0.05$). Income inequality also explains additional variance in generalized trust (ΔR^2 0.09), but adds very little to the explained variance of institutional quality or to the overall fit of the model. With regards to the latter, all indicators of fit for model 2 are worse than those for model 1: the CFI and the IFI are smaller, and the SRMR and the RMSEA are larger. Finally, although income inequality does not increase overall model fit, model 2 maintains the feedback effect found in model 1.

The next model (model 3) adds the effect of Nordic on generalized trust and institutional quality. In contrast to models 1 and 2, the only statistically significant effect in the feedback loop is from generalized trust to institutional quality ($p < 0.05$). Yet, according to the indicators of fit, model 3 fits worse than models 1 and 2, and an increase in R^2 only occurs for generalized trust (ΔR^2 0.12). The effect of Nordic on generalized trust, however, is statistically significant ($p < 0.05$), which supports prior work. In model 4, a path from percent Muslim to institutional quality and a path from percent Muslim to generalized trust are added. As shown, the fit of model 4 is more inferior to the other three models. Not only that, but percent Muslim fails to predict either institutional quality or generalized trust ($p > 0.05$), and the change in R^2 for both is negligible. In spite of poor fit, model 4 reveals that the relationship between institutional quality and generalized trust is bidirectional and positive, albeit with a one-tailed p-value of 0.10 for the institutional quality to generalized trust path coefficient. In model 5, the effect of communist on institutional quality and generalized trust is added. Although the path coefficient from communist to institutional quality is statistically significant ($p < 0.05$), the indicators of fit for model 5 are worse than that of models 1 and 2 and the path coefficient from generalized trust to institutional quality is the only statistically significant effect in the feedback loop.

In Model 6, I conduct *ex post* model trimming and eliminate parameters by constraining statistically insignificant path coefficients found across all five models to zero, which results in direct effects from monarchy, income inequality and Nordic to generalized trust and direct effects from information technologies and communist to institutional quality. The results show that the fit of this model is slightly superior to the less constrained model 4 (except for the SRMR), but less superior to the more constrained models 1 through 3. Model 6 also reveals that the feedback effect between generalized trust and institutional quality is similar to that found in model 1.

The key result from the CFA and the sequence of nested SEMs is strong support for a contemporaneous positive feedback effect between institutional quality and generalized trust. While some of the models suggest that generalized trust is a statistically significant predictor of institutional quality and not the other way around (i.e., models 3 and 5), none of the other control variables significantly improve model fit, suggesting that the best-fitting model is the instruments only model that reveals a statistically significant positive feedback effect between generalized trust and institutional quality (i.e., model 1, Table 2).[9]

[9] For model 1, Table 2, I also controlled for gross domestic product, which did not significantly influence generalized trust, but it did, however, affect other relationships in the model. It was highly correlated with both the information technologies and institutional quality dimensions ($r > 0.77$), which resulted in

Table 3 Unstandardized parameter estimates for a latent dimension nonrecursive model of institutional quality and generalized trust

	Outcome dimensions	
	Institutional quality	Generalized trust
Information technologies	0.46*(0.08)	
Monarchy		0.13*(0.05)
Institutional quality		0.04*(0.02)
Generalized trust	2.92*(1.34)	
R^2	0.73	0.31
Goodness-of-fit		
χ^2	13.14	
CFI	0.994	
IFI	0.994	
SRMR	0.025	
RMSEA	0.071	
N	64	

Unstandardized coefficients (numbers in parentheses are robust standard errors); *$p < 0.05$ (one-tailed tests)

Figure 1 presents the standardized parameter estimates and Table 3 summarizes the unstandardized path coefficients for this model.[10] What is most evident from Fig. 1 is that the magnitude of the standardized direct effect of generalized trust on institutional quality (0.410) is nearly one-and-a-half times the magnitude of the direct effect of institutional quality on generalized trust (0.284). To explore whether these two paths are, in fact, statistically different from each other, I ran a model where the path from generalized trust to institutional quality is constrained to equal the path from institutional quality to generalized trust. Since this model is nested within the Fig. 1 model, a statistically significant difference in χ^2 between the two models would suggest unique differences between the two paths. Results reveal the two paths to be statistically different. When the two paths are free (i.e., Fig. 1), the χ^2 is significantly reduced compared to the model where the path from generalized trust to institutional quality is constrained to equal the path from institutional quality to generalized trust ($\Delta\chi^2$ on 1 $df = 4.037$ unadjusted and 4.153 Satorra-Bentler adjusted).

Footnote 9 continued
discriminant validity issues and difficulties in converging on a solution associated with the small sample size ($n = 64$). As a result, I left gross domestic product out of the analysis since both information technologies and institutional quality capture a large portion of its variance. Results are available upon request.

[10] I analyzed a number of alternative models to further test the sensitivity of the results. First, some of the variables, specifically legal property rights and income inequality, had less than 10% missing cases. In the original analyses, I used multiple imputation techniques found in Stata 10.1 to overcome this issue. To see if the imputed data may have biased the results, I re-analyzed the models in Table 2 using listwise deletion with the missing cases, which yielded an N of 58. The results indicated that none of the key path coefficients deviated from those presented in Tables 2 and 3. Second, I also explored model-based imputation methods available in EQS 6.1 (Bentler 2003). This method replaces a missing score with an imputed value drawn from a full information maximum-likelihood predictive distribution. Although models 2 through 5 had difficulty converging on a solution, the model in Fig. 1 converged, which paralleled the significant positive feedback effect found therein. Third, and finally, I investigated the pairwise deletion option found EQS 6.1, which did not substantively alter the results presented here.

These results, according to some, are expected. Pluralists have long argued that social capital, be it civic engagement or generalized trust, should foster fair and effective political institutions and heightened institutional performance. Conversely, state-centered theorists for some time have underscored the necessity of institutional quality in producing generalized trust. The evidence reported here suggests that both are correct. Yet it should be surprising to state-centered scholars (and unsurprising to pluralists) that the connection is stronger from generalized trust to institutional quality, rather than the reverse. These results are robust even when examining institutional quality as a single-indicator dimension composed of legal property rights, rule of law, or corruption (results available upon request).

Figure 1 also reveals a lack of statistical significance between the institutional quality and generalized trust disturbance terms, which offers evidence against the possibility of spuriousness. This indicates that generalized trust and institutional quality are indeed the determinants of their relationship. Also note that the estimate is negative. If an analyst a priori expects a positive correlation between the disturbance terms (as is expected in the present study) but estimates a negative relationship, this often suggests model misspecification problems, which can arise from using categorically measured exogenous variables in EQS (Kline 2005). Misspecification is the case, however, only if the correlation between the disturbance terms is large *and* statistically significant (Asher 1983). Since monarchy is a binary variable and the correlation between the disturbance terms is small and statistically insignificant, model misspecification is probably not an issue and the results presented in Fig. 1 are likely unbiased.

5 Discussion and Conclusion

It is argued that institutional quality may produce or be a product of generalized trust. While an extensive literature has explored this relationship, little empirical work has investigated the possibility of a contemporaneous causal feedback effect between these variables. To remedy this issue, I made use of an identified nonrecursive structural equation model to determine if a reciprocal relationship exists between institutional quality and generalized trust. It appears that it does. The results reveal a statistically significant and positive feedback effect between institutional quality and generalized trust, where the path is stronger from generalized trust to institutional quality.

The present findings suggest that political-institutional factors, such as fair and effective legal systems and credible commitments between rulers and citizens foster social environments where individuals recognize that sanctions follow opportunism and rule-breaking for citizens and leaders alike regardless of being loyal or disloyal to the ruler. The consequence is predictable economic exchange and a common expectation that possible exchange partners are likely reliable. In other words, because of institutional mechanisms strangers become worthy of trust. What these exact individual-level mechanisms are, however, remains unclear: Is it the feeling of safety and security? Is it the inference of public corruption to private treachery? Or, is it the perception that rulers are subject to the same legal and political constraints as citizens? Although the present analysis does not empirically assess each of these mechanisms, it reveals that legal property rights, rule of law and corruption play a part in the production of generalized trust, which suggests that these micro-level mechanisms might account for the observed effects.

The present findings also suggest that generalized trust contributes to the development of institutional quality. This finding itself supports the main pluralist insight that for

political institutions to perform effectively and efficiently, the social and civil environment of a country must have some basic level of generalized trust. And when the willingness of citizens to rely on generalized others wanes, so too will the performance of political institutions. It is difficult to tell what accounts for this relationship, but the literature clearly points to five possible intervening factors: the checks-and-balances of voting institutions; the lower transaction costs of control; the creation of civic virtues; the effectiveness of bureaucracies; and/or the ease of political communication (Boix and Posner 1998). The story is that generalized trust produces all or one of these mechanisms, which then increase the quality of political institutions. Yet recent studies are pointing toward certain mechanisms instead of others. Bjørnskov (2010), for instance, found greater evidence for the working of bureaucratic mechanisms over electoral mechanisms in the connection from generalized trust to institutional quality, while Letki (2006) found that measures of civic virtue were statistically unrelated to generalized trust. Although insightful, these studies examined only three of the five possible mechanisms outlined by Boix and Posner (1998), indicating that much more work is required in order to understand just how generalized trust produces institutional performance.

In important ways, the present analysis confirms both sides of the classic pluralist versus state-centered debates. A key element of civic and political culture—generalized trust—has been shown here to generate the performance and quality of political institutions. How governments sanction noncooperative behavior, create confidence in their citizens and electorate, avoid corrupt practices, and abide by their own institutional rules is conditional on the amount of generalized trust within the population. Likewise, this generalized trust is dependent on those very same factors: institutional fairness, effectiveness, and incorruptibility, and the rule of law. As Robert Putnam writes, "Effective collaborative institutions require interpersonal skills and trust, but those skills and that trust are also inculcated and reinforced by organized collaboration (1993: 180)." And, interestingly, this comparative analysis shows that one connection in the feedback loop is slightly stronger than the reverse: from generalized trust to institutional quality.

While the present results contribute to our understanding of the dynamic relationship between institutional quality and generalized trust, two types of analyses, both dealing with time, would shed light on this relationship. First, research in the future should use cross-lagged panel designs—as advocated by Paxton (2002)—to identify the institutional factors besides democracy that might produce generalized trust, and vice versa. Second, a more revealing analysis should implement either growth curve models (Bollen and Curran 2006) or hierarchical generalized cross-lagged panel models. The former would specify how institutional quality impacts the starting point and growth (or decline) of generalized trust (and vice versa), while the latter would permit the researcher to take temporal, contextual, and demographic factors into account. The issue with these alternative analyses is that they require large samples across at least three waves of data or are currently being developed (i.e., hierarchical cross-lagged panel designs). Once the requisite data and statistical techniques are available, they will greatly contribute to our understanding of the relationship between political institutions and generalized trust.

Apart from this, the findings summarized above have important policy implications not only for countries trying to establish stable and transparent political institutions but also for countries attempting to glue their citizenry together and foster a vibrant civic culture. The results presented and discussed above suggest that political actors would do well to invest in policy geared toward the creation of fair and effective political institutions as well as social programs aimed at building trust within communities. The latter of which, however, is much more difficult to accomplish (Putnam 1993). Therefore, since both processes

mutually reinforce the other, getting out of a vicious cycle of mutual distrust and into a virtuous cycle of mutual trust may rest on top-down solutions, where policy makers enhance institutional performance that, in turn, stimulates generalized trust which creates an even more robust political-institutional system.

In conclusion, the present findings provisionally point to the following: generalized trust bolsters institutional quality and institutional quality is critical for the development of generalized trust.

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Appendix

Sensitivity Analysis I: Instrument Validity

I conducted a number of tests in Stata 10.1 using the *ivregress* and *ivreg2* commands to determine the relevance of the instrumental variables (Baum et al. 2007).[11] Instruments must first and foremost be correlated with Y and uncorrelated with ε in the following equation:

$$Y = \beta_1 X_1 + \beta_2 W_1 + \varepsilon$$

where Y is the dependent variable of interest, X_1 is the troublesome causal variable, and W_1 is a vector of non-troublesome covariates. If, however, possible instruments are uncorrelated with Y and/or correlated with ε then these instruments are invalid and should be discarded. I find that information technologies are significantly correlated with generalized trust ($r = 0.38$, $p < 0.05$) and uncorrelated with the error term ($r = 0.03$, $p > 0.05$) in the equation below:

$$\text{Generalized Trust} = \beta_1 * \text{Institutional Quality} + \beta_2 * \text{Monarchy} + \varepsilon$$

This suggests that the information technologies dimension is a promising instrument for institutional quality (Murray 2006). Furthermore, the first-stage regression analysis reveals that the partial R^2 for institutional quality, where information technologies is the instrumental variable, has a relatively high value of 0.59.[12] A test of underidentification (i.e., Anderson LM test) reveals that $p = 0.000$, suggesting that I can reject the null hypothesis that the equation is underidentified. That is, the model is identified. Moreover, the Cragg-Donald F statistic [(1, 61) = 88.00] is well above the typical single endogenous regressor cut-off value of 10.0 (Staiger and Stock 1997; Stock and Yogo 2005), which shows that I can reject the null hypothesis that information technologies are weak. Thus, information technologies do not suffer from a weak-instrument problem. In regards to over-identification, no formal tests, such as Sargan's or Hansen J statistic, are necessary since the

[11] To explore whether 2SLS or generalized method of moments (GMM) is more appropriate for the following instrument validity tests, I used the *ivhettest* found with *ivreg2* in Stata 10.1. Both tests failed to reject the null hypothesis that the disturbance terms are homoskedastic (information technologies instrument, $p = 0.11$; monarchy instrument, $p = 0.88$). This indicates that the use of classic 2SLS is efficient and robust.

[12] I use the following syntax in Stat 10.1 for *ivreg2* and *ivregress*, respectively: ivreg2 generalized_trust monarchy (institutional_quality = information_technologies) ivregress 2sls generalized_trust monarchy (institutional_quality = information_technologies).

Table 4 Results of confirmatory factor analysis for measures

Constructs and items	Eigenvalue	α	R^2	Standardized factor loadings	
				1	2
Institutional quality	2.824	0.935			
Legal property rights			0.894	0.946	
Rule of law			0.963	0.981	
Corruption			0.980	0.990	
Information technologies	1.620	0.870			
Bandwidth			0.802		0.895
Internet users			0.939		0.969

equation is exactly identified (i.e., the number of instruments does not exceed the number of endogenous variables). Finally, checking the Fig. 1 Lagrange Multiplier (LM) in EQS 6.1 revealed that the overall model chi-square would *not* significantly decrease if a fixed-to-zero path from information technologies to generalized trust was freely estimated. This provides more evidence for information technologies as an instrument and that the model in Fig. 1 is properly specified. (Table 4).

In regards to monarchy, I find that it is significantly correlated with institutional quality ($r = 0.49$, $p < 0.05$) and uncorrelated with the error term ($r = 0.12$, $p > 0.05$) in the equation below, suggesting that it is a promising instrument:

$$\text{Institutional Quality} = \beta_1 * \text{Generalized Trust} + \beta_2 * \text{Information Technologies} + \varepsilon$$

The first-stage regression analysis also reveals that the partial R^2 for generalized trust, where monarchy is the instrumental variable, has a relatively low value of 0.16.[13] Although this suggests that monarchy may be a weak instrument, the Cragg-Donald F statistic [(1, 61) = 11.11] is above the typical single endogenous regressor 10.0 cut-off value, indicating that monarchy is not a weak instrument. The Anderson LM test for underidentification shows that I can reject the null hypothesis that the equation is underidentified ($p = 0.0017$). Once again, no tests are necessary to determine over-identification since the equation is exactly identified. Finally, the Fig. 1 Lagrange Multiplier (LM) paralleled those for the information technologies instrument: the overall model chi-square would *not* significantly decrease if a fixed-to-zero path from monarchy to institutional quality was freely estimated. All of this provides firm diagnostic evidence, beyond the theoretical and historical reasons outlined in the paper, for monarchy as an instrument.

Sensitivity Analysis II: Alternative Instruments

I also examined a number of alternative IVs for generalized trust. Recent studies by Bergh and Bjørnskov (2011), Bjørnskov (2010) and Tabellini (2007) propose such IVs. Drawing on Kashima and Kashima (1998), Tabellini argues that countries where respect for individual rights is weak also have languages that permit dropping of the personal pronoun, or "pro-dropping." This suggests that a greater emphasis on collective identity and common

[13] I use the following syntax in Stat 10.1 for *ivreg2* and *ivregress*, respectively: ivreg2 institutional_quality information_technologies (generalized_trust = monarchy) ivregress 2sls institutional_quality information_technologies (generalized_trust = monarchy).

rights will occur in countries where "pro-dropping" is forbidden, which should increase generalized trust. The second instrument, used by Bjørnskov, is the average temperature in the coldest month of the year. The theoretical and historical argument here is that a country with harsh winters creates a greater demand for individuals and small groups to depend on strangers outside of their particularized social network for survival. Those in need during cold winters would likely receive help from strangers, while those in countries with milder winters could exclusively rely on their immediate family and friends for survival. The result is a historical development of generalized trust in those societies with colder winters.

I subject these alternative instruments to the same diagnostic test outlined above. "Pro-dropping" is coded as a binary variable, where "1" equals a license to *pro-drop* in the country's official language, while "0" equals otherwise. The *temperature* instrument is a continuous variable that measures a country's average temperature (Celsius) in the coldest month of the year. When using these alternative IVs, the key results paralleled those presented in Fig. 1, yet failed many of the diagnostic tests. The alternative IVs suffered from (a) underidentification (only temperature, $p = 0.70$); (b) weak instrument problems where the Cragg-Donald F statistic was well below the typical cut-off value of 10.0 (pro-drop, $F = 6.9$; temperature, $F = 0.14$; both, $F = 3.38$); (c) weak partial-R^2 (pro-drop, $R^2 = 0.10$; temperature, $R^2 = 0.002$; both, $R^2 = 0.10$); and (d) significantly correlated disturbance terms in the SEM (only if pro-drop was in the equation). In addition, pro-drop was significantly correlated with the error term (ε) in the following equation:

$$\text{Institutional Quality} = \beta_1 * \text{Generalized Trust} + \beta_2 * \text{Information Technologies} + \varepsilon$$

I also examined diagnostics with the alternative instruments coupled with monarchy. The best combination of instruments was monarchy and pro-drop. Although the instruments produced identification ($p = 0.001$) and a moderate partial-R^2 of 0.22, the overall model fit was worse than model 1 in Table 2, the Cragg-Donald F statistic was below the cut-off value of 10.0 ($F = 8.23$), the Sargan test statistic suggested overidentification ($p = 0.02$), and the generalized trust and institutional quality disturbance terms were significantly correlated. As a result, these instruments were excluded from the analysis in favor of monarchy.

In the end, monarchy was chosen because of theoretical and historical reasons, which were also supported empirically: all alternative instruments failed other tests and explained less model variation in comparison to monarchy (i.e., monarchy yielded the lowest model IFI, CFI, SRMR and RMSEA) but generated similar results to those found in Fig. 1 with respect to the feedback loop between institutional quality and generalized trust. Results for all of the above analyses, as always, are available upon request.

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