Trust, Governance, and Growth: A Simultaneous Equation Approach

by

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Abstract

This thesis aims to establish the empirical relationship between trust, governance, and economic growth. Initially, a conceptual model grounded in institutional economic theory is developed to help guide the subsequent empirical model. Aspects unique to the conceptual model, as compared to previous literature, include a hypothesized interdependent relationship between trust, governance, and growth. Feedback effects imply two, distinct paths that countries can take. High initial trust endowments create a social environment conducive to high-quality, formal institutions, that ultimately sets a country on a trajectory of high economic growth. Conversely, a trust-governance trap exists, where countries with low initial trust endowments create poor formal institutions that result in sustained levels of low economic growth.

An empirical model that reflects the interdependent relationship between trust, governance, and growth is then established. Contrary to previous studies, trust and governance are modeled econometrically as a non-recursive system of equations with feedback effects. In this empirical form, trust and governance are shown to be positively related to one another. Statistically significant total effects imply the existence of the hypothesized trust-governance trap. European colonization, social diversity, and income inequality play important roles in determining the nature of the relationship.

Finally, modeled in a similar, simultaneous fashion, trust is shown to have a significant, sizable, positive effect on long-term economic growth (1970-2009). A major contribution is the extension of the empirical sample to a much larger set of countries, more representative of the world at large. Results are tested for robustness to the exclusion of statistical outliers and countries that exhibit trust values inconsistent with the dimensions of trust hypothesized to be theoretically related to economic development.

Chapter 1: Introduction

Beginning in the mid-1800s, the Industrial Revolution quickly spread across the world forever changing the global economic landscape (Bolt and Van Zanden 2013). While the root cause of this event has been vigorously debated, the fact that global economic development was dramatically different before and after is generally accepted as fact. The standard of living, as measured by per capita income increased ten-fold for the average global citizen following the Industrial Revolution. Notably, per capita income remained roughly constant for the roughly 1,850 years prior to the Industrial Revolution.

While the average citizen benefitted greatly from the wealth creation associated with the technological advances of the Industrial Revolution, it is clear that not every region of the world benefitted equally. At the beginning of the Industrial Revolution in 1820, the standard of living was roughly equal in all of the regions mentioned. By today's standards, the global population was extremely poor, life expectancies were low, and subsistence agriculture overwhelmingly represented the majority of the population's economic activity. The richest and poorest regions, respectively, were the United Kingdom and Sub-Saharan Africa, with a 4-1 ratio of relative per capita income. Today that ratio has swelled closer to 20-1, when considering Scandinavia to Sub-Saharan Africa (Heston, Summers, and Aten 2009).

Today the study of economic growth, particularly within the specialized field of development economics, attempts to uncover the factors that account for this wide discrepancy in growth outcomes that we see between regions persisting until today. Theories abound attempting to explain the cause responsible for such a dramatic divergence in income. Included in those theories are ones related to relative geographic endowments, natural resource wealth, conflict, and governance.

Concerning governance, a popular school of thought known as the New Institutional Economics (NIE) plays a prominent role in the discussion concerning what in fact drives economic prosperity. Predictably, NIE cites the role of formal institutions as the critical factor in creating an environment conducive to well-functioning markets and subsequent economic growth. NIE encompasses a variety of disciplines, including economists, sociologists, historians, and anthropologists. Together they cite the important roles that history, culture, as well as, the roles that traditions and social norms play with regards to economic progress.

New Institutional economists today are some of the leading contributors to the discussion of why, or why not, markets and governance work in the developing world. Well-defined property rights, checks and balances in government, reliability of contract enforcement, prevalence of corruption, as well as, civil and political liberties are just a small sample of formal institutional indicators that have been shown empirically to influence economic growth.

Effective formal institutions (i.e. rules that govern how individuals behave with one another) stimulate economic growth in primarily two ways.[1] First and foremost, protection of property rights, civil liberties, and political liberties allow market participants to invest their time and assets in productive activity without fear of expropriation from criminals or the government. This stimulates higher levels of savings, investment, and entrepreneurial activity than would otherwise exist without these protections. Second, efficient provision of public goods, such as education, transportation infrastructure, and basic medical care are facilitated by formal institutions that discourage corruption, allow some form of representation for the diverse interests and needs of a society's various constituencies, and permit for the democratic replacement of ineffective government representatives.

[1] Governance and formal institutions are used synonymously in this thesis, and meant to represent the formal rules, laws, and norms applied by national governments. This is not entirely accurate, however is consistent with the application of these terms in the empirical literature.

In addition, a growing subset of the institutional literature deals with the informal institutions that contribute to economic growth. Moral, religious, and civil society norms, in the case of wealthy European countries, often served as templates for the formal rules that were written into legal code. Granted, formal institutions are a necessary, yet insufficient means of providing markets the capacity to operate in an efficient fashion. Underlying social and moral norms compatible with laws and regulations are needed to reduce the transaction costs required for efficient and effective enforcement. Laws based on the foundations of the ethical tenants of a country's religious faiths or social compacts serve this purpose. Bargained by competing interests and carried forward over generations, these informal rules provide instant credibility and authority. Unlike state-authored laws and regulations, informal rules are reinforced every time citizens gather as family for weekly religious services or for periodic town hall meetings.

While perhaps controversial, there is a strong basis for believing that culture has proved to be a particularly strong influence on a nation's ability to establish and maintain an environment conducive to economic growth. Religion, in particular, has been theorized to have a strong role in the direction a country's development takes (Guiso, Sapineza, and Zingales 2003). Primary socialization in many countries is done in a religious context, by which ethical norms particular to different religious faiths are transmitted throughout society. Max Weber, who competes for the designation of father of sociology with Karl Marx, believed that Protestantism (particularly Calvinism) supplied Western society with the norms necessary for sustained economic growth (Weber 1905). In addition to Christianity, the fear of eternal judgment together with promises of everlasting paradise serve many faiths as the respective "stick and carrot" sufficient to motivate their believers to engage in ethical behavior, irrespective of the formal institutional environment. There is even empirical evidence that religious values carried with immigrants from their home countries affect different factors related to economic growth, such as the

probability of becoming an entrepreneur. One's religious affiliation even influenced the value placed in teaching thriftiness to one's own children (Guiso, Sapienza, and Zingales 2006).

Social networks, particularly those that promote engagement in civil society, have long been cited by sociologists as factors in the advancement of economic development. Alexis de Tocqueville (1835) famously noted the increased levels of civic association in 19th century America as being partially responsible for the economic success of the United States. More recently, modern sociologists, including Putnam (2000) and Fukuyama (1995), have built on Tocqueville's insight that civil society acts as a counterbalance to political society, going so far as to suggest that it is necessary for economic growth.[2] However, this is far from the consensus view as critics have noted the potential for civil associations to create conflict and strife rather than foster cooperation; particularly those drawn along ethnic and/or political lines. Antonio Gramsci (1995), a Marxist, in contrast to the writings of Karl Marx himself, acknowledged the importance of embracing civil society as a means of spreading communist ideology. Thus, the effect of civil association on economic growth has been effectively segmented between the "bad" types of association, which can include political organizations, and the "good" type (e.g. religious, sports, art, etc.) that integrates citizens across different sectarian lines, helping to unify, build trust, and promote cooperation.

The latter form of association has inspired a growing body of research around the concept of social capital. Loosely defined, social capital is the general notion that social networks create value for society and the individuals that participate in them. Proponents of social capital theory are less interested in the role formal institutions play in regards to economic development, instead focusing on the twin roles that reciprocity and reputation play within social networks to promote economic growth. Social capital creates value through its ability to strengthen bonds within groups of homogeneous actors

[2] Tocqueville himself was influenced by the classical Scottish political economists, including Adam Ferguson, Adam Smith, and John Locke.

and builds the bridges of goodwill that can emerge between different groups within a heterogeneous society. This value is manifested in higher levels of generalized trust in society, with trust often times being used as a proxy for social capital.

The relationship between formal institutions and the factors mentioned above is rich and complex, mired with various interdependencies. Given these linkages it is often difficult to discriminate between cause and effect when analyzing the varying effects of formal institutions, informal norms, rates of civic engagement, and culture. One critical unifying factor is that of interpersonal trust. Social norms, historical experience, religious participation, and the formalized rule of law are all associated with varying levels of higher or lower interpersonal trust.

Given the critical link between formal and informal institutions, it naturally follows that trust plays an important intermediary role in the promotion of economic growth. In fact, trust has long been regarded as an essential element of well-functioning markets. Even in this age of increasingly electronic commerce, the overwhelming majority of global economic exchange occurs in a social, often personal, context. Many might be surprised to know that Adam Smith (1759) was best known in his own era as a political scientist and philosopher. He wrote of the "sense of duty" that individuals within a society often have for others. He was also interested in the role of reciprocity as an inspiration for trusting behavior within communities. More recently, Nobel Laureate Kenneth Arrow (1972, p.357) suggested, "virtually every commercial transaction has within itself an element of trust".

Without trust, or an effective substitute, it is widely believed that markets, and by proxy, economic activity would suffer considerably. Substitutes for trust (e.g. detailed contracts) are generally accompanied by transaction costs associated with implementation and enforcement. Thus, the nature in which trust is generated in a society often goes beyond substitutes, which often come in the form of formal institutions.

As a first step, this thesis will attempt to ascertain empirically the determinants of generalized societal trust beyond formal institutions. The key explanatory variables of interest with regards to trust are income inequality, societal diversity, and religion. Income inequality and social diversity, often referred to as fractionalization in the literature, are generally believed to have a negative impact on economic growth. Thus, presumably as a society or country becomes more heterogeneous, along income, ethnic, linguistic, and/or religious lines, economic growth prospects diminish.

In essence, income inequality and fractionalization can be thought of as a proxy for unlikelihood of cooperation, given it is widely assumed that homogeneous agents have a higher probability of cooperating than heterogeneous agents. Consequently, the two characteristics could lower economic growth in a variety of ways: less frequent commercial transactions, lower (and unequally distributed) provision of public goods, and/or the inability to resolve collective action problems. This paper implicitly hypothesizes that much of income inequality and fractionalization's effects on growth are borne through their relationship to trust.

An important intermediate step in this research is the analysis of the relationship between formal institutions and trust. There are no formal, published empirical analyses relating these two important societal characteristics. The initial hypothesis is that trust, proxying for social capital, is highly interdependent with formal institutions, or governance. Higher levels of societal trust are assumed to be associated with higher quality governance, in turn, increasing rates of economic growth.

The final portion, and ultimate objective of the empirical study, utilizes the model created associating trust and governance as part of a larger system of simultaneous equations that includes economic growth. The ultimate hypothesis is that trust and governance through their interdependent relationship, have a positive and significant effect on economic growth.

This paper's contribution is three-fold. First, the cross-country analysis is extended to over 100 countries vs. 36 and 29 countries, used in the two leading empirical studies examining this topic. In addition to statistical benefit achieved with a larger dataset, the 100 country sample produces results more representative of the world at large. This also accounts for the relationship between formal and informal institutions. Finally, the governance-trust model is extended to include economic growth.

Chapter 2: Literature Review

2.1 The Definition and Theoretical Determinants of Trust

Before describing the measurement of trust, it will be useful to define and then examine the theoretical foundations of the determinants of trust in greater detail. While there are many possible definitions, all include several common characteristics; trust is typically thought of in a social context (i.e. party A trusts party B), a subjective probability is involved (i.e. party A expects something from party B), and normally it involves the expectation of some action (i.e. party A expects party B to do something). The best definition that includes the "thin"[3] trust conducive to economic growth is:

Trust = The confidence by Party A that Party B will not act opportunistically when Party A is vulnerable.

The literature related to trust can be divided among three main categories. The first is related to how formal institutions influence trust. This set of literature is perhaps the largest and most diverse. In summary, institutions provide the rules necessary to mitigate opportunism, thereby raising trust levels[4]. The next category of literature is interdisciplinary in nature and deals with the idea of social capital. A number of proponents of social capital theory, often game theoreticians or experimental economists, are less concerned with the role formal institutions play in regards to trust development. Instead their focus is squarely based in a neoclassical economic context, where rational, calculating agents deal with the twin roles that reciprocity and reputation play within social networks to promote

[3] Putnam (2000) distinguishes between "thick" trust, shared among family and friends, and "thin" trust which is applicable to those less proximate and is based on reputations, norms, and signals.

[4] See Williamson (1975) and North (1994) for the perspective from new institutional economics. Alternatively, Platteau (2004a) argues institutions are only substitutes for moral norms and ideally should only play a reinforcing role in the generation of societal trust.

trust[5]. Another variant of social capital theory concerns itself with the horizontal associations, or group memberships they believe responsible for fostering stronger societal bonds, and consequently, trust[6]. Finally, there is another interdisciplinary group of economists, historians, and sociologists that explore how culture, moral norms, and societal structure influence trust. Given the variables of interest in the empirical model of this thesis, the focus of the following is on this latter approach.

The discussion of how moral norms influence trust is a complicated affair. As defined by Platteau (2004b), moral norms are an internalized set of rules governing behavior such that violation of those rules, even when the violation might go undetected, is prevented because the moral norm has an intrinsic value higher than any utility that a competing short-term desire or action might provide. Norms, as defined in this case, generate behavior that is driven from completely internal considerations. Emotions play a key "enforcement" role and may include guilt, shame, or fear of disappointing those we respect. Thus, honesty, when held as a moral norm, would result in higher levels of trust given the intimate relationship between trust and honesty.

However, the norms of concern are those that promote generalized morality, not limited-group morality. Together primary and secondary socialization generate and reinforce the norms that encourage generalized morality, and consequently, generalized trust. During their primary socialization in the family, people are set on a trajectory that determines their notions of right vs. wrong, the value (or lack of value) of personal responsibility, and their general ability and likelihood to move from clearly defined interaction with their familiars to interactions with those less proximate. Later during secondary socialization, religious communities, peer groups, and civil society continue to generate and reinforce moral norms acquired earlier. It is through these channels, namely cultural and societal norms, that a person's relative trustworthiness, or initial endowment of trustworthiness, is established.

[5] See Granovetter (1985), who argues that trust is driven by the reciprocity and reputation mechanisms within social networks. Granovetter, like Platteau, views institutions as substitutes for trust.

[6] Robert Putnam is most closely associated with this line of research.

To better understand the relationship between culture and trust, it is important to recognize that events in the past shape the behavior of individuals and society today. On an individual level, few would deny that reciprocity plays an important role in how we interact with others, and more specifically, in generating trust[7]. Given unique cultural endowments between countries, social and moral norms across countries can lead to widely varying informal institutions. Examples of informal institutions that reinforce trust include guilt, ostracism, "afterlife" sanctions, and/or reputational loss (Platteau, 2004b; Knack and Keefer, 2008). Even in instances where reciprocity helps generate trust, Platteau (2004b) uses a modified assurance game to demonstrate that an optimal mix of informal norms increases the probability of trusting behavior. According to Platteau, trustworthiness is likely to be sustained if (1) people start with a preference for honesty, (2) the belief that other people are trustworthy is high, (3) the bent for honesty is strong enough not to be discouraged by bad experiences, (4) cheaters feel guilt when cheating honest people, and (5) honest people are willing to punish cheater's even when their own interest has not been harmed.

Knack and Keefer (1995), pioneers in the economic social capital literature, explored the determinants of trust beyond formal institutions and the reputational mechanisms of social networks. They posited that levels of societal trust are highly dependent on ethnic homogeneity and civil association membership.

Knack and Keefer give four reasons why ethnic homogeneity would be positively related to trust. First, agents that are similar may be more likely to feel shame or ostracize one another in the case one abuses the trust of the other. Second, people believe both themselves and those that are similar to be inherently trustworthy. Third, social homogeneity increases the likelihood that agents will agree on a set of norms that constitute fairness. Finally, altruistic behavior is theorized to be higher in socially

[7] Reciprocity can also result in the hindrance of trust. The act of trusting inherently creates vulnerability increasing the expected payoff to cheating. See Granovetter (1985).

similar populations. The authors note that ethnic homogeneity was significantly and positively related to trust as part of a separate empirical analysis they published (1997), as well as, in an empirical study published by Stephen Knack and Paul Zak (2001).

Group association is also considered by Knack and Keefer as a theoretical determinant of trust. Voluntary associations can reinforce habits associated with cooperation, civic-mindedness, and solidarity that spillover into broader trusting behavior on a societal level (Putnam 1993). Knack and Keefer give three explanations for how increased level of group membership might increase trust. For one, group membership may reflect and reinforce common interests and bonds. Also, group membership may increase the value of ostracism as a punishment for deviating behavior, thereby increasing trust. Lastly, greater intensity of contact promoted by group associations may increase the confidence that members are inherently trustworthy. The empirical evidence supporting the relationship between trust and groups is mixed. Several empirical studies, including one by the authors (1997) only found a weak statistical association between group membership and trust. A persistent problem with estimating the relationship is the bi-causal nature of the association, as higher trust can potentially result in higher rates of participation in groups.

2.2 The Measurement of Trust

The most cited source used as a measure of trust in recent literature is the World Values Survey (WVS). This worldwide survey, gauging socioeconomic and geopolitical change, has been conducted in various waves spanning the 1981-2009 timeframe.[8] The question of interest, sometimes referred to as the Rosenberg question, is as follows:

"*Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people*?"

[8] See: http://www.worldvaluessurvey.org/index_organization.

The possible responses are structured in a binary fashion: (1) Most people can be trusted, or (2) You can never be too careful when dealing with others.

This particular question is used in a variety of studies involving interpersonal trust. Notable examples include Knack and Keefer (1997) who used the WVS data to analyze the role that institutions, societal diversity, and civic association play in the building of trust. Guiso, Sapienza, & Zingales (2006) utilizing a portion of the same dataset, provide a critical insight with their discussion of how cultural priors survive immigration and time to influence trust. These authors were able to show significant relationships between ethnic origin of U.S. citizens and trust. Notably, these trust levels correlated highly with trust levels in the respective countries of origin. Glaeser, et al. (2000), using the Rosenberg question as part of their experimental study, were able to show that age, education, and income were positive and significant in their relation to trust. In contrast, race (African-American), the population of the location where one lives, being a practicing Baptist, and/or having no religious affiliation were significantly associated with lower levels of trust. These authors further interpreted their results as implying that the Rosenberg question does not appear to measure trust, however the question does predict trustworthiness. The final important finding was the confirmation that reciprocity drives behavior; past trusting behavior is correlated with future trusting behavior.

Interestingly, Knack and Keefer (1997) found that responses to the Rosenberg question drawn from the U.S. General Social Survey (GSS) were highly correlated to results from an experiment run by Reader's Digest[9]. This particular experiment measured the percentage of wallets returned intact to their owners after being deliberately dropped in a busy public place. The Reader's Digest experiment was conducted throughout the country in various large U.S. cities. Keefer's trust measure has a Pearson's

[9] The GSS, performed in the United States, was modeled after the WVS.

correlation coefficient of .67 with Reader's Digest experimental results suggesting that the responses generated from the Rosenberg question might capture, at least in part, generalized trust.

Finally, an important observation made by Zak and Knack (2001) in their study of the effects of trust on economic growth was that the WVS trust measure appeared to exhibit very little change over the 10-year period analyzed. The authors noted that 8 of the 29 countries in their sample included social capital variables measured near the end of the sample period, as opposed to the beginning. The ultimate aim of their study was to examine the relationship between social capital and growth, thus the countries with social capital measured near the end of their sample period might introduce problems associated with reverse causality. The results attained by the authors were robust to inclusion and exclusion of the eight countries. Additionally, they documented that there was a correlation of .91 for trust observations measured between the 1980 WVS wave and the 1990-1991 wave.

2.3 Empirical Determinants of Trust

Two principal, published studies have used empirical analysis to evaluate the determinants of trust. Zak and Knack (2001) as part of their examination of the effect of trust on growth, set the stage by analyzing the determinants of trust. Later, Bjornskov (2006) built on the Zak and Knack study conducting a more detailed analysis using updated data with more countries.

Table 1 includes descriptive statistics and results related to the Zak & Knack trust model. Their dependent variable was trust, as measured by the Rosenberg question, using data primarily from WVS. Three additional observations were included from Eurobarometer and a government study in New Zealand, both modeled after the WVS. In cases where there were multiple trust observations for the same country, the most recent observation was utilized. Explanatory variables focused mainly on

Table 1: Zak and Knack (2001) Trust Model

	Time Range	Sign	Significance	Source	Mean	St. Dev.	N
Dependent Variable:							
Trust (%)				WVS and Eurobarometer	32.2	15	41
Explanatory Variables:							
GDP (per cap, PPP, constant $)	1985	(+)/(-)	-, **, ***	Heston, Summers, and Aten	N/A	N/A	41
Schooling Attainment	1985	(+)	-, *, ***	Barro and Lee	N/A	N/A	41
Property Rights Index	1982-1990	(+)	-, *, ***	ICRG	37.2	12.3	41
Gini Income	Circa 1985	(-)	***	Dienenger and Squire	37.4	9.2	36
Gini Land	Circa 1985	(-)	***	UN FAO census	57.9	12.7	36
Ethnic Homogeneity	1991	(-)	**	ELF - Sullivan	81.9	18.2	41
Homogeneity Squared	1991	(+)	**	ELF - Sullivan	N/A	N/A	41
Economic Discrimination	1975	(-)	***	Ted Gurr	N/A	N/A	N/A
Contract Enforcement	1972-1989	(+)	***	BERI	2.6	0.65	33
Corruption Index	N/A	(+)	***	Transparency Intl	6.2	2.5	39
Investor Rights	1990	(+)	***	CIFRA	57.9	15.8	37

* p<.10, ** p<.05, *** p<.01, - not significant

GDP (per capita, PPP, constant prices), Schooling, and Property rights had different significance levels depending on the specification.

proxies for fractionalization and institutions, however, they also included GDP (per capita, PPP, constant prices) and educational attainment as proxies for wealth and wages.

Of the three social distance measures, Gini income inequality and Gini land inequality were significantly and negatively related to trust. In fact, in regression equations where the Gini inequality measures were included, these social distance measures were the only significant variables and accounted for most of the variation in trust. The ethnic homogeneity measure used by the authors, from Sullivan (1991), had no linear relationship to trust. Instead it was shown to be a quadratic function of trust, lending support to the polarization hypothesis. In essence, polarization suggests that the negative effects of diversity on society are strongest when a smaller number of relatively powerful groups are present in a society, or around a fractionalization measure of .50.[10] Predicted values of trust were lowest for values of homogeneity of .66, and relatively higher for values of homogeneity greater than or less than .66. While not mentioned by the authors, it is interesting to note that the homogeneity coefficients imply that countries with relatively high ethnic homogeneity (values: 0-.30) have lower predicted trust values than those countries with extremely low ethnic homogeneity (values .70-1.00). This seems counterintuitive. As mentioned in section 2.1, ethnic homogeneity is theorized to be positively related to trust and Knack and Keefer (1997) found that relationship to hold empirically.

Zak and Knack (2001) reference Knack and Keefer's (1997) study that used a smaller sample, which included both the Sullivan (1991) ethnic measure and WVS trust measure as their data source. The correlation of the Knack and Keefer (1997) ethnic homogeneity measure with the Alesina, et al. (2003) ethnic fractionalization measure is .865, suggesting that both social distance measures may produce similar statistical results. However, one should note that the variances for the three Alesina, et al. fractionalization measures (ethnic, linguistic, and religious) are considerably higher than that of the

[10] If the ethnic composition of a country was split in half, the fractionalization measure would be .50 (.50^2 + .50^2 = .50). See appendix 1.1 for a more detailed description of polarization vs. fractionalization.

Sullivan measure. Theoretically the idea of fractionalization, particularly when broadened to include language and/or religion, might be a more complete representation of social distance than that of just measuring the largest ethnic group in a country.

Institutional variables were highly significant in every regression in the Zak and Knack analysis, particularly the corruption index, contract enforcement, and a measure of investor rights. Property rights were often significant and only weakened when other institutional variables were added. As expected, all institutional variables were positively related to trust. Notably, social distance and institutional variables were not included simultaneously in any of their regression equations.

Rounding out Zak and Knack's (2001) trust model were GDP (per capita, PPP, constant price) and educational attainment, both proxies for wealth and income. Not surprisingly, given the high correlation between the two variables (r=.81), in no case were the variables simultaneously significant. Educational attainment was positively related to trust in all cases, while GDP (per capita, PPP, constant price) changed signs depending on the particular specification. These variables were weakly significant or not significant when included with the social distance measures, while one or the other was significant jointly when the specification included institutional variables.

Table 2 includes descriptive statistics for Bjornskov's (2006) trust model. His sample size of 74 countries nearly doubled that used for Zak and Knack. Variables unique to the Bjornskov study include a dummy for countries with monarchies, a dummy for those European countries that were previously part of, or controlled by, the Communist U.S.S.R., political ideology, the age structure of society, and population size.

The monarchy dummy was inspired by casual observation that several of the Scandinavian countries had both high levels of trust and were constitutional monarchies. The Kingdom of Jordan also

Table 2: Bjornskov (2006) Trust Model

	Time Range	Sign	Significance	Source	Mean	St. Dev.	N
Dependent Variable:							
Trust (%)	1997-2003			WVS and Danish Social Capital Project	27.8	15.7	76
Explanatory Variables:							
GDP (per capita, PPP, constant 2005 $)	2000	(+)/(-)	-	Heston, Summers, and Aten	12,565	9,730	76
Education	2004	(+)	-	World Bank	85.5	28.1	72
Monarchy	2003	(+)	***	ICRG	0.18	0.39	76
Post-Communist	N/A	(-)	***	N/A	0.22	0.42	76
Gini Income	Circa 1990	(-)	***	Dienenger and Squire	37.80	9.8	76
Ethnic Homogeneity	2003	(-)	-	Alesina, et al.	81.9	18.2	76
Religious Composition	2003	(+)	*,***	CIA	N/A	N/A	76
Gastil Index	2003	(-)	-	Freedom House	2.4	1.8	76
Democratic Legacy	2003	(+)	-	Freedom House	18.8	15.8	76
Press Freedom	2004	(+)	-	Freedom House	35.9	22.3	75
Rule of Law	2003	(+)	-	Kaufmann, et al.	0.47	1.04	76

* p<.10, ** p<.05, *** p<.01, - not significant

The religious composition variables had different significance levels depending on the specification and religion specified.

appeared to have higher trust levels than its neighbors. This variable was one of the exogenous determinants significantly related to trust in the author's model. The positive effect of monarchy on trust was highly statistically significant. A few possible explanations were given as to why monarchies might have higher levels of trust. These explanations include a common source of unity and the existence of a positive role model. Another explanation speculated that the existence of a monarch reflects a deep historical tradition of trust, as most European countries began as monarchies only to have them violently overthrown. While not considered by the author, it is possible that the dummy just captures the fact that Scandinavia has higher trust than the rest of the world, for reasons unrelated to their monarch.

With regards to the post-communist dummy variable, Bjornskov cited the dictatorship theory of Paldam and Svendsen (2001). The argument is that trust levels in Central and Eastern Europe were structurally lower in the period following the fall of the U.S.S.R. due to the collective repression experienced during the Soviet Union's rule. In most of their specifications, this variable was inversely and significantly related to trust.

Concerning demographic characteristics, Putnam (2000) argued that younger generations of Americans appear to be less trusting than their older peers. When tested by Bjornskov he did not find age to be related to trust. Population size was also hypothesized to be related to trust, as trust is more likely to be sustained in smaller networks. Again, this characteristic was not related to trust in Bjornskov's sample.

Turning to theories of political development, openness to trade and political ideology were considered as potential determinants of trust. Global trade skeptics argue that globalization might negatively impact social cohesion. Also cited is political commentary that suggests that a global shift to the political right has been occurring recently. Sociological literature presumes that this shift would

result in declining trust, as the political right is less inclined to be interested in issues of social justice. Needless to say, Bjornskov found neither of these variables to be related to trust.

Religious composition is a characteristic touched upon by Knack and Keefer and Zak and Knack, but analyzed in more detail by Bjornskov. Cited are the potential effects of religion on trust that were described in length by Max Weber (1905). Hierarchical religions (e.g. Catholicism, Islam, Christian Orthodox) create obligations to religious leaders that might prove divisive in religiously diverse societies. On the contrary, European Protestantism departed from this tradition by instilling values related to individual responsibility and civic virtue.

The percentage of Protestants, Catholic, Muslims, and those practicing Eastern religions (e.g. Hinduism, Buddhism) were included in the Bjornskov trust model as explanatory variables. Percent Catholic and percent Muslim were inversely and significantly related to trust. Percent practicing Eastern religion in about half of the specifications were significantly and positively related to trust. Percent Protestant had a positive sign but was not statistically significantly. Bjornskov noted that these variables should be interpreted as if they were dummy variables as normally, but not always, a large portion of the population in any country belongs to one of these religions.

Several variables employed by Zak and Knack were also used by Bjornskov, including: GDP (per capita, PPP, constant 2005 prices), education, formal institutions, ethnic diversity, and income inequality. An important extension in Bjornskov's analysis involved the consideration that the majority of these variables are potentially endogenous with respect to trust. GDP (per capita, PPP, constant 2005 prices) is potentially endogenous likely capturing the long-run effects of trust on growth. Contrary to Zak and Knack, GDP (per capita, PPP, constant 2005 prices) was not significantly related to trust in any of his specifications. Growth was tested in a two-stage least squares specification (2SLS) instrumenting

with lagged growth and the Gastil Index[11]. This specification confirmed the result that income or income growth is not significantly related to trust.

Bjornskov also entertains the possibility that education could be endogenous to trust. Two reasons are cited. First, trust could lead to better educational outcomes if students gain access to a larger network of fellow students and family for help with their studies. Secondly, the demand for employees with higher education might be influenced by trust if the cost to monitor complex tasks is high. Education was not related to trust when included in either an OLS or 2SLS specification.

Formal institutions are likewise treated as endogenous to trust by Bjornskov. The justification given is that the rule of law could make society more trusting as it protects individuals from being harmed when their trust is violated. When included exogenously in his base OLS specification, none of the formal institutional variables were significantly related to trust. In 2SLS specifications using trade openness, press freedom, and a dummy for a common law system as instruments for the Gastil Index and Rule of Law[12], the OLS results were confirmed with formal institutions showing no association with trust.

The final variable treated as potentially endogenous was income inequality. Contrary to the other potentially endogenous variables, income inequality was highly significant in the base OLS equation. Increases in income inequality were associated with reductions in trust. This result was confirmed using political ideology as an instrument in an IV specification. The alternative form of social polarization, ethnic diversity, was only included in the base OLS equation. In no case was ethnic diversity significantly related to trust, contrary to the results of Zak and Knack.

[11] The Gastil Index is a measure of civil liberties and political rights published annually by Freedom House. More detail is available in section 3.3.2.

[12] The Rule of Law measure used by Bjornskov is published annually by the World Bank (Kaufmann, Kraay, and Mastruzzi 2009). More detail is available in section 3.3.2.

In a simple test of exclusion, Bjornskov found that Iran and China were extreme outliers so these countries were excluded from his analysis. Outliers are a significant concern as this current analysis moves forward, not only in trust regressions, but even more so when examining economic growth. The issue of outliers will be treated more extensively in Chapter 4.

In summary, four variables were found by Bjornskov to be significantly and exogenously related to trust: religious composition variables (e.g. % Catholic, % Muslim, etc.), whether a country has ever had a monarch, post-communist countries (ex-republics of the USSR and Eastern European countries behind the Iron Curtain), and the determinant with the strongest relationship, income inequality. This is in contrast to Zak and Knack, who found that both income inequality, ethnic diversity, and a range of formal institutions were significantly related to trust. These results will be used as a guide for the portion of the empirical analysis in this thesis dealing with the determinants of trust.

2.4 Trust and Economic Growth

The limited amount of empirical work published related to trust has been conducted by the New Institutional economists. Not surprisingly, two of the articles cited above are the only ones that include trust as an explanatory variable in an economic growth regression.

Knack and Keefer (1997) explored the relationship between trust and economic growth (average 1980-1992) using different regression specifications with a sample of 29 countries. In all cases, trust was positively related to growth and statistically significant. Given concerns of possible endogeneity, the authors used a 2SLS regression with law students as a proportion of graduate students and their ethnic heterogeneity variable as instruments for trust.[13] The coefficient for trust increased slightly in the specification using an IV estimator and suggested that for every 10% increase in aggregate interpersonal trust, average annual economic growth would increase 0.86%. A term interacting trust with initial GDP

[13] The legal system as a formal institution is viewed as a substitute for trust.

was included, although the expectation for direction of influence was ambiguous. One hypothesis is that lower income countries rely more heavily on informal institutions such as social capital, therefore these countries experience higher marginal economic gains from increases in trust. Alternatively, if greater specialization increases the number of commercial transaction across time and space, rich countries might benefit more than poorer countries from increases in trust. The coefficient of the interaction term was in fact negative and statistically significant, supporting the first hypothesis. The implication of this finding is that the cross-country convergence of economic growth rates is accelerated in the presence of higher levels of trust.

A third specification merits special mention, one in which Knack and Keefer created an alternative trust measure. Dubbed "CIVIC", the measure was designed to quantify the amount of trustworthiness, as opposed to generalized trust in a society. The variable was an average of five different survey questions taken from the WVS, asking respondents if they had engaged in the following activities: (1) "claiming government benefits which you are not entitled to" (2) "avoiding a fare on public transport" (3) "cheating on taxes if you have the chance" (4) "keeping money that you have found" (5) "failing to report damage you've done accidentally to a parked vehicle". This measure is interesting in that it is highly correlated to trust, however measures an important variation. Namely, the variable captures expectation's regarding societal honesty, and consequently trustworthiness. This is in contrast to responses from the Rosenberg question that measure respondent's trust in others.

Where responses to the Rosenberg question capture the expectations regarding whether others will act against the survey participant's own self-interest, CIVIC measures survey participant's readiness to cooperate in the resolution of collective action problems. The theoretical basis of their CIVIC variable, as provided by Knack and Keefer, was based on the notion that civic norms resolve prisoner dilemma's without imposing substantial external costs. Accordingly, subsequent costs associated with monitoring

and the enforcement of contracts diminish, sustaining higher levels of economic growth. On a final note, in the instance that CIVIC and trust were included together in Knack and Keefer's economic growth regression, both variables were positively related to growth and statistically significant.

Zak and Knack (2001) ran two sets of economic growth regressions with trust as the explanatory variable of interest.[14] Both used standard economic growth control variables (i.e. initial GDP to control for convergence, schooling attainment, and prices of investment goods). The first set of regressions varied controls representing formal institutions, while the second set included various economic inequality measures as controls. The sample size ranged from 32 to 41 countries depending on the specification.

Table 3 contains descriptive statistics and results related to the Zak & Knack economic growth model. Their dependent variable was average economic growth between 1970 and 1992. The variable source cited was Heston, Summers, and Aten (2009), which is a reference to the Penn World Table dataset compiled by the Center for International Comparisons at the University of Pennsylvania. This particular dataset is the standard used for development-related empirical work drawing from national income, expenditure, and price data. Their base economic growth model utilizes the same 41 countries used in their trust model. The mean value of 2% annual growth is reflective of a sample highly weighted towards high income, OECD countries.

Zak and Knack's base regression, along with every specification thereafter, includes initial values from 1970 for GDP (per capita, PPP, constant 2005 prices), educational attainment, and the price of investment goods. These three variables were all drawn from the Penn World Tables and are variables

[14] The dependent variable was average growth of GDP (per capita, PPP, constant price) over the 1970-1992 timeframe.

Table 3: Zak and Knack (2001) Growth Model

	Time Range	Sign	Significance	Source	Mean	St. Dev.	N
Dependent Variable:							
Economic Growth	1970-1992			Heston, Summers, and Aten	1.9-2.1		41
Explanatory Variables:							
GDP (per capita, PPP, constant $)	1970	(-)	-, **, ***	Heston, Summers, and Aten	N/A	N/A	41
Schooling Attainment	1970	(+)/(-)	-	Barro and Lee	N/A	N/A	41
Price Investment Goods	1970	(-)	**,***	Heston, Summers, and Aten	N/A	N/A	41
Investment/GDP	1970-1992	(+)	***	Heston, Summers, and Aten	21.8	6.6	41
Trust x GDP	Mixed	(-)	***	WVS, WVS, Barro/Lee	N/A	N/A	41
Trust (%)	1981-1990	(+)	***	WVS and EVS	32.2	15	41
Gini Income	Circa 1985	(-)	-,**	Dienenger and Squire	37.4	9.2	36
Gini Land	Circa 1985	(-)	-,**	UN FAO census	57.9	12.7	36
Economic Discrimination	1975	(-)	-,***	Ted Gurr	N/A	N/A	38
Contract Enforcement	1972-1989	(+)	-,**	BERI	2.6	0.65	33
Corruption Index	N/A	(+)	-,**	Transparency Intl	6.2	2.5	39
Property Rights Index	1982-1990	(+)	***	ICRG	37.2	12.3	41

* p<.10, ** p<.05, *** p<.01, - not significant

GDP, schooling attainment, price of investment goods, Gini income, Gini land, economic discrimination, contract enforcement, and the corruption index had different significance levels depending on the specification.

that are considered standard in economic growth regressions.[15] Initial GDP (per capita, PPP, constant 2005 prices) is included to capture a convergence effect, whereby low income countries are theorized to more likely have higher growth than higher income countries. In all cases, the coefficient was negative as expected for this variable, while the significance varied from not being significant to being significant at the 1% level. The price of investment goods and educational attainment measures are typically included to capture the effects of changes in the stock of physical and human capital, respectively.

The first set of specifications discussed by Zak and Knack add explanatory variables for trust, investment, a term interacting initial GDP (per capita, PPP, constant price) with trust, and finally trust is used as an instrument in a 2SLS regression. The trust measure is the same used in the prior regression where trust was used as a dependent variable, again taken from responses to the Rosenberg question. The only caveat is that contrary to their trust regression, in this case the earlier value was used when a country had multiple trust observations. Trust was significant with an elasticity close to one in all of these specifications. In this case, an elasticity of one implies that a one standard deviation increase (16%) from the mean trust level (32%) would result in average economic growth increasing from 2.9% to 3.2%.

Their interaction term, GDP (per capita, PPP, constant price) with trust, was included to test whether the convergence experience for low income countries differs from high income countries. The negative coefficient on the interaction term, significant at the one percent level, confirmed that this difference was the case. Zak and Knack report that the marginal effect of convergence for countries in their sample with trust values under 25% is uniformly positive, large and significant, implying that the low levels of trust are creating a trap that acts as a barrier to growth.

[15] Sala-i-Martin (1997) in his study of the robustness of economic growth regressions listed these 3 variables as ones that were present in all 62 empirical studies used as the basis of his analysis. A fourth variable not included by Zak and Knack but cited by Sala-i-Martin was population growth.

By the time Zak and Knack's study started, the WVS had only conducted two waves of surveys, one in 1981-1984, the other in 1990-1993. Given the dependent variable of economic growth was calculated over the 1970-1992 timeframe, a problem arose when their explanatory variable of interest was mainly collected anywhere from the middle to the tail end of the corresponding period of their dependent variable. Conceptually the authors argued that trust, on a country level, changes very slowly, if at all, over time. The Pearson correlation coefficient of .91 between the first and second wave trust observations supported their hypothesis.

However, just in case this issue created an endogeneity problem, Zak and Knack ran a 2SLS regression using four separate variables measuring the percentage of a respective country's population that was Catholic, Islam, Protestant, and Orthodox. These four instrumental variables were indeed highly significant in the first stage trust regression, and importantly, related statistically to economic growth solely through trust. In the 2SLS regression, trust was significant at the 5% level helping to alleviate any potential concerns regarding endogeneity.

Next, Zak and Knack ran a set of economic growth regressions that added various formal institution variables both separately and contemporaneous with trust to see if trust would augment the influence of the institutional variables on economic growth. The institutional variables used were proxies for property rights, corruption, and contract enforcement. In all cases, when included without trust, these three variables were highly significant with large coefficients. Trust was highly significant when included in the models. The coefficient magnitudes for corruption and contract enforcement declined significantly and were consequently not statistically significant when trust was included. Zak and Knack interpreted these findings as suggesting that formal institutions increase growth, in part, through their effect of increased levels of societal trust. The only institution variable that remained significant when included with trust was property rights. However, the magnitude of the coefficient

declined by one-fifth. Zak and Knack argued that this was consistent with how the property right variable was measured, in part capturing both institutional based trust and interpersonal trust. The WVS measure of trust used in the study, it was argued, is unlikely to capture individual's trust related to government institutions.

In the set of regressions using formal institutions as controls, trust was positively related to growth and statistically significant. A 10% increase in trust would be responsible for boosting average economic growth between .43% and .62%. When the formal institution measures were run both with and without trust, inclusion of trust decreased both the significance and magnitude of the respective coefficients of the formal institutional variables. Contract enforceability and corruption were not statistically different from zero when trust was included. However, when trust was removed these two variables were both statistically different from zero at the 1% level. One possible interpretation of this result is that societal trust and formal institutions, particularly ones pertaining to contract enforcement and penalties for engaging in corruption, are substitutes for one another. Considering the trust variable retained significance, it is possible that societal trust and governance are mutually dependent with trust being the dominant factor related to economic growth.

Similar results were obtained when using controls for economic inequality. A 10% increase in trust implied an increase in average economic growth ranging from .49% to .60%. Again, where in all cases the inequality measures where statistically significant at the 1% level when trust was not included, none were statistically different from zero following the inclusion of the trust variable. This finding suggests that the effect of inequality on economic growth is mainly transmitted through lower levels of societal trust.

Chapter 3: Analytical Framework

3.1 Conceptual Framework

Trust, and its study within the social sciences, falls into a broader framework encompassed by the concept and study of social capital. Given the interdisciplinary nature of the research, it should come as no surprise that there is no clear-cut, accepted definition as to what exactly constitutes social capital and how it is generated. Social capital, in its broadest interpretation, typically involves the notions of reciprocity, interactions within social networks, civil society participation and shared norms such as trust. With a favorable combination, these characteristics are thought to create an "asset" for society that promotes the type of cooperation within, and between, groups that help resolve collective action problems and are necessary to achieve higher rates of economic growth. At its worse, social capital can act as a liability for society, promoting inter-group conflict and creating norms that act as a barrier to economic development.

Economists typically think of trust, and its role in economics, as falling into two standard economic frameworks: principal-agent and prisoner's dilemma. In a principal-agent framework, trust is an input that reduces the transaction costs associated with creation, monitoring, and enforcement of contracts. Zak and Knack (2001) in their empirical study, set the stage with a theoretical model based on this framework. Their model assumes a broker – client relationship where trust is assumed to be the time spent monitoring the broker as opposed to other wage-earning productive activity. As trust increases, the clients, or principals, spend more time in productive activities generating income and less time monitoring.

Trust is also treated by other economists as a prisoner's dilemma. Game theorists consider the roles of reputation and reciprocity in the generation of trust and consequently, economic growth (Platteau 2004a). In empirical work, perhaps most famously by Elinor Ostrom (2000), economists were interested in whether the generation of cooperative norms (i.e. trust and trustworthy behavior) truly fit into the n-person prisoner's dilemma framework that previous researchers had theorized was the case.

While both of these frameworks are powerful, they have limitations. In theoretical terms, prisoner's dilemmas and principal-agent problems can typically be resolved through repeated games (i.e. reputation) and/or formal institutions that impose some type of punishment for deviant social behavior. However, in everyday practice we observe that cooperation is often the result of informal norms. These norms can come in the form of inherited culture, tradition, and religious beliefs. These informal norms often generate internal rules and enforcement mechanisms at the community or organizational level. This is in contrast to external punishment and incentives imposed by formal, government-generated institutions.

Informal norms are of critical importance towards the end of reducing transaction costs so that cooperation can be achieved and economic growth attained. Francis Fukuyama (1995) has argued and shown empirically how internal professional standards reduce external monitoring costs, high-tech R&D is facilitated by the informal exchange of intellectual property rights, and trust between workers and management is necessary to avoid work stoppage in just-in-time manufacturing operations. In the context of an n-person prisoner's dilemma reducing costs associated with organization, administration, and enforcement of internal governance systems is critical to avoid collaboration traps. Informal norms are an important and efficient way in which societies mitigate these costs.

While most economists tend to relegate the role of culture and values to the "residual" in their empirical models, for the better part of 150 years religion, culture, and values were thought to be a

main driver, if not the principal determinant of economic development. Max Weber argued that Protestantism promoted values such as honesty and hard work that served as the catalyst for economic growth in the 19th-century. This of course, was in contrast to Weber's contemporary Karl Marx, who hypothesized that economic growth created societal change leading to an inevitable uprising of the proletariat and socialist utopia (so, in the end societal change led to economic utopia). More recently, economic historian Michael Landes (2000) cited the role culture and values played in Japan's rapid economic development in the 20th century.

Sociologists of today, and political economists of the past, embraced and argued for the inclusion of informal norms, culture, and by association, trust, in any explanation of global economic development. In contrast, economists have mostly ignored the role of informal norms, instead focusing on the roles repetition, reputation, and formal institutions play in overcoming principal-agent and prisoner dilemma problems. Even in the two modern empirical studies confirming that trust does play a role in economic growth that were reviewed above, both studies work under the implicit assumption that formal institutions are responsible for generating trust, not vice-versa.

Ignoring the role of informal norms is a critical failing of modern economist's treatment of trust. There is no doubt that formal institutions and trust contribute to economic development in a complementary fashion. However, one of the main hypotheses to be tested in this thesis is that there exists an endogenous component of trust, unrelated to formal institutions or external governance, directly related to income generation and economic growth.

However, it would be disingenuous to suggest that informal norms, or trust, are the sole factors in determining whether a country has economic success. Institutional economists look to formal rules, laws, and governance as the explanation behind what drives economic growth (Acemoglu, Johnson, and Robinson 2002; Knack and Keefer 1995). Published research typically assumes that, true to Hobbes,

formal institutions are necessary and responsible for generating the informal norms necessary for economic progress. These norms include obedience, respect of private property, and the subject of this study, trust. In fact, Zak and Knack follow-up their 2001 analysis of trust and growth with a separate article examining public policies that can raise trust levels (Zak and Knack 2003). The failure of the standard neo-classical economic framework to address the role of trust, values, and culture, may be leading to theoretical and empirical models that overstate the influence of formal institutions and also confuse the main direction of causality in the relationship between trust and formal governance.

Trust and formal institutions are undoubtedly complementary in their interdependent roles in determining economic growth. However, does the direction of causality primarily flow from governance to trust as most recent research suggests? Fukuyama (1995) argues that government policy is not an effective tool for building social capital and trust. He states social capital is a product of religion, culture and historical experience outside the control of government institutions. On the other hand, he does write that governments are capable of destroying social capital when they crowd out activities better left to the private sector. The effective ability of citizens to organize and cooperate is driven by habit. States can erect a barrier to these positive habit-conditioned norms, by acting as a substitute and consequently creating a dependency on the state. In an unsettling analysis of the U.S. South during Reconstruction, Carden (2009) analyzes the sources of low productivity that persist in the region until today. He argues that low productivity in the U.S. South is a product of the tension between informal norms persistent during slavery that conflicted with the formal institutions imposed post-Civil War. This is despite better governance and higher levels of freedom existing in the region today.

The issues outlined above lead to inconsistencies we see in the real world and questions that might be addressed in a better conceptual framework that relates trust to economic development. These issues in no particular order are: (1) In which direction does the flow of causality between trust

and formal institutions appear to be stronger? (2) Do poor institutions have a stronger negative effect on trust, and consequently, economic development, than the economic benefits derived from good governance?, and finally, (3) Is there evidence of a destructive cycle whereby low trust promotes poor governance, which in turn lowers trust even further creating a low-growth trust trap?

The basis for the empirical work in this thesis is best captured by a conceptual model that incorporates the role that social capital plays in economic development. The primary implication of the model is that higher levels of interpersonal trust ("good" social capital) are positively associated with aggregate levels of income and the rate of economic growth. The relationship between trust and economic growth is both direct and indirect given the positive relationship trust has with better governance. Empirically this will be tested through an extension of Zak and Knack's (2001) empirical work to a larger cross-country dataset more representative of the world as a whole.

Other important implications that can be drawn from the conceptual model concern the relationship between social capital and formal institutions. Namely, that formal institutions: (1) have a strong direct influence on economic growth when they are "bad" vs. a weak direct influence when they are "good", (2) social capital has a strong direct effect on formal institutions, and (3) formal institutions have a weak direct effect on social capital. This thesis hypothesizes that trust is critical in its role in determining which economic growth trajectory a country, or region, will take. On average, countries that have higher interpersonal trust will have higher levels of income and sustain higher levels of economic growth.

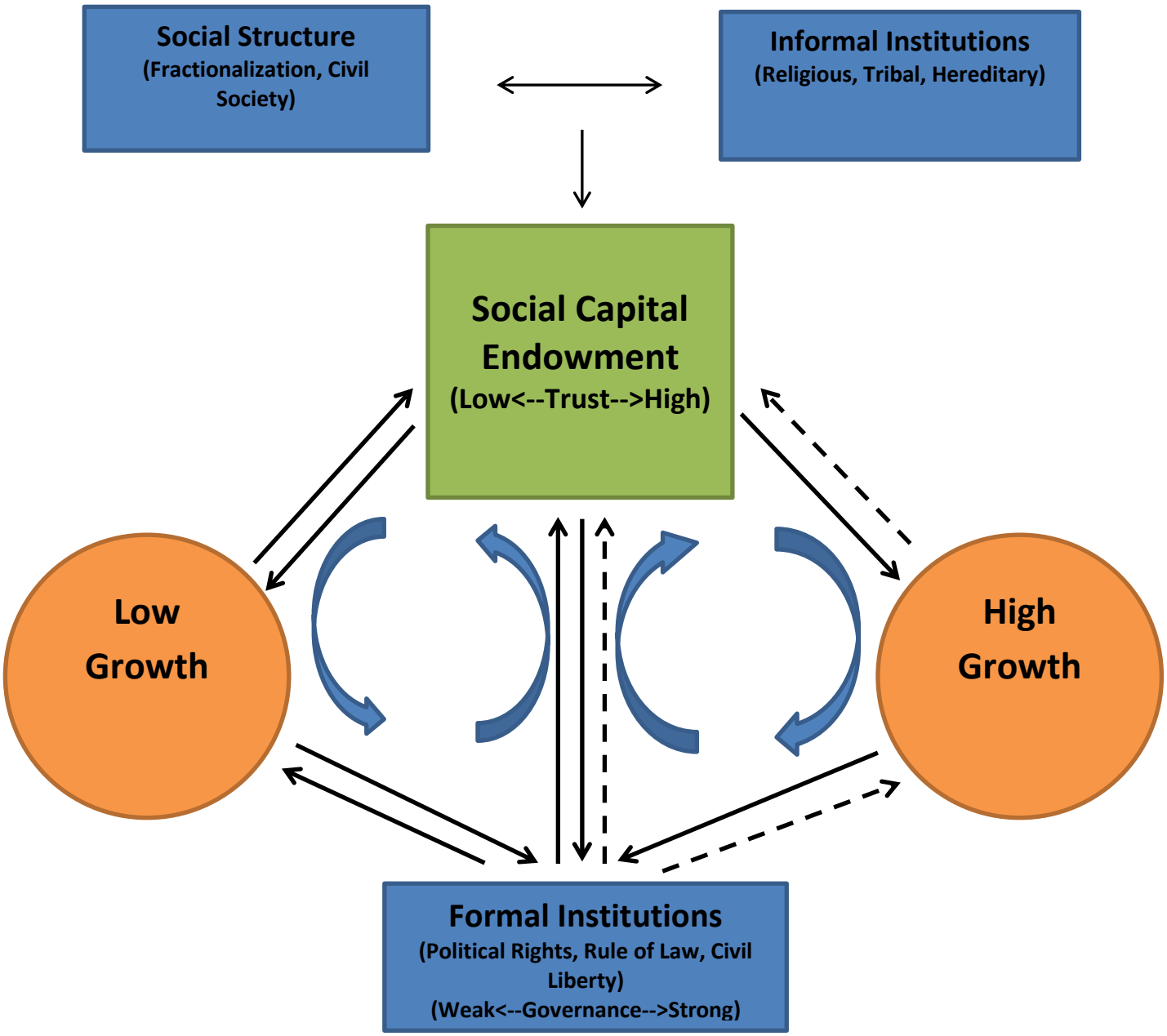
The conceptual framework is represented graphically below in Figure 1. In Figure 1, each country, state, or society, is assumed to start with an initial endowment of social capital. Inherent in that endowment are characteristics that lead to greater cooperation (i.e. "good" social capital) between citizens and those that lead to less cooperation, or worse, conflict (i.e. "bad" social capital). Or, as Greif

(2008) defines institutions: “good” social capital is contract enforcing and coercion constraining. Going forward, increased levels of societal trust, as a component of social capital, are assumed to both lower the costs of contract enforcement and are inherently coercion constraining. Thus, in the model, “good” social capital will be used interchangeably and assumed directly associated with higher levels of trust and vice-versa.

An initial trust endowment is formed from a society’s prevailing social structure and the informal norms that regulate social behavior. Informal norms are a mixture of household, religious, tribal, and civil society rules that constrain opportunistic behavior and incentivize cooperation. Social structure characteristics, such as the relative mix of ethnicities, linguistic groups, and religious groups in a society can create a foundation that allows for the transmission of both beneficial and harmful norms. Whether harmful or beneficial, the transmission and acceptance of norms is higher within homogeneous groups. Trust as a beneficial norm is more likely to persist within a homogeneous society. Different religious and cultural traditions, teachings, and norms will also lead to differing perceptions related to the value of intra and inter-group cooperation.

Continuing with Figure 1, graphically demonstrated is the dynamic interplay between social capital, formal institutions, and economic growth. As Greif (2008) observed, the formation of institutions and promotion of economic growth are the result of an evolutionary process in which institutions co-evolve with markets. In cases where institutions are contract enforcing and coercion constraining, markets and institutions mutually promote, support and reinforce one another, eventually arriving at a high-growth equilibrium. In the case where institutions do not uphold the validity of contracts, or are unable to constrain (perhaps even promote) coercive acts of violence against person and property, markets are constrained and the economy is pushed into a low-level equilibrium.

Figure 1: Conceptual Framework, Adapted From Greif (2008) and North (1994)



A characteristic unique to this conceptual model is the separate treatment of formal and informal institutions (i.e. social capital). Social capital is assumed to have both a direct effect on economic growth and formal institutional development. Similarly, formal institutions have direct effects on both social capital and economic growth. Essentially, this is just an extension of Greif's analysis with an explicit distinction made between formal and informal institutions. However, not only are social capital and formal institutions assumed to have independent effects, the magnitudes of the effects are assumed to be unequal.

Dotted lines in Figure 1 represent where an effect is assumed to be "weak" while solid lines represent "strong" effects. Social capital, whether good or bad, is assumed to strongly encourage or discourage healthy markets and economic growth. Consequently, market development supported by social capital is assumed to evolve into formal institutions that support and reinforce both the markets and in turn, the stock of social capital. The effect of market development on formal institutions is assumed to be strong, while the reinforcement effect that formal institutions exert on social capital is dependent on whether a country is on a high-growth path or low-growth path.

As Fukuyama noted, the creation of "good" social capital is notoriously resistant to incentives provided by formal institutional change, particularly in the short run. With that being the case, on the high-growth path, formal institutions exert a weak reinforcement effect on social capital. On the contrary, poorly designed formal institutions have a strong destructive effect on social capital. Again, this is consistent with Fukuyama, and others, who note that government action can both crowd-out, and in the worst case, discourage, private-order cooperative norms.

The model implies that for countries blessed with a "high"-trust endowment, ceteris paribus, the result is a virtuous cycle of positive economic growth. Growth is reinforced through formal and informal institutions that provide the incentives necessary to sustain economic progress. In contrast, a

country facing a “low”-trust endowment is susceptible to unproductive, informal institutions becoming written into the formal rule of law of a society, thereby creating a barrier to economic development.

The exception to the high-growth, low-growth cycle rule are cases where externally imposed formal institutions, antagonistic to healthy markets, disrupt the institutions-market system. As the model suggests, poorly designed formal institutions exert a dominant effect on market and market participant’s behavior. Thus, even in cases where the prevailing social environment is conducive to economic growth, poorly designed formal institutions can push, and/or maintain, societies in a low-growth trap. Totalitarian rule, as well as, legacy colonial extractive (both coercive) institutions are examples of governance that might be responsible for pushing countries onto a low-growth path.

3.2 Empirical Framework

The objectives of the empirical work associated with this thesis are threefold. One important objective is to extend the empirical work done on this topic to a larger cross-country dataset that is more representative of the income distribution in the community of nations. By doing so the analysis is extended to a higher proportion of the low and middle-income countries of interest than the work of Zak and Knack (2001) and Bjornkov (2006). The second objective is to test some of the more interesting implications of the conceptual model developed above. Of particular interest are the relative influences that trust and formal institutions have on one another. Finally, economic growth, governance, and trust are modeled simultaneously.

3.2.1 Trust Equation

To begin the analysis, the determinants of trust are tested using regression analysis applied to the expanded dataset with 116 countries. A base specification with trust as the independent variable is informed using the Zak and Knack (2001) and Bjornskov (2006) specifications as a guide.

The trust equation is as follows:

(1) $y_{1i} = a_0 + a_1 x_{1i} + a_2 x_{2i} + a_3 x_{3i} + a_4 x_{4i} + a_5 z_{1i} + a_6 z_{1i}^2 + a_7 z_{2i} + a_8 y_{2i} + \epsilon_1$

$y_i =$ Interpersonal Trust (Percentage responding affirmatively)

$x_1 =$ GDP (per capita, PPP, constant 2005 prices)

$x_2 =$ Educational Attainment (Years, Population 15+)

$x_3 =$ Income Inequality (Gini Coefficient)

$x_4 =$ Post-Communist Dummy

$z_1 =$ A Vector of Different Forms of Fractionalization (Ethnic, Linguistic, Religious)

$z_1^2 =$ Fractionalization Squared (Ethnic^2, Linguistic^2, Religious^2)

$z_2 =$ A Vector of Religious Composition Variables (% Catholic, % Muslim, % Orthodox, %Protestant)

$y_2 =$ A Vector of Formal Institutions Variables (Political Rights, Civil Liberties, Rule of Law, Voice and Accountability, Etc.)

The independent variables included in the above model were chosen based on their inclusion and significance in the Zak and Knack and Bjornskov studies. One exogenous variable that has been notably excluded in the above specification is the monarchy dummy. A potential fear is that this dummy proxies for Scandinavia and/or wealth, thus the exclusion.

Education is conditionally included in the base specification, however if there is no indication of significance this variable will be excluded due to its potential endogeneity. GDP (per capita, PPP, constant 2005 prices) is initially treated likewise.

Given the strength of significance of income inequality with respect to trust in both the Zak and Knack and Bjornskov studies, income inequality will be included despite its possible endogeneity. As Bjornskov noted, income inequality appears to remain relatively static, alleviating some of the concern of including income inequality as a fully exogenous determinant of trust. An area for further research would be a more detailed analysis exploring this relationship.

With new data collected from Alesina et al. (2003), the effect of social diversity on trust is expanded to test not just ethnic, but linguistic and religious diversity as well. Social polarization, a theoretical and empirical concept introduced by Montalvo and Reynal-Querol (2005), is modeled by including fractionalization with fractionalization-squared (e.g. ethnic^2, linguistic^2, religious^2). Appendix 1 includes a more detailed analysis of the measurements of fractionalization and polarization, as well as, their theoretical relationship with trust.

The religious composition variables provide an interesting proxy for the relative informal norms, both positive and negative, that may affect trust based on religious identity. It is interesting to note that a significant number of individuals may self-identify as a particular religion, however not formally practice that religion. With that said the religious composition variables may pick up historical and cultural components that have been embedded in the religious identification, however are independent of actually practicing a given faith.

Finally, the above variables along with formal institutions are estimated using OLS. It is important to note that formal institutions are initially treated as exogenous to trust in the base OLS specification. Later, IV techniques including two-stage least squares (2SLS), three-stage least squares (3SLS), generalized method of moments (GMM) and full information maximum likelihood (FIML) estimators are employed to treat the implicit endogeneity and simultaneity present in the relationships between trust, governance, and growth.

3.2.2 Formal Institution Equation

Next, a separate specification using different measures of formal institutions as the independent variable is modeled. The first step in this estimation is to find characteristics related to governance that are unrelated to trust. Once accomplished, the predicted values from the separately modeled formal institution equation can be used in the structural trust equation. Otherwise known as two- stage least squares estimation (2SLS), this process provides more consistent estimates if formal institutions and trust are indeed endogenous to one another. The reverse can also be tested, trust as a function of formal institutions, assuming any of the variables found to be associated with trust are independent of formal institutions. If, as assumed, trust and formal institutions are found to be interdependently related, a fully specified formal institution equation can be included in a simultaneous equation model together with trust.

The formal institution equation is as follows:

(2) $y_{2i} = b_0 + b_1 x_{5i} + b_2 x_{6i} + b_3 x_{5i} x_{6i} + b_4 z_{1i} + b_5 z_{1i}^2 + b_6 z_{3i} + b_7 y_{1i} + \epsilon_2$

$y_2 =$ A Vector of Formal Institutions Variables (Political Rights, Civil Liberties, Rule of Law, Voice and Accountability, Etc.)

$x_5 =$ Colony Dummy

$x_6 =$ Population Density in the Year 1500

$x_5 x_6 =$ Colony Dummy x Population Density

$z_1 =$ A Vector of Different Forms of Fractionalization (Ethnic, Linguistic, Religious)

z_1^2 = Fractionalization Squared (Ethnic^2, Linguistic^2, Religious^2)

z_3 = A Vector of Legal Origin Dummies (English, French, German, Scandinavian, Communist)

y_1 = Interpersonal Trust (Percentage responding affirmatively)

Given the interdependent nature of formal institutions and trust, ideally the two equations (1) and (2) should be estimated simultaneously. The challenge with this approach is finding an adequate number of instrumental variables to identify the system. Initially, 2SLS estimation with tests of instrument validity will be performed. Additionally, it is important that overidentification restrictions are imposed. If instruments can be found that are related to one variable, but not the other, the two equations can be estimated simultaneously with trust and formal institutions appearing in both equations as dependent and independent variables. Run simultaneously as shown below, a full-information estimator such as 3SLS or FIML is necessary because the equation errors, as modeled, are correlated violating the conditions necessary to consistently estimate with OLS or 2SLS.

The simultaneous equation specification is as follows:

(1) $y_{1i} = a_0 + a_1x_{1i} + a_2x_{2i} + a_3x_{3i} + a_4x_{4i} + a_5z_{1i} + a_6z_{1i}^2 + a_7z_{2i} + a_8y_{2i} + \epsilon_1$

(2) $y_{2i} = b_0 + b_1x_{5i} + b_2x_{6i} + b_3x_{5i}x_{6i} + b_4z_{1i} + b_5z_{1i}^2 + b_6z_{3i} + b_7y_{1i} + \epsilon_2$

An important condition of using FIML is that the estimated residuals are normally distributed. It is necessary to test the residuals for normality to ensure the FIML estimation is robust. Fortunately, 3SLS and GMM estimation is robust to non-normally distributed residuals. Another important condition is that for 3SLS, GMM, and FIML, all equations should be fully specified with no omitted variables. In practice, this may be a difficult condition to meet. Coefficient estimates can be compared between the

estimators. While there are limited means of knowing whether omitted variables are biasing estimates, extreme variations between the estimates may provide a signal that something is awry.

3.2.3 GDP Growth Equation

One of the principal objectives of this empirical analysis is to ascertain the effects of both trust and governance on economic growth. The determinants of growth have been directly modeled after those used in the Zak and Knack (2001) study. Appendix 2.3 shows expected signs for the below specified determinants. Sections 2.4 and 3.3 discuss in more detail the basis for inclusion of the control variables.

The growth equation is as follows:

(3) $y_{3i} = c_0 + c_1 x_{1i} + c_2 x_{7i} + c_3 x_{8i} + c_4 y_{1i} + c_5 y_{2i} + \epsilon_3$

y_3 = Average Annual Change in GDP (per capita, PPP, constant 2005 prices)

x_1 = Initial GDP (per capita, PPP, constant 2005 prices)

x_7 = Educational Attainment

x_8 = Price of Investment Goods

y_1 = Interpersonal Trust (Percentage responding affirmatively)

y_2 = A Vector of Formal Institutions Variables (Political Rights, Civil Liberties, Rule of Law, Voice and Accountability, Etc.)

The simultaneous equation specification including growth is as follows:

(1) $y_{1i} = a_0 + a_1 x_{1i} + a_2 x_{2i} + a_3 x_{3i} + a_4 x_{4i} + a_5 z_{1i} + a_6 z_{1i}^2 + a_7 z_{2i} + a_8 y_{2i} + \epsilon_1$

(2) $y_{2i} = b_0 + b_1 x_{5i} + b_2 x_{6i} + b_3 x_{5i} x_{6i} + b_4 z_{1i} + b_5 z_{1i}^2 + b_6 z_{3i} + b_7 y_{1i} + \epsilon_2$

(3) $y_{3i} = c_0 + c_1 x_{1i} + c_2 x_{7i} + c_3 x_{8i} + c_4 y_{1i} + c_5 y_{2i} + \epsilon_3$

Trust and governance are assumed to be positively associated with one another and, in turn, drive higher rates of economic growth. Ideally, growth would be included as an independent variable in both equations (1) and (2), however this does not make sense given the use of beginning levels of trust and governance to describe growth. For instance, it would be difficult to argue that economic growth from 1970-2009 would be a determinant of governance levels in 1970. Adding an equation for GDP (per capita, PPP, constant 2005 prices) that allows for the inclusion of income as a determinant of trust and formal institutions would be an interesting extension for further research.

3.3 Data Sources and Measurements

3.3.1 Trust Variable

Appendix 3.1 includes all countries used in the cross-sectional empirical analysis with their calculated trust values. The trust values are based on responses to the Rosenberg question taken from various sources, including: WVS, EVS, Afrobarometer, Arabbarometer, Globalbarometer, Latinobarómetro, and the East-Asian Barometer. As a base of reference, the Zak and Knack study was primarily drawn from WVS with only three observations drawn from elsewhere. Bjornskov also sourced his trust data principally from WVS with only a few country observations pulled from the separate Danish Social Capital Project.

The data drawn from these non-WVS surveys are structured similarly to WVS, typically a subset of questions modeled from the WVS relating to themes of interest to social science researchers. Like the WVS, the other surveys generally include responses from thousands of households in a given country over the course of years ranging from 1981-2009. While it would have been preferable to have sufficient data available all sourced from the same survey, there is reason to believe given the similar survey design that the trust measure should be consistent across the entire sample[16].

Consistent across all surveys, trust data is based on respondent's answer to the Rosenberg question: "*Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people*?". Trust values are the percentage of respondents in a given country responding affirmatively to the Rosenberg question.

It is interesting to note that trust values intuitively match what one might expect anecdotally. For instance, Scandinavian countries register high trust values while Latin America and Sub-Saharan Africa typically exhibit low values of trust. One notable exception is China, which has one of the highest trust values. This is consistent with trust values, as measured by the Rosenberg question, across different years and through similar surveys.[17] Fukuyama (1995), among others, suggest that China is a society very much characterized by "thick trust" or limited-group trust, in which trust of most citizens is limited to familiars. Perhaps, the majority of survey responders interpreted, "most people" as it pertains to the Rosenberg question, to only include immediate family and close peers.

[16] Correlation of matching observations with the 31 observation Knack and Keefer (1997) sample, all drawn from WVS, was .94. Dividing the trust measure by two, the calculated mean and standard deviation are 25.8 and 13.1 vs. 32.2 and 15 for the 41 observations in Zak and Knack's (2001) sample.

[17] WVS value for China in 2007 was 104.6 while an average of values taken from 1995, 2000, 2001 was 110.5.

A critical assumption made by both Zak and Knack, and earlier by Knack and Keefer, with regard to the trust variable, is that it stays relatively stable over time. There is reason to believe that this assumption may not hold. This issue is explored in more detail in chapter 4.

3.3.2 Formal Institutions/Governance Variable(s)

One key set of control variables used in previous empirical studies was measures of governance used as proxies for the strength of formal institutions in a given country. The governance measures used in the Zak and Knack and Knack and Keefer studies were unavailable, so as a substitute a collection of measures from the World Bank and the Gastil Index measures will be used instead.

Freedom House has published their annual survey since 1973, ranking countries political rights and civil liberties according to internally developed criteria. The two separate measures both range from 1 to 7, with 1 being "completely free", 3-5 being "partially free", and 6-7 "not free". A simple average of a country's political rights and civil liberties measures is common in empirical studies and is known as the Gastil Index. The Gastil Index will be used as a formal institutions variable in the empirical analysis for this paper. The benefits of using this particular variable include its broad availability, as well as, the simplicity and objectivity of its interpretation.

The other governance variable used is an index based on the World Bank (WB) Governance Indicators (Kaufmann, Kraay, and Mastruzzi 2009). The indicators are divided into five categories: voice and accountability, regulatory quality, political stability and lack of violence, rule of law, control of corruption, and government effectiveness. The final measure for each category is based on aggregations from 30 different underlying sources. All of the indicators are scaled from -2.5 to +2.5, with -2.5 being the weakest governed countries and +2.5 the strongest. Estimates for each category are available for years 1996 through 2010. The index is a simple average of the five different categories.

Accordingly, the minimum value is -2.5 and the maximum value is +2.5, with -2.5 being the weakest governed countries and +2.5 representing countries with the highest quality of governance.

3.3.3 GDP and GDP Growth Variable

The ultimate dependent variable of interest, GDP is collected from the Penn World Tables V.6.3 maintained by the Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania. It is the same data source used by both Zak and Knack (2001) and Bjornskov (2006). The GDP data is measured on a per capita basis, adjusted for purchasing power parity, and is in constant prices from 2005. Various papers describing the methodology for determining the cross-country real income measures are available through the Penn World Tables website (Heston, Summers, and Aten 2009).

3.3.4 Income Inequality Variable

The Gini coefficient, as a measure of income inequality, is sourced from the U.N. Wider database. At the time of collection in 2010, the database contained Gini calculations for virtually every country for years ranging from 1980-2010. An average was taken for each country of all observations collected between the years 1993-2010.[18] The number of observations existing for any given country ranged from 1 (no average was taken, just the point estimate) for countries such as Spain and the U.S. to over 24 for Brazil. There were no obvious criteria for what determined how many Gini observations might be available for any given country.

[18] The relationship between trust and growth was initially planned to be estimated for the period 1993-2009 to allow for inclusion of East European countries and former republics of the U.S.S.R.

Income inequality was negatively and significantly related to trust in both the Zak and Knack (2001) and Bjornskov (2006) studies. This relationship is assumed to hold in the larger sample collected for this thesis.

3.3.5 Fractionalization Variable

One small contribution of this paper is provided through the use of a disaggregated fractionalization measure that conceptually seems to be a better measure of social distance. The measure borrowed from Alesina, et al., measures social distance along not only ethnic, but also linguistic and religious lines. In fact, the Alesina, et al. measures in several cases are inconsistent with the Zak and Knack measure. For instance, the Zak and Knack[19] ethnic homogeneity measure for South Africa was 73(%)[20], while Alesina, et al.'s primary data reference shows the largest ethnic group as Zulu at 13% and language as Zulu at 22.7%.[21]

Appendix 1.3 – 1.5 takes a closer look at how the fractionalization variables are calculated. Disaggregated fractionalization measures for ethnicity, language, and religion are shown for Kenya, Algeria, and the United States. Looking at the United States, ethnic, linguistic, and religious fractionalization correspond to expectations. Ethnicity is drawn along racial lines while language share is dominated by English, with Spanish a distant second. Religion is dominated by Christianity, yet divided across various denominations. [22]

[19] This is actually drawn from Knack and Keefer, which Zak and Knack reference as their source.

[20] Presumably ethnicity according to this measure is drawn along racial lines (black vs. Afrikaaner), while the fractionalization ethnicity measure often separates across tribal lines for Sub-Saharan Africa.

[21] South Africa's ethnic and linguistic fractionalization measures are among the highest at .75 and .87 respectively.

[22] Language groups are separated according to percentage that identifies a language as their lingua franca.

Alternatively, Algeria is one of the least religiously fractionalized countries, with over 99% of the country Sunni Muslims. The largest ethnic and linguistic groups, Arab and Arabic, represent overwhelming shares of the country's population, yet the ethnic and linguistic fractionalization measures rank in the middle of the pack and in the top-half respectively. Finally, it's interesting to note that Kenya, like the South Africa example given above, measures its ethnic cleavages according to tribe. Comparing Kenya's disaggregated linguistic and ethnicity measures demonstrate how, oftentimes, it is difficult to separate ethnicity from language. This is particularly true in Africa where many tribes have their own native language.

3.3.6 Religious Composition Variable(s)

In both the Zak and Knack (2001) and Knack and Keefer (1997) papers, informal institutions were essentially excluded from their empirical models. However, an intriguing proxy for informal institutions was briefly mentioned in both papers in the form of religious composition variables. Variables measuring the proportions of a country's population represented by various religions were later shown to be statistically related to trust by Bjornskov (2006).

Citing Putnam, Leonardi, and Nanetti (1993), Fukuyama (1995), and La Porta, et al. (1999), these authors also suggest that certain religions could inherently foster institutions that promote or hinder trust. Hierarchical religions, such as Catholicism and Islam, theoretically lessen trust, while Protestantism fosters trust.[23] Both sets of authors concluded that Catholicism and Islam were negatively related to trust, while Protestantism was positively related.

Cross-country percentage shares of Catholicism, Christian Orthodox, Islam, and Protestantism reported in the World Christian Encyclopedia (Barrett, Kurian, and Johnson 2000) will be used as proxies

[23] Fukuyama (1995) and Platteau (2004a) cite Max Weber who believed that Protestant faiths "shattered the fetters of kin", or were responsible for a shift from the then-prevalent limited-group morality to a generalized morality that encouraged a strong work ethic and civic participation with strong social ties.

for informal institutions. While not a perfect proxy, the measure will in part capture the shared ethics transmitted through these religious institutions, in contrast to rules and laws imposed by government institutions.

3.3.7 Colony, Population Density (1500), and Colony x Density Variables

In the seminal paper, "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution" Acemoglu, Johnson, and Robinson (2002) argued that when looking at the current world income distribution a major reversal in wealth was experienced by those societies that were wealthy in the year 1500 compared to today. The authors were able to empirically demonstrate that the reversal could be completely explained by the historical legacies that formed the basis of current formal institutions. The hypothesis was further refined positing that sparsely populated countries that were subsequently colonized, developed institutions that promoted economic development because the colonizers typically settled there with the intentions of remaining permanently. Alternatively, geographies that were densely populated in 1500 and experienced colonization developed "extractive" institutions. The colonizers main intent for colonizing densely populated areas tended towards the extraction of wealth to send back to their home countries. High population density provided sources of slave labor to facilitate this process. The authors empirically tested their hypothesis using a dummy variable for countries that had been colonized by Europe combined with a measure of population density in 1500.

The data from this study are publically available and used as an important determinant of the formal institutions variables. A key consideration in using this set of variables is the likelihood that the variables are unrelated and independent of societal trust and growth, outside of the mediating effect they have on trust and growth through governance. The colony dummy takes a value of one if a country

was colonized by a European nation. The density variable is the log of the population density, defined as the number of persons per square kilometer, in the year 1500.

3.3.8 Legal Origin Variables

Another important set of instruments used to explain formal institutions were taken from an empirical analysis of the determinants of governance published by La Porta, et al. (1999). In their paper examining different determinants of government quality, historical legal origins were strong predictors of various aspects of government quality. Legal origin variables (dummies) available from their dataset include English, French, Socialist, German, and Scandinavian origins

Socialist legal origin was predicted and shown to be negatively associated with various measures of formal institutional quality. The underlying theory is relatively straightforward as the centralization of power associated with socialism encourages regimes that on average are more repressive, stifle voice and accountability, and limit civil liberties.

The effect of the four remaining legal origin dummies on institutional quality is more nuanced. The central distinction pits legal origins associated with common law versus those based in civil law. Civil law regimes, imported or deriving from the Napoleanic Civil Code, according to the authors, are characterized by the intent to build institutions that consolidate state power. On the contrary, common law based legal systems were developed to limit the ability of the state to infringe on individual liberties.

Thus, French legal origins represent one end of the spectrum and are assumed to be negatively associated with governance quality. The other end of the spectrum is denoted by English legal origins, the founders of common law. English legal origins are hypothesized to be associated with high quality governance. The other legal origins fall somewhere in between these two extremes. It should be noted

that the French and English legal origins were exported to a large cross-section of the world during the period of European colonization.

3.3.9 Other Control Variables

The remainder of the variables used in the empirical model are controls used to explain GDP growth (% annual, per capita, PPP, constant 2005 prices) growth. Appendix 2 provides a summary of the variables used in the respective trust, governance and GDP growth (% annual, per capita, PPP, constant 2005 prices) equations, including expected signs, sources, and time periods from which the data was drawn.

Consistent with Zak and Knack's (2001) growth equation, GDP (per capita, PPP, constant 2005 prices) is expected to be negative in sign as predicted by convergence (see Appendix 2.3). The education variable, as a proxy for human capital, is expected to be positive. Educational attainment of the population (15+) is sourced from the standard Barro-Lee dataset. The price of investment goods is used as a proxy for investment and is expected to be negatively related to growth. The investment goods price data was collected from the Penn World Tables 6.3.

Chapter 4: Challenges Associated With the Empirical Analysis: An Interlude

There are several challenges, both inherent to empirical growth studies, and specific to the empirical analysis that follows that should be mentioned before detailing the empirical results. Perhaps the most fundamental challenges are related to the measurement, and ability to accurately measure, interpersonal trust. One key assumption used in all of the empirical growth/trust studies done to date assumes that trust levels do not change significantly over time. This assumption will be analyzed in more detail in this chapter. Another key assumption is that the Rosenberg question, essentially the only widely available trust measure available for empirical trust analysis, accurately reflects the "wide-radius" trust that is conceptually associated with economic growth. The implications of this assumption will be discussed based on the results of a recent paper that suggests this may not be the case. Finally, the implications of the length of time period used as part of the growth analysis will also be examined.

4.1 Variation in Trust Over Time

Is generalized interpersonal trust really stable over time within countries? All of the empirical studies using trust are based on the critical assumption that trust does not change significantly over time. However, if trust is stable and GDP (per capita, PPP, constant 2005 prices) growth is highly variable, under what circumstances would we expect trust to be a determinant of growth?

Contrary to Zak and Knack's assumption, Putnam (1995a) hypothesized that trust, particularly in developed countries, has been systematically declining over time. However, the data shows no evidence of a global declining trend in trust. Looking at the 98 countries that have multiple trust observations, there is almost no change from the earliest average value (average trust value: 28.3, average year: 1995) to the most recent average value (average trust value: 27.2, average year: 2007).

Of course, this doesn't reveal anything about the underlying distribution of the change in trust over time.

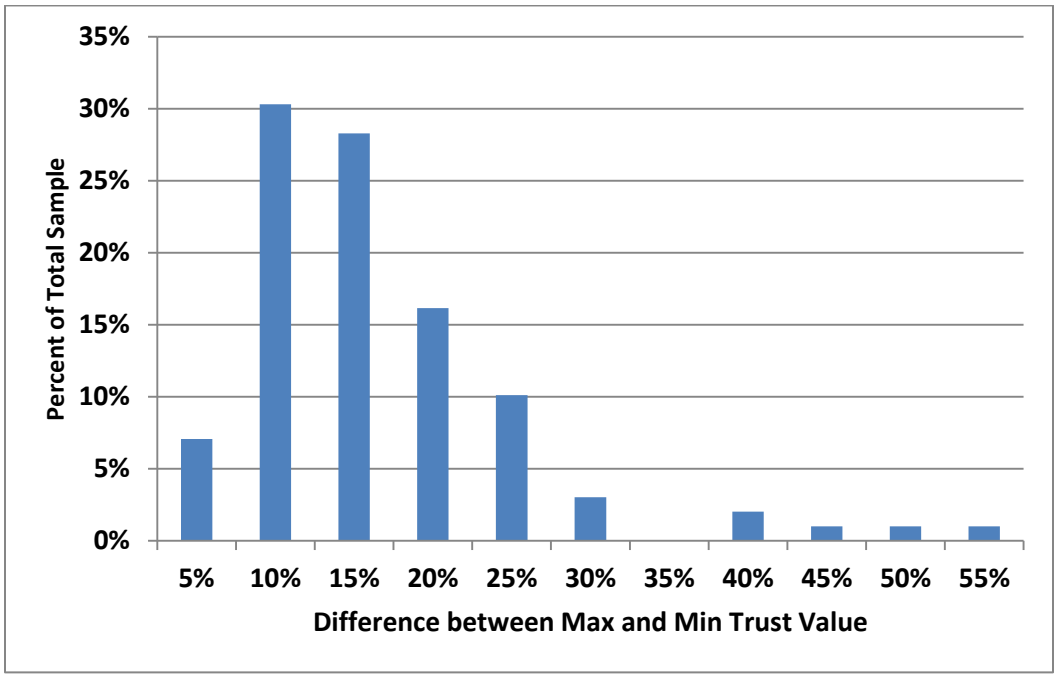
Table 4 shows all countries that had a greater than 10% change in their trust measure from the earliest recorded observation to the latest recorded observation. This is an absolute percentage change, so for example Azerbaijan recorded 20.5% of those interviewed in 1996 responding "Most people can be trusted." While in 2008, the latest and only other recorded observation for the country, 44.8% responded affirmatively, a difference of 24.3%. Of the 98 countries with multiple observations, 16 countries had absolute changes of greater than 10%, while slightly fewer, 15, had absolute changes less than -10%. This of course means that more than two-thirds of countries with multiple trust values had < 5% change in their trust value between the earliest and latest years recorded.

Table 4: Percent change in trust

> +10% change			> -10% change	
Country	% change		Country	% change
Azerbaijan	24.4		Iran	-54.7
Denmark	24.0		Malawi	-37.9
Thailand	23.8		Indonesia	-26.3
Belarus	19.3		Botswana	-22.4
Netherlands	17.5		Myanmar	-21.6
Norway	14.2		Egypt	-19.4
Sweden	14.0		Albania	-16.4
Singapore	13.1		Senegal	-14.9
Lesotho	12.5		Bulgaria	-12.5
Switzerland	12.2		India	-12.1
Macedonia	11.9		Hungary	-11.9
Malta	11.7		Guatemala	-10.8
Hong Kong	11.5		Mongolia	-10.5
Venezuela	11.5		Nigeria	-10.4
Vietnam	11.0		Zambia	-10.1
Iceland	10.9			
N =	16		N =	15

While the trust values seem to be fairly stable, the time period over which the surveys were conducted is admittedly somewhat arbitrary and differs from country to country. Is it the case that trust values vary substantially for countries within the time periods measured for each respective country? The answer appears to be mixed. Figure 2 shows the distribution of the difference between minimum and maximum trust values. The distribution is centered between 10-15% with half of countries having trust ranges greater than 12%. Looking just at the min and max values there appears to be substantial variation of trust values for individual countries.

Figure 2: Trust, difference between max and min



Granted, the variation appears to be less when measuring dispersion with the coefficient of variation (CV). Appendix 4.2 shows 32 countries whose CV of trust values is greater than 30%. Of those 32, only 9 countries have standard deviations greater than 10%, meaning that most of the time, trust values don't vary more than ± 10% from their mean values. In fact, the CV of trust values within country

is on average 26.5% while the CV between countries is 56.5%, suggesting that the variation of trust between countries is significantly greater than variation within.

Additionally, there appears to be a systematic relationship between the variability of trust, the level of trust, and income levels. The CV of trust values has a -0.4 correlation with GDP (2009, per capita, PPP, constant 2005 prices), so as country level income decreases, the variation in trust tends to increase. The CV of trust is also inversely correlated to the average trust values (p=-.31), implying that countries with lower trust tend to have a higher variability of trust. One final note on variability, when regressing GDP (2009, per capita, PPP, constant 2005 prices) on both average trust and the CV of trust, both have significant coefficients at < 1% level. An increase in the CV from 0 to 1 is associated with a decline in per capita income of -$19,465, while an increase by 1% of those responding positively to the trust survey question is associated with an increase in GDP (per capita, PPP, constant 2005 prices) of $273. Those two variables alone explain 37% of the variation in GDP (per capita, PPP, constant 2005 prices) levels.

In summary, trust does appear to change over time within countries however, variation cross-country is substantially higher. While it would be ideal to use a panel model to evaluate our hypotheses econometrically, the data is still too limited to do so at this time. The higher level of cross-country variation in trust should allow for reliable estimates when aggregating the data into a cross-section. Thus, as in prior studies, the empirical models used here will assume that trust is relatively stable over time; at least relative to the variation in trust observed between countries.

Despite the above evidence to the contrary, the prior research in this area supports the idea that trust levels within countries are relatively stable over time. Both Zak and Knack (2001), almost as a footnote, cited the high correlation between the first and second-wave trust values that they used in their empirical analysis. Bjornskov (2006) in a more detailed fashion, extended the analysis to an

expanded set of countries surveyed through the fourth wave of WVS. Using both a standard OLS model with change in trust as a dependent variable, as well as a fixed-effects panel model, he concluded that trust can be assumed to be stable over time.

In his OLS model, Bjornskov used the yearly change in trust between different waves of the WVS as the dependent variable. In practice, this equated to looking at the change in trust for 64 countries based on two point estimates that on average were roughly 10 years apart. The independent variable of interest was the initial value of trust. In all of his specifications using various controls the coefficient for initial trust was negative and significant at the 1% level. The negative sign on this coefficient implies that there was a strong reversion to mean effect.

Bjornskov's fixed-effect model included between 46-69 countries with a subset of 23 countries that had data available across four waves of the WVS. Controlling for potential bias effects across waves, because waves subsequent to wave 1 included more countries, the fixed effects reportedly explained 80-85% of the variation in trust values across waves (Table 5, equation 1).

Conducting an analysis with a balanced panel of 53 countries produced similar results. In lieu of using only data from the WVS, an average of trust values taken from various surveys were calculated over three distinct time periods. The time periods used correspond roughly with WVS waves 3, 4, and 5 which were conducted during years 1990-1998, 1999-2003, and 2004-2010 respectively. Again, 90% of the variation in trust over time for these 53 countries is attributable to country fixed effects.

Latinobarometro conducted a WVS-type social survey in 17 countries in Latin America over a 13-year period from 1996-2009 (the survey was not conducted in 1999). Using data from this survey, the influence of fixed effects in this Latin American sample (Table 5, equation 4 and 5) differs significantly compared with the more comprehensive sample. Fixed effects accounted for 48% of the variation in trust (equation 4). This apparent variation in trust over time could be mostly "noise", more indicative of

the challenges of designing and implementing an ambitious multi-year household survey. Granted, the result leaves open the possibility that trust may be more variable than previously believed.

Table 5: Trust panel, Bower vs. Bjornskov

Equation	**1**	**2**	**3**	**4**	**5**
Source:	Bjornskov	Bower	Bower	Bower	Bower
N	69	53	53	17	17
# of Time Periods	3	3	3	13	13
GDP / cap (000s)			0.600***		0.000
			(3.66)		(-0.56)
Gastil Index			2.913***		
			(3.81)		
Second Wave (WVS)	0.088*				
	(1.684)				
Third Wave (WVS)	0.03				
	(0.54)				
Fourth Wave (WVS)	-0.095*				
	(-1.804)				
R-square	0.87	0.89	0.91	0.48	0.48
F-statistic (Fixed Effects)	17.74	16.28	16.28	11.83	26.3

***p<.001,**p<.05,*p<.10, estimator = panel GMM; t-statistics in parentheses

Curiously, when including GDP (per capita, PPP, constant 2005 prices) and the Gastil Index as regressors in the more comprehensive sample (Table 5, equation 3) both variables were significant at (less than) the 1% level. While one must be aware of the very realistic, and serious problem of potential endogeneity, it still is instructive to do so given previous cross-sectional studies that have used similar specifications with contrary results, particularly in the case of GDP (per capita, PPP, constant 2005 prices). One needs to take a leap of faith when ignoring the endogeneity problem, however it is a leap that has already been frequently taken in the studies cited to this point. The extremely high levels of significance for these variables is perplexing given one of the major themes of Bjornskov's study.

Namely, trust is a stable societal characteristic that should show little correlation, nor influence from, country-level characteristics such as economic growth and institutional change that visibly show substantial variation across time.

Ideally, when using either GDP (per capita, PPP, constant 2005 prices) or any proxy for formal institutions as dependent variables we would use instruments (and an appropriate estimator such as IV/GMM) to correct for the possible endogeneity. Bjornskov attempted this using IV models for several determinants of trust that he identified as being potentially endogenous, among those were economic growth and the Gastil Index, a proxy for formal institutions. Bjornskov concluded that economic growth and the Gastil Index were not determinants of trust after using instruments of lagged growth and the Gastil Index for economic growth, and a measure of openness to international trade (imports +exports / GDP) for the Gastil Index. While perhaps in a statistical sense these instruments are uncorrelated with trust, it is far from certain that they are uncorrelated with trust from a true economic sense. Natural resource exporting countries inherently have high degrees of openness, however often rank low in measures of institutional quality. Much of the economic growth in East Asia and Southeast Asia has been associated with high degrees of openness, but not necessarily better governance (i.e. China, Vietnam).

Using a larger set of countries as compared to Bjornskov, there does not seem to be a statistical relationship between openness and the Gastil Index. Table 6 shows a comparison of the Bjornskov results with the ones calculated with a larger 95 country sample. In the larger sample, openness wasn't significant.

Table 6: Gastil Index regression, OLS

Equation	1	2	3
Source:	Bjornskov	Bower	Bower
N	73	95	115
Dependent Variable	Gastil	Gastil ('73)	Gastil ('09)
GDP / cap (000s)	-0.557***		
	(-7.01)		
Openness	0.435***	-0.004	0.000
	(4.848)	(-0.62)	(0.05)
R-square	0.38	0.00	0.00
F-statistic	32.74	0.46	0.00

***p<.001,p<.05,p<.10; t-statistics in parentheses are white-corrected

This relationship between formal institutions and trust is of critical importance given the design of the conceptual model presented in this thesis. The model posits that there is an interdependent relationship between governance and trust, thus one would expect to detect some evidence of influence flowing in both directions. Worse yet, there was enough doubt in the mind of Bjornskov to include the Gastil Index in the initial specification as a determinant of trust, so why he would choose to use the same variable as an instrument for economic growth does not seem to make much sense. Presumably, this was done because the Gastil Index was not found to be associated with trust either in his base OLS specification or when instrumenting for the Gastil Index. If governance truly has no effect on trust, then there is no problem using it as an instrument for growth. Even if Bjornskov found no association between trust and governance in his sample, this is still a big leap of faith to take, that governance does not in fact influence societal trust. Again, while technically sound, this is not a best practice - using a variable that is conceptually and empirically related to the errors in the structural equation the researcher is trying to estimate. Finally, for both of the first stage regressions for these variables Bjornskov included GDP (per capita, PPP, constant 2005 prices) as an explanatory variable,

however did not include GDP (per capita, PPP, constant 2005 prices) in the second stage. This implies that GDP (per capita, PPP, constant 2005 prices) was used as an instrumental variable. If this is true it would be a clear violation of the requirement that the instrument be uncorrelated with errors in the trust equation.

The endogenous relationship between trust and governance is a central theme of this study. Contrary to results attained by Bjornskov, GDP and formal institutions do appear to be determinants of societal trust as suggested by the results attained in Table 5. This is consistent with the conceptual model presented in this paper. The empirical framework outlined in section 3.2 reflects this hypothesized, interdependent relationship between governance and trust.

Further, evidence presented in this section questions the assumption that interpersonal trust stays stable over time. With the potential that this assumption is invalid, steps are taken in the empirical analysis to address any problems violation of this assumption may cause. Namely, empirical results are tested removing countries that show abnormally large variations in their trust measures over time. The methods used to identify those countries are provided in more detail in the following chapter.

4.2 Trust Radius

Delhey, Newton, and Welzel (2011) recently published a paper exploring different dimensions of trust that the Rosenberg question attempts to measure. In particular, the authors were concerned with what they call the "radius problem. Namely, how wide or narrow the circle of people that respondents to the Rosenberg question assume when considering "most people". The Rosenberg question is meant to capture trust within a large circle of unfamiliars versus a smaller circle of family and close friends. Delhey, Newton, and Welzel found that the estimated radius varied significantly across their 51-country sample.

A radius was estimated using a new set of questions from the most recent fifth wave of WVS. Respondents were asked how much they trust people from various groups, including: your family, your neighborhood, people you know personally, people you meet for the first time, people of another religion, and people of another nationality. There were four possible responses ranging from "trust completely" to "do not trust at all". The first three categories were classified as "in-group" trust while the last three are classified as "out-group" trust. A separate linear regression (OLS) was then run for each country using the Rosenberg question as the dependent variable and in-group and out-group trust as independent variables. The difference between the two coefficients ($ß_{out\text{-}group} - ß_{in\text{-}group}$) gives an estimation of a country's trust radius. This difference is scaled by adding one and dividing by two to avoid negative values.

Roughly 80% (41/51) of countries had estimated trust radiuses greater than 50%, meaning that their responses to the Rosenberg question were more related to out-group trust than in-group trust. In an attempt to explain the cross-country differences in trust radiuses, another OLS regression found that Confucianism (negatively related) and economic modernity (positively related) were most highly related to the cross-country variance in the trust radius. In fact, four of the ten countries with trust radiuses less than 50% were from Asia: Thailand, China, South Korea, and Vietnam. The remaining six countries with trust radiuses under 50% are all classified as low-income or middle-income by the World Bank: Morocco, Burkina Faso, Romania, Ghana, Jordan, and South Africa.

When comparing trust levels to trust radiuses, there are three countries that pose the most serious problem when estimating the relationship between trust and growth: China, South Korea, and Vietnam. As shown in Table 7, these three countries in particular exhibit both annual growth rates and trust values well above the respective means, potentially biasing upwards the coefficients and significance for trust in growth regressions.

Table 7: GDP Growth and Trust, Low trust Radius Countries

Country	GDP growth 1970-2009, % annual)	Trust
China	7.69	60.3
Vietnam	4.24	41.1
Korea, South	5.57	38.0
South Africa	0.93	28.3
Jordan	1.36	27.7
Morocco	2.08	23.5
Thailand	4.18	17.7
Romania	2.90	16.1
Ghana	0.71	15.7
Burkina Faso	1.20	14.7
Average:	1.96	26.7

As noted in this section, Delhey, Newton, and Welzel provide evidence that the Rosenberg question does not solely capture generalized trust, the dimension of trust thought to be most associated with economic growth. As a consequence, steps need to be taken to reflect this fact when undertaking the empirical analysis proposed in this study. A separate sample, excluding countries identified in Table 7 as having disproportionate levels of wide-radius trust, will be tested as an assessment of the robustness of results.

4.3 Temporal Consistency Between Dependent and Independent Variables

The main objective of the following fixed effects analysis is to get a better understanding of whether trust on a country level changes perceptibly over time. Of particular interest is whether the variation in trust over time is muted relative to changes in GDP (per capita, PPP, constant 2005 prices), a critical assumption for the cross-sectional econometric analyses examining trust employed to date. Again, what could be confounding the results achieved with the fixed effects model is the relatively

short time period examined. We know annual GDP growth (per capita, PPP, constant 2005 prices) can vary significantly within countries over any given 10-year period. On the other hand, factors that are generally attributed in macroeconomic development theory to changes in GDP (per capita, PPP, constant 2005 prices) tend to be more structural in nature (i.e. savings, capital formation, technology).

Berggren, Elinder, and Jordahl (2008) published a robustness analysis analyzing Zak and Knack's results. Using techniques that examine the appropriateness of model specification (extreme bounds analysis) and the potential confounding effects of extreme outliers (least trimmed squares), they concluded that Zak and Knack's results are not robust and that trust is not related to growth. While the techniques used to examine robustness were certainly novel and an important contribution in terms of helping interpret results from growth regressions, there was an important limitation to their study.[24] The authors limited the time period of analysis to ten years, which leads to temporal inconsistency with regards to the dependent variable and regressors.

Table 8 breaks out the base specification of GDP growth (% annual, per capita, PPP, constant 2005 prices) regressions used by Zak and Knack by overlapping decades. This particular specification will be used as the base for subsequent analysis of the relationship between trust and GDP growth (per capita, PPP, constant 2005 prices) hereafter. The decades analyzed are 1990-2000, 1995-2005, and 1999-2009. Base control variables are initial GDP (per capita, PPP, constant 2005 prices) for the decade, initial level of educational attainment, and initial level of price of investment goods. The trust measure is the earliest trust measure available for the 104 countries available in the sample.

Even with overlapping time periods that are relatively contemporaneous, there is evidence from this brief analysis that the choice of time period matters. The magnitudes and significance levels of parameter estimates vary substantially, as does the overall significance of the specification. The

[24] The robustness techniques used by Berggren, et al. were truly an important contribution. The application of least trimmed squares was integrated into the empirical analysis used in this paper.

coefficient magnitudes for all the control variables change significantly from decade to decade. This is particularly true of the education and price of investment goods variables. The goodness-of-fit of the regression specifications triples from the beginning decade measured to the final decade.

The relationship between trust and growth in this exercise appears to remain relatively constant over time, in terms of magnitude. While in the two most recent time periods trust is significant (or just on the verge of being significant), in the first time period trust is not significantly related to growth. Considering the change seen with respect to the control variables relationship to growth, it appears that the choice of time period used in growth regressions matters. Given the structural nature of the variables used in the regression it would be preferable to use the longest time period possible. However, one must keep in mind that using longer-time periods comes at the expense of a larger sample size (the fall of the USSR resulted in significantly more countries today as compared to thirty years ago).

Table 8: GDP Growth by decades, OLS, N=104

Equation	**1**	**2**	**3**
Dependent Variable	Growth ('90-'00)	Growth ('95-'05)	Growth ('99-'09)
Intercept	0.828	1.840***	3.779***
	(1.45)	(2.87)	(4.59)
Initial GDP	-0.004	-0.031	-0.034
	(-0.13)	(-1.40)	(-1.15)
Education	0.139	0.232**	0.088
	(1.40)	(2.39)	(0.85)
Price of Investment Goods	-0.010*	-0.019*	-0.040**
	(-1.95)	(-1.88)	(-2.25)
Trust (begin)	0.026	0.025*	0.026
	(1.27)	(1.66)	(1.64)
R-square	0.10	0.22	0.32
Dependent Mean	1.66	2.56	2.39

***p<.01,**p<.05,*p<.10; t-statistics in parentheses are white-corrected

In summary, section 4.1 explored the issue of whether trust truly is stable over time. The results were inconclusive. Judging by the difference in maximum versus minimum values there appears to be a substantial amount of variation. Panel data analysis similar to that done by Bjornskov (2006) produced results that were mixed. A mix of countries similar to that used by Bjornskov suggested that most of the variation in trust is due to fixed effects (versus time effects). A smaller sample of Latin American countries, with a larger range of time periods, suggested a much larger part of the variation is occurring over time.

To be safe, steps will be taken in the empirical analysis, following in Chapter 5, to test the robustness of results to a sample that includes countries with large changes in trust. This will be done by using both a full sample and a sample excluding countries with abnormally high trust variations. Results attained with the full sample and the smaller sample will be evaluated to see if they are similar.

The trust-radius issue was outlined in Section 4.2. Country trust measures that are highly associated with "narrow-radius" trust present a problem for any analysis attempting to explain the relationship between trust and growth. Conceptually, economic growth is theorized to be positively related to generalized trust, as opposed to, trust in familiars. Similar to the treatment applied to countries that demonstrate large variations in trust, a sample excluding countries with high trust radiuses (as identified by Delhey, Newton, and Welzel 2011) will be used to test the robustness of empirical results.

Finally, any analysis of the determinants of GDP growth (% annual, per capita, PPP, constant 2005 prices) is sensitive to the time period used. As trust and governance are theorized to be structural characteristics of society, the growth period used should be relatively long, to capture this structural relationship. Short-term growth can be heavily influenced by business cycles and idiosyncratic risks and opportunities specific to countries and regions. Ultimately, the growth period used in the empirical

analysis is 1970-2009. Forty years should be sufficient to capture any effects that trust and governance may have on income growth.

Chapter 5: Empirical Results

The following empirical analysis was structured to test hypotheses stemming from the analytical and conceptual models presented earlier in this paper. At first, regression analysis was performed to evaluate the determinants of societal trust. With knowledge of those determinants, formal institutions and trust are modeled together using a systems approach. Finally, GDP (per capita, PPP, constant 2005 prices) and growth in GDP (% annual, per capita, PPP, constant 2005 prices) were added to a more complete system including trust and governance.

Results, in most cases, were also tested for robustness removing outliers using two general methods. The first method involves removing countries that were identified as having a large coefficient of variation with respect to their trust values. Also, those countries that had wide vs. narrow trust radiuses were removed. In total, 14 countries were identified using these criteria. In cases where removal of these "outliers" was tested, typically the table is labeled "CV-Radius".

The second outlier removal method utilizes a technique known as Least Trimmed Squares to identify outliers. The impetus for using this technique comes from Berggren, Elinder, and Jordahl (2008), who applied the method as part of robustness analysis of Zak and Knack's (2001) study of trust and growth. A description of the procedure and its application are explained in more detail later in the chapter.

5.1 Determinants of Trust

Table 9 includes results generated running regression specifications based on both the Zak and Knack (2001) and Bjornskov (2006) studies using the larger 111 country sample. Additionally, the

Table 9: Trust Results, OLS

Equation	1a	1b	2a	2b	3a	3b	3c	4a	4b
Source:	Bower	Z & K	Bower	Z & K	Bower	Bower	Bjornskov	Bower	Bower
N	107	36	111	41	111	111	74	97	104
Outlier removal method:								CV-Radius	LTS
Constant	38.553***	33.520***	28.517***	27.287**	35.905***	53.432***		25.089***	24.342***
	(5.68)	(4.08)	(5.05)	(2.23)	(4.22)	(9.24)		(3.99)	(3.90)
GDP per capita ('000)	0.606**	-0.262	0.381*	0.032	0.477***		0.136	0.585***	0.589***
	(2.25)	(-0.33)	(1.87)	(0.04)	(3.43)		(1.05)	(4.49)	(4.59)
Education	-0.646	1.871	-0.210	2.029*					
	(-1.35)	(1.61)	(-0.39)	(1.86)					
WB Governance Index 1996	2.631		3.963						
	(0.88)		(1.53)						
Property Rights Index		0.465		0.608*					
		(1.60)		(1.70)					
Gini Income	-0.355***	-0.764***			-0.313**	-0.611***	-0.386***	-0.253**	-0.265**
	(-2.93)	(-4.84)			(-2.35)	(-5.03)	(-3.28)	(-2.00)	(-2.34)
Ethnic			-0.380**	-1.067**	-0.055	-0.083	-.137	-0.014	0.006
			(-2.02)	(-2.65)	(-1.06)	(-1.58)	(-1.47)	(0.32)	(0.15)
Ethnic^2			0.003*	0.008**					
			(1.70)	(2.67)					
Post-Communist					1.175	-3.189	-0.282***	3.169	0.662
					(0.36)	(-0.99)	(2.33)	(1.06)	(0.25)
Protestants					0.253***	0.308***	0.236	0.335***	0.347***
					(4.12)	(4.58)	(1.61)	(7.13)	(7.84)
Catholic					-0.056	-0.028	-0.197**	-0.000	0.014
					(-1.35)	(-0.63)	(-2.09)	(0.00)	(0.56)
Muslim					0.001	-0.038	-0.150**	0.064	0.064*
					(0.02)	(-0.79)	(-2.62)	(1.38)	(1.78)
Orthodox					-0.112*	-0.111*		-0.039	-0.040
					(-1.81)	(-1.71)		(-0.69)	(-0.78)
Eastern Religion							0.153*		
							(1.05)		
R-square	0.40	0.69	0.33	0.61	0.54	0.49	0.47	0.66	0.69
Mean, D.V.	26.6	32.3	26.7	32.1	26.3	26.3	N/A	27.0	25.6

***p<.01,**p<.05,*p<.10; t-statistics in parentheses are white-corrected

Bjornskov specification was tested, excluding observations with studentized residuals greater than 2.5 standard deviations from the mean generated using a least trimmed squared estimation technique. In the final specification, country observations were excluded that showed extreme variation in trust over time, as well as, those countries identified by Delhey, Newton, and Welzel (2011) as having trust radiuses less than 0.5.

Equations 1a and 1b in Table 9 compare the base specification used by Zak and Knack (2001) in their trust determinants regression. Consistent with Zak and Knack (labeled Z&K in Table 9) and Bjornskov, the latest trust observation collected for a respective country was used as the dependent variable. Conversely, when trust was included as an independent variable in regressions later in the chapter, the earliest available values were utilized. The variable of interest, income inequality, was highly significant in both, although the magnitude using the larger sample is half of that attained in the sample used by Zak and Knack. The comparable elasticity was reduced by roughly half, as well, as the mean values for Gini income between the two samples are roughly equal. In the case of educational attainment, the sign changes, but the coefficient was not significantly different from zero.

Notably, GDP (per capita, PPP, constant 2005 prices) was positively and significantly related to trust in the larger sample consistent with this study's conceptual model. The positive sign and significance persists when further controlling for governance, fractionalization, and other controls in equations 2a and 3a. Contrary to Bjornskov, this is likely a symptom of the endogenous relationship between income and trust.

The creators of the World Bank Formal Institution measures suggest not creating an index of the disaggregated institution measures, as each of the dimensions are an index in themselves that should be treated as relative rankings. The authors argue that averaging the ranking renders a less reliable indicator. Thus, equation 1a was tested with the six different disaggregated formal institution

measures, in lieu of, the indexed average.[25] Results presented in equation 1a are robust to using those disaggregated indicators vs. the index. Furthermore, an alternative measure of institutions, the Gastil Index was tested. The World Bank governance index was not significantly related to trust in specification 1a or 2a. We will see later that this is likely a byproduct of the inclusion of GDP (per capita, PPP, constant 2005 prices) in the equations. GDP (per capita, PPP, constant 2005 prices) and governance are highly correlated, and worse yet, both are endogenously related to trust (and likely each other), biasing the estimates of the respective coefficient estimates and resulting in inconsistent standard error estimates.

Equation 2a mimics Zak and Knack's trust specification that includes ethnic fractionalization as the variable of interest. Ethnic fractionalization was non-linearly related to trust in the Zak and Knack study, and again is significant using the same specification in the larger sample. Alternative measures of fractionalization compiled by Alesina, et al. (2003), linguistic and religious fractionalization, were also tested. In no instance were linguistic or religious fractionalization significantly related to trust, linearly or non-linearly.

This specification was also tested using the disaggregated World Bank institution measures and Gastil Index as well. Results did not change when substituting the Gastil Index for the World Bank governance index. However, results were not robust to one of the disaggregated World Bank measures, Rule of Law. When substituting in Rule of Law, ethnic fractionalization was insignificant. This is the first indication of results that suggest formal institutional quality acts as a mediating variable between trust and fractionalization. This is explored later in this section. The Gastil Index from Freedom House was tested as well, with analogous results[26].

[25] The results from the disaggregation are not included in Table 9, however are available at request.

[26] Again, results using the disaggregated WB governance indicators and Gastil Index are not included in Table 9. The results are available at request.

Equations 3a, 3b, and 3c are meant to compare results obtained by Bjornskov (2006) to those generated with the larger sample. These findings included four variables significantly related to trust: religious composition variables (e.g. % Catholic, % Muslim, etc.), whether a country has ever had a monarch, post-communist countries (ex-republics of the USSR and Eastern European countries behind the Iron Curtain), and the determinant with the strongest relationship, income inequality. Equation 3a applies their most complete specification with the larger sample. The monarchy dummy was not included because it likely has a spurious correlation with trust, a reflection of the high-trust Nordic countries being former monarchies. The eastern religion composition variable was substituted for Christian Orthodox, as data for that variable was not collected in the dataset used for this analysis.[27]

Confirming one of the primary results from Bjornskov (2006), income inequality has a highly significant negative effect on trust. The magnitude of the relationship depends on whether GDP (per capita, PPP, constant 2005 prices) is included in the specification, however this variable is significant in either case. Ethnic fractionalization/polarization, linguistic fractionalization/polarization, and religious fractionalization/polarization are all insignificant. Also contrary to Bjornskov results, post-communist countries did not have a different relationship to trust compared to other countries in the world. Finally, the significance of the religious composition variables differs with results obtained by Bjornskov.In the larger sample, % Protestant is highly significant while % Catholic and % Muslim are not significantly different from zero. In all cases, the religious composition variables have the expected signs on their respective coefficients.

In a simple test of exclusion, Bjornskov found that Iran and China were extreme outliers and excluded those countries from his analysis. Given this record of sensitivity to outliers, results have been tested removing outliers identified through one of two methods. In equation 4a, countries that had

[27] As stated by Bjornskov, et.al (2006), the choice of inclusion of religious composition variables is somewhat arbitrary as they should be interpreted relative to each other and the significance of any given variable depends on the sample distribution.

large changes in trust over time were excluded from the sample. The criteria used to determine what constituted a large change in trust included those countries that had a coefficient of variation (CV) greater than 2.5 times the mean CV, as well as, those whose difference between the maximum trust value and minimum trust value (max – min) was greater than 2.5 times the mean (max – min) value. Additionally, those countries identified by Delhey, Newton, and Welzel (2011) as having a trust radius less than .5 were excluded. Incidentally, China and Iran are both included in the list of excluded countries. China is among those countries with a trust radius less than .5, while Iran exhibits extreme variation in its trust value (CV = 102%).

Appendix 4.3 lists the 14 countries that were identified based on the above criteria. In total, 6 countries were removed from specification 4a due to extraordinarily large changes in their trust measure: Iran, Malawi, Myanmar, Vietnam, Lesotho, and Indonesia. [28] The average CV for those countries that had multiple trust values was .26, while the four countries excluded due to high CVs had CVs ranging between .86 and 1.03. The average difference between maximum and minimum trust values was 11.75 (percentage points) while the four countries with differences greater than 2.5 times the mean had differences ranging between 43 percentage points and 54 percentage points. Figure 3 and Figure 4 show visual representations of the distributions of CV and max-min for the countries that have more than one trust value.

The analysis in chapter 4 investigating whether trust does change over time, or instead remains relatively static, proved inconclusive. To be safe, it makes sense to confirm that results remain the same when excluding those observations that seem to have extreme movements in trust over time. Keeping countries in the dataset that have large trust movements over time potentially exacerbates endogeneity

[28] Six instead of eight countries were excluded because both Iran and Malawi met both the CV and max-min criteria for exclusion.

Figure 3: Distribution of Trust CV

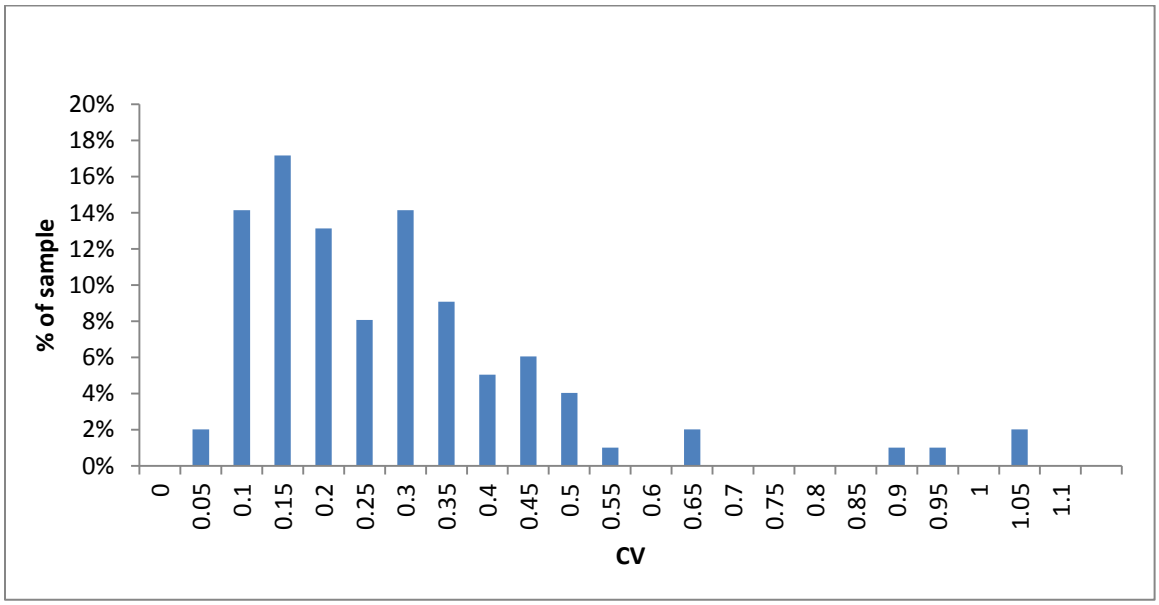
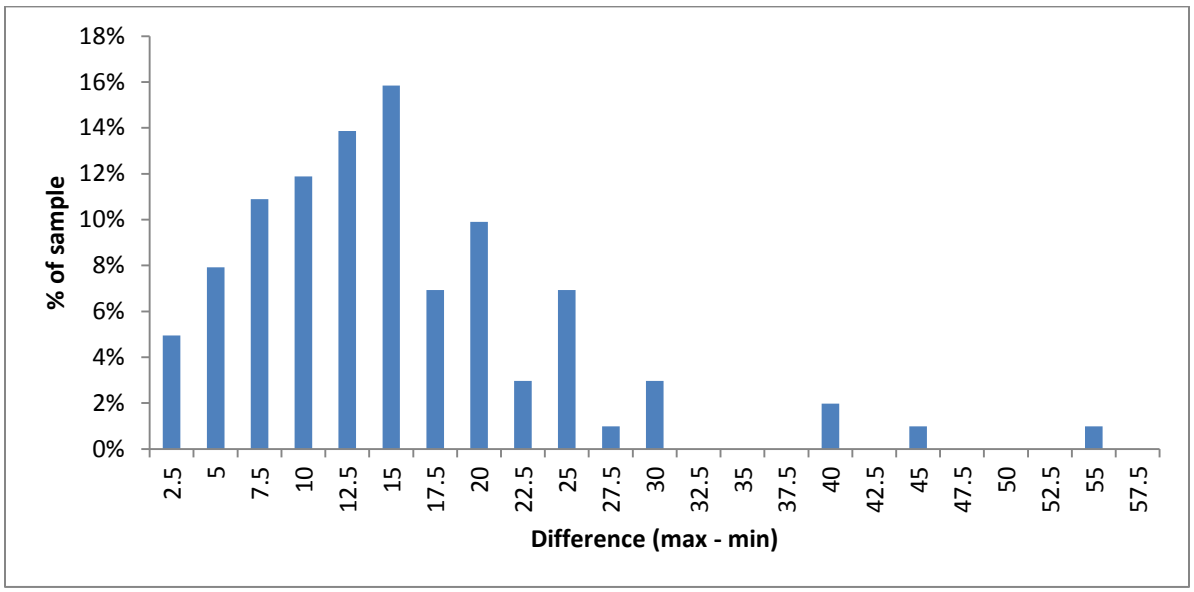


Figure 4: Distribution of Max to Min, Trust



problems that we face when examining the determinants of trust, as well as, when using trust as a regressor in economic growth regressions.

Another motive behind the removal of outliers is to try and eliminate countries from the sample that have been subject to measurement error, or exogenous shocks that potentially skewed one or multiple observed trust values. For instance, Iran has two observed trust values taken from the WVS in years 2000 and 2005. The year 2000 value was one of the highest in the total sample at 65.3. Five years later the recorded measure was 10.6, ranking near the bottom of the sample. One potential explanation was the regional conflict that flared up following 9/11/2001 and the invasion of neighboring Iraq by the United States. While there had been some optimism in the year 2000 that the United States may lift unilateral sanctions against Iran, any hope of improved relations between Iran and the United States dissipated after the attack on the World Trade Center. While there is no way of knowing whether these events had a direct effect on the observed trust values, it is certainly possible, and given here as an anecdote of potential exogenous shocks that could temporarily skew observed trust values.

Appendix 4.3 also shows countries that were excluded due to having low trust radiuses. The motivation for excluding these countries is based on the idea that these particular countries have trust measures that are measuring narrow-radius vs. wide-radius trust, which theoretically is not considered a determinant of economic growth or development. Unfortunately, data limitations do not allow for the estimation for new trust radius measures for the larger sample used in this study. The questions necessary to do so have not yet become standard in the myriad of surveys that aim to emulate the WVS and from which many of the trust observations in the sample used in this study were drawn.

Removing these outliers results in minor differences compared to the full sample specification in 3a. In equation 4a, the principal variable of interest, income inequality, retains the same sign and significance levels. Granted, the magnitude (and corresponding elasticity) drops roughly 15%. The other variable of interest, ethnic fractionalization, drops drastically in magnitude and significance, even

registering a positive sign (however is essentially zero). Overall, the results are robust to exclusion of the high-CV, low-radius countries.

Another more rigorous way to test and correct for outliers is Least Trimmed Squares (LTS). This technique was used by Bergrren, Elinder, and Jordahl (2008) to test the robustness between trust and growth. As described in that study, in essence, LTS is a three-step process in which outliers are identified and then removed from the sample before using OLS (or other appropriate estimator) to calculate a regression. In the first step an OLS regression is run on the entire sample and through iteration, 75% of observations that provide the best fit are identified and used to calculate a regression line. The next step involves creating a new sample that combines the fitted values from the previous step with the 25% of observations excluded. An OLS regression is run on the new sample using the same dependent variable. Using the new regression line, studentized residuals are calculated. Those countries that have studentized residuals with an absolute value of 2.5 or greater are considered outliers.

Appendix 4.4 contains output from a LTS regression run on the specification in equation 4b, demonstrating the standardized residuals calculated as part of the technique. Seven countries have been identified as outliers based on having residuals greater than 2.5 standard deviations from the mean residual: China, Vietnam, Azerbaijan, Belarus, Thailand, Trinidad and Tobago, and Rwanda.

Results in equation 4b are similar to those obtained in 4a when excluding outliers using LTS. Gini income has a strong inverse relationship to trust, significant at the 5% level with nearly the same magnitude. Ethnic fractionalization is not significantly different from zero. Again, contrary to Bjornskov % Protestant was highly significant with nearly the same positive magnitude in equation 4a. Percent Muslim is also positively related to trust at a 10% level of significance.

Table 10 contains results that serve as a transition to the next section of this chapter. In equations 1 and 2, the effects of income inequality, ethnic fractionalization, and governance on trust are

Table 10: Trust, Formal Institutions, and Fractionalization, OLS

Equation	1	2
N	110	110
Constant	50.954***	44.764***
	(9.29)	(6.52)
Gini Income	-0.556***	-0.447***
	(-4.75)	(-3.67)
Ethnic	-0.089*	-0.063
	(-1.70)	(-1.13)
Protestant	0.317***	0.280***
	(5.08)	(4.49)
Catholic	-0.029	-0.031
	(-0.67)	(-0.82)
Muslim	-0.034	0.003
	(-0.72)	(0.06)
Orthodox	-0.137**	-0.105
	(-2.23)	(-1.61)
WB Governance Index 1996		3.478*
		(1.94)
R-square	0.48	0.50
Mean, D.V.	26.52	26.52

***p<.01,**p<.05,*p<.10; t-statistics in parentheses are white-corrected

obtained excluding potentially endogenous control variables used in other studies. Namely, GDP (per capita, PPP, constant 2005 prices) and educational attainment, and the post-communist dummy are excluded, while the religious composition variables remain as exogenous controls. The potential endogeneity of governance itself is ignored for now, but will be treated in the next section of this chapter.

In equation 1, income inequality and ethnic fractionalization are negatively and significantly related to trust when including the exogenous controls and excluding endogenous controls. The WB

governance index is excluded in equation 1. When introducing governance into the specification in equation 2, ethnic fractionalization loses significance and income inequality weakens slightly in magnitude and strength of significance. This suggests that quality of governance acts as a socio-economic characteristic which mediates the effects of income and equality and ethnic diversity on trust.

In the case of ethnic fractionalization, assuming ethnic fractionalization is significantly related to governance, all of the effect on trust is transmitted through governance quality. Or stated differently, ethnic diversity does not have an observed direct effect on societal trust. Ethnic diversity becomes a societal "problem", reflected by lower trust, when ethnic diversity is accompanied by identity politics and lower quality formal institutions. Conversely, ethnic homogeneity has a positive, reinforcing effect on societal trust through the ability to cooperatively craft higher quality institutions.

The estimate for income inequality also diminishes in magnitude, although only marginally. Gini income remains highly significant. This implies that governance is a partial mediator of ethnic fractionalization to trust. Governance could mediate income inequality in the sense that high-income citizens might lobby for the establishment of institutions that preserve their wealth and future income opportunities at the expense of lower income citizens. This might be done explicitly through legislation that provides special treatment to the wealthy or ruling class, or implicitly through bribery, corruption, or lack of enforcement. These lower quality institutions would lead to lower societal trust.

The following sections explore these relationships in more detail. Importantly, the critical assumption that ethnic fractionalization is related to quality of governance is tackled. The issue of endogeneity between trust and governance is also addressed.

5.2 Formal Institutions as a Determinant of Trust

There is some debate about the direction of causality between formal institutions and trust. Zak and Knack (2001) asserted that formal institutions were a strong determinant of trust. On the other hand, Bjornskov (2006), using instrumental variable techniques generated contradictory results. Using openness (exports + imports / GDP) and press freedom as instruments for the Gastil Index and a rule of law measure, respectively, Bjornskov found the two formal institution measures were not significantly related to trust. While the variables used to instrument for the Gastil Index and rule of law proved to be reliable instruments based on standard tests (Staiger and Stock's rule of thumb for proper instruments and Sargan's overidentification test), it is questionable whether the instruments chosen are related to formal institutions in a conceptual sense. Arguably, openness to foreign trade and freedom of the press might suffer from the same endogeneity that the instruments were meant to correct for.

The conceptual model used in this paper posits that there is a two-way influence between trust and formal institutions. Social structures and civil society, particularly in democratic societies, are responsible for the creation and development of formal governing institutions. However, it is a fluid process in which institutions evolve affecting how members of society, including individuals, groups, and organizations, interact with one another. There are also notable cases, such as through external colonization, military conquest, or internal revolution, in which formal institutions are imposed on societies. Given the different avenues through which formal institutions are created and maintained (e.g. colonization, direct democracy) , the differing degrees of rigidity influencing the rates that formal institutions evolve (e.g. totalitarian, democratic rule), and the relative influences that formal institutions have on societies and individuals (e.g. laissez-faire, centralized control) it is evident that informal institutions, such as societal trust, and formal institutions develop and evolve in an interdependent fashion.

Table 11 and Table 12 begin the empirical analysis that aims to formally explore this question. In total, five different instruments were chosen that are both conceptually and statistically related to formal institutions. An index of the World Bank institutional governance measures was used as the formal institutions variable. Using an IV/2SLS approach, the instruments are used as exogenous regressors in separate equations that all specify the World Bank formal institutions index as the dependent variable. In the second stage, predicted values of formal institutions generated in the previous step are used in combination with other relevant control variables in regressions aimed at explaining trust as the dependent variable[29].

Table 11 contains first-stage results. Equation 1 uses data collected from Acemoglu, Johnson, and Robinson (2002) as instruments for formal institutions. The variables include a colonization dummy, the log of the population density in 1500, and the interaction between the two variables. All three variables were highly significant based on a chi-square test of joint significance in this first-stage[30]. The dependent variable in equation 1 is the World Bank governance index (WB 1996) from the year 1996. The results imply that when the log of the population density for a country in the year 1500 was above .78, European colonization (colony dummy = 1) resulted in lower quality governance as measured in 1996. This is consistent with the hypothesis and results attained by Acemoglu, Johnson, and Robinson demonstrating that relatively populous countries in 1500 subject to European colonization experienced a reversal in relative wealth due to the lasting effect of poor institutions left by the colonizers.

This same set of instrumental variables were used in equations 5 – 7, instead substituting the Gastil Index from 1973, 1980, and 1990 (FH 1973, FH 1980, FH 1990) as the first stage formal institution

[29] The results in Table 12, and for all of the instances where 2SLS is used going forward, were attained using the 2sls option available in the model procedure in SAS. Standard errors were calculated using a heteroscedasticity-corrected covariance matrix (option: HCCME=1).

[30] The null hypothesis for the instrument validity tests is that the instruments are jointly equal to zero. By rejecting the null hypothesis the instruments are deemed valid.

Table 11: Formal Institutions, IV/2SLS First Stage Results

Equation	<base>	1	2	3	4	5	6	7
N	108	105	107	107	107	92	92	92
Instrument:	None	Pop.Density/Colony	Socialist/Colony	French/Colony	English/Colony	Pop.Density/Colony	Pop.Density/Colony	Pop.Density/Colony
First-Stage D.V.:	None	WB 1996	WB 1996	WB 1996	WB 1996	FH 1973	FH 1980	FH 1990
Constant	50.782***	40.911***	45.300***	18.565	57.567***	48.400***	49.048***	54.300***
	(8.62)	(4.76)	(4.67)	(0.63)	(5.29)	(5.50)	(5.83)	(6.48)
Gini Income	-0.637***	-0.394**	-0.493***	0.164	-0.794***	-0.339*	-0.298	-0.181
	(-6.08)	(-2.35)	(-2.79)	(0.22)	(-3.44)	(-1.77)	(-1.30)	(-0.84)
Linguistic	0.232*	0.112	0.142	-0.184	0.292	0.069	0.053	-0.062
	(1.85)	(0.84)	(1.17)	(-0.41)	(1.66)	(0.44)	(0.31)	(-0.32)
Linguistic^2	-0.004***	-0.002	-0.003*	0.002	-0.005**	-0.001	-0.001	0.001
	(-2.73)	(-1.33)	(4.12)	(0.33)	(-2.24)	(-0.61)	(-0.54)	(1.30)
Protestant	0.322***	0.239***	0.276***	0.62	-0.017	0.182**	0.175*	0.114
	(4.75)	(3.30)	(4.14)	(0.24)	(-0.31)	(2.02)	(1.90)	(1.17)
Catholic	-0.032	-0.044	-0.037	-0.083	-0.096	-0.071	-0.083	-0.150*
	(-0.66)	(-0.85)	(-0.80)	(-0.94)	(-1.28)	(-1.23)	(-1.24)	(-1.74)
Muslim	-0.050	0.016	-0.011	0.174	-0.212**	0.004	0.009	0.032
	(-1.02)	(0.21)	(-0.15)	(0.76)	(-2.51)	(0.05)	(0.11)	(0.30)
Orthodox	-0.170***	-0.068***	-0.133	0.040		-0.024	-0.037	-0.050
	(-2.86)	(-0.86)	(-1.59)	(0.19)		(-0.21)	(-0.41)	(-0.59)
WB Governance Index 1996		6.453**	3.550	20.949	-4.436			
		(2.09)	(1.00)	(1.10)	(-0.92)			
Freedom House '73, '80, '90						-1.610	-2.056	-4.450
						(-0.62)	(0.76)	(-1.56)
R-square	0.52	0.54	0.55	-0.05	0.45	0.33	0.31	0.23
Mean, D.V.	26.61	27.00	26.82	26.82	26.82	27.46	27.46	27.46
Sargan		0.07	0.15	2.78	1.01	3.80	3.73	0.63

***p<.01, **p<.05, *p<.10; t-statistics in parentheses calculated using a heteroskedasticity consistent covariance matrix

dependent variable. The results were similar in these three equations, with European colonization having a negative effect on the Gastil Index for log population density values greater than .3 – 2.5, keeping in mind that the Gastil Index is scaled where governance gets worse as the index increases.

Equations 2-4 in Table 11 use dummy variables from La Porta, et al. (1999) indicating origins of a respective country's legal system. In that particular study, the origin of a country's legal system was shown to be highly related to a country's quality of governance. The legal origins dummy variables used in the analysis include English, French, Socialist, German, and Scandinavian. The general theory involves two main assumptions. The first is that socialist origins are invariably associated with low quality governance. The remaining legal origins fall on a spectrum depending on a respective origin's association with common law or civil law. English legal origins are based in common law which is assumed by the authors to be related to higher quality governance. On the other end of the spectrum are French legal origins based in Napoleonic civil law, which is assumed by the authors to be related to lower quality governance. Scandinavian and Germanic legal origins fall somewhere in between. This relationship between legal origins, governance, and trust is explored further in the next section.

As instruments for the World Bank governance index, socialist legal origin and English legal origin when included with a colonization dummy, passed joint significance tests in equations 2 and 4. Socialist legal origin is associated with lower quality governance and English origins with higher quality governance, as hypothesized by La Porta, et al. Colonization and French legal origin were not significantly related to the Gastil Index, thus do not qualify as good instruments.

Table 12 includes 2SLS second-stage results. The first equation listed in Table 12 (<base>) is the base equation used for the analysis, replicating the final trust equation from the previous section by regressing income inequality and fractionalization on trust, controlling with the religious composition variables. This base equation was included for comparison purposes so that the coefficient estimates

Table 12: Formal Institutions, IV/2SLS Results, Second Stage Results, D.V.=Trust

Equation	1	2	3	4	5	6	7
N	105	107	107	107	92	92	92
D.V. (Formal Institutions):	WB 1996	WB 1996	WB 1996	WB 1996	FH 1973	FH 1980	FH 1990
Constant	1.040***	2.004***	1.446***	1.167***	4.029***	4.489***	3.354***
	(2.42)	(5.19)	(3.54)	(3.53)	(3.36)	(3.43)	(3.28)
Gini Income	-0.035***	-0.034***	-0.032***	-0.032***	0.066***	0.050**	0.042**
	(-3.92)	(-3.36)	(-2.99)	(-3.85)	(3.10)	(2.01)	(1.96)
Linguistic	0.015*	0.023***	-0.018*	0.017*	-0.033	-0.038	-0.031*
	(1.82)	(2.82)	(-1.91)	(1.91)	(-1.23)	(-1.44)	(-1.77)
Linguistic^2	-0.0002**	-0.0003***	-0.0002**	-0.0002***	0.0005	0.0005	0.0004
	(1.79)	(-3.10)	(-2.22)	(-2.36)	(1.66)	(1.57)	(2.28)
Protestant	0.009***	0.006**	0.012***	0.014	-0.025***	-0.023***	-0.022***
	(3.32)	(2.06)	(3.99)	(5.71)	(-3.27)	(-2.80)	(-2.87)
Catholic	0.002	0.000	0.001	0.006	-0.011*	-0.014*	-0.021***
	(0.80)	(0.08)	(0.41)	(3.02)	(-1.68)	(-1.98)	(-3.31)
Muslim	-0.008**	-0.014***	-0.012***	-0.007**	0.006	0.007	0.003
	(-2.43)	(-4.69)	(-3.53)	(-2.11)	(0.70)	(0.92)	(0.39)
Orthodox	-0.010**	-0.007***	-0.011***	-0.008**	0.021**	0.010	0.002
	(-2.23)	(-2.94)	(-2.67)	(-2.18)	(2.40)	(0.48)	(0.13)
Colony	0.342*	-0.507***	-0.237	-0.381**	-2.116***	-1.531***	-0.428
	(1.82)	(-2.82)	(-1.11)	(-2.31)	(-3.15)	(-2.15)	(-0.70)
Pop. Density (1500)	0.207***				-0.598***	-0.630***	-0.349**
	(4.28)				(-2.97)	(-2.99)	(-2.23)
Colony x Density	-0.437***				0.830***	0.729***	0.710***
	(-6.18)				(3.56)	(2.93)	(3.54)
Socialist Legal Origin		-1.017***					
		(-7.21)					
French Legal Origin			0.143				
			(0.77)				
U.K. Legal Origin				0.685***			
				(4.30)			
R-square	0.62	0.63	0.50	0.56	0.40	0.33	0.53
Test of Inst. (p)	<.0001	<.0001	0.452	<.0001	0.002	0.019	0.003
Mean, D.V.	0.16	0.17	0.17	0.17	4.12	3.93	3.34

***p<.01, **p<.05, *p<.10; t-statistics in parentheses calculated using a heteroskedasticity consistent covariance matrix

for trust determinants can be compared depending on whether governance is included or excluded from the specification. The sample is reduced slightly due to missing values for instruments used for the WB governance index. As a result of a slightly different mix of countries, ethnic fractionalization lost significance in this base specification. However, linguistic polarization is significant and thus is substituted for ethnic fractionalization as a proxy for social diversity. Linguistic fractionalization is strongly related to ethnic fractionalization (Pearson's correlation coefficient=.68). Depending on the mix of countries, one or the other often are significantly related to trust.

Again, income inequality and a form of fractionalization, specifically linguistic polarization, are significantly related to trust. The marginal effects related to linguistic polarization merit a closer look, as contrary to expectations, the primary term has a positive sign while the squared-term has a negative sign. The signs signal a positive relationship between linguistic fractionalization and trust up to some intermediate level of fractionalization, a leveling off, and then a decline in trust as linguistic fractionalization continues to increase.

Table 13 shows point elasticities of linguistic fractionalization with respect to trust. The elasticities are evaluated using the mean level of trust in the sample. Elasticities are relatively small however increase from values of 1 -10 of linguistic fractionalization. They level off at the relatively low level of 15, turning negative close to 30. Between values of 30 – 100, the elasticity decreases at an increasing rate. Linguistic fractionalization appears to have its largest effect on trust at higher levels. The effect is relatively muted below levels of roughly 50, however increases dramatically as levels approach the maximum of 100. Trust level in countries such as Tanzania and Uganda with fractionalization measures of 89 and 92, respectively, would be highly sensitive to changes in linguistic fractionalization. A one unit decrease in the level of linguistic fractionalization in these countries would

Table 13: Elasticity of Linguistic Fractionalization

Linguistic Fractionalization	Elasticity
5	0.04
10	0.06
15	0.06
20	0.05
25	0.03
30	-0.01
35	-0.06
40	-0.13
45	-0.22
50	-0.32
55	-0.43
60	-0.56
65	-0.70
70	-0.86
75	-1.04
80	-1.23
85	-1.43
90	-1.65
95	-1.89
100	-2.13

translate into a 1.65 % (absolute percentage point) increase in the level of societal trust. While fractionalization may move slowly over time, for many countries it does change. This is particularly true of countries and regions with large migrant and/or immigrant populations (e.g. EU, Africa). Conflict can also be a source of shifts in fractionalization as ethnic, linguistic, and religious groups are displaced as refugees, changing the relative mix of groups in countries both losing and receiving refugees.[31]

Equation 1 in Table 12 includes the predicted values of World Bank governance that used the colonization dummy, log population density in 1500, and the interaction between colonization and

[31] One example that comes to mind is the ethnic Nepalese, roughly 30% of the Bhutanese population, permanently displaced from Nepal. Also, the Iraq war resulted in an estimated two million, mostly Sunni Muslims, displaced from Iraq to Syria – roughly 10% of the Syrian population. Conflict throughout Africa for decades has resulted in a continually shifting ethnic, linguistic, and religious balance on that continent.

density as instruments in the first stage. The World Bank governance index using these variables as instruments is highly significant with a relatively large magnitude when used to explain trust. A one-standard deviation improvement in governance equates to a 7.5% absolute percentage increase in the level of societal trust.

This finding is important, because it demonstrates that formal institutions can and do affect societal trust. An important implication that can be taken from the specific instruments chosen is that the historical legacy of colonization established the foundation on which current formal institutions were developed. This historical legacy reflected in current formal institutions continues to have a strong impact on societal trust today. When comparing results in equation 1 to the base specification that excludes the WB governance index, one can see that the magnitude of linguistic polarization diminishes to the point where it is not significantly different from zero. Likewise, the significance and magnitude of the effect of Gini income on trust diminishes. First stage results (equation 1, Table 11) show that income inequality and linguistic polarization are significantly related to governance as well. Together, this implies that the effect of linguistic diversity and income inequality on trust is transmitted through the effects that formal institutions have on trust. In the case of linguistic polarization, governance acts as the sole transmitter. The negative influence of income inequality on trust is partially exacerbated (or improved) by changes in quality of governance, however there are aspects of income inequality that directly, and negatively, influence societal trust irrespective of the quality of governance.

One interpretation of these results is that the historical legacies of colonization embedded in today's formal institutions exacerbate the negative effect that linguistic diversity and income inequality have on societal trust. This in some ways contradicts the theoretical basis by which social diversity is included as a determinant of trust. For instance, the theoretical model developed by Zak and Knack (2001) assumes that social diversity, in particular ethnic diversity, has a negative effect on societal trust

because individuals are genetically predisposed to mistrust (or cheat) those that do not share the same ethnic background. The results attained in Table 12 suggest something much different. Namely, linguistic differences alone are not responsible for lowered societal trust, instead trust is only lower in the presence of linguistic diversity when those differences are reflected in formal institutional quality. In other words, when linguistic differences (proxying for ethnic or just social diversity, in general) are used to extract rents for respective linguistic groups through channels of governance, governance quality is lower, and only then, is the effect of linguistic diversity reflected in lower societal trust.

Socialist, French, and U.K. legal origin variables were the instruments (along with colonization) reflected in the coefficient estimates for the WB governance index in equations 2 – 4 (Table 12), respectively. In no case, was the formal institutions variable significant when using any of the legal origin dummies as instruments. One interpretation that can be drawn from this result is that formal institutions do not have a uniform, or even necessarily a direct, effect on trust. In the case of the legal origin dummies, as binary variables, they likely capture not only historical legal legacies, but cultural legacies as well, both of which are dynamic. If the dummies capture characteristics that are contemporary with current institutions, the formal institutions variable should not be significantly related to trust given the long lead time necessary for changes to diffuse through society and become detectable on an aggregate basis.

Finally, the set of "colonial" instruments were used in equations using the Gastil Index, as the formal institution measure in an IV/2SLS specification. The benefit of using the Gastil Index is the long time-series of data available, going as far back as 1973. Choosing various years from 1973 to 1990, it is possible to explore further this concept of contemporaneity between trust and formal institutions. Beginning values of trust were used as the dependent variable (ending values of trust were used in the

WB governance specifications). In none of the cases included in Table 12 was the variable significant when the Gastil Index was used as the measure of formal institutions (equations 5-7).

As a final note to Table 12, an important condition of IV estimation is confirmed to hold, namely that the instruments used in the first-stage cannot be correlated with the error term in the second-stage equation. A Sargan overidentification restriction test was performed to verify this condition was met. The Sargan test statistic is distributed as a chi-square with k-1 degrees of freedom (k=number of instruments). To obtain the Sargan test statistic, an auxiliary regression is performed by taking the residuals from the second stage regression and regressing those residuals on all exogenous independent variables from the first-stage equation, including the instruments. The test statistic is the R-square value from the auxiliary regression multiplied by the sample size. The null hypothesis is that the instruments are uncorrelated with the second-stage residuals, thus low values of the test statistic confirm the validity of the instruments. All equations in Table 12, pass the Sargan test of overidentification restrictions.

Moving forward to Table 14, these results hold when excluding outliers using LTS or countries that have low-trust radiuses and high CVs. All results cited above hold when excluding countries that have high trust CVs and low-trust radiuses (see Appendix 4.3 for the list of excluded countries). With high CV/low-radius countries excluded, equations 2 and 3 in Table 14 contain respective results of the WB governance index instrumented with colony/density and socialist legal origin. Excluding these "outliers" does little to change significance or magnitude of the key institutions, Gini income, and linguistic polarization variables in equation 2. In equation 3, the institutions variable is significant when instrumenting with socialist legal origin, where it previously was not when using the full sample. As with the colony/density instrument, Gini income weakens significantly in magnitude and linguistic polarization loses significance when including the significant institutions variable. Equation 4 is the Gastil 1990 specification with the excluded high-CV/low-density observations. Ending trust values were

Table 14: Formal Institutions IV/2SLS Results: With Outliers Removed[32]

Equation	1	2	3	4	5	6	7
N	108	91	93	78	100	102	89
Instrument:	None	Pop.Density/Colony	Socialist/Colony	Pop.Density/Colony	Pop.Density/Colony	Socialist/Colony	Pop.Density/Colony
First-Stage D.V.:	None	WB 1996	WB 1996	FH 1990	WB 1996	WB 1996	FH 1990
Outlier Removal Method:	None	Radius/CV	Radius/CV	Radius/CV	LTS	LTS	LTS
Constant	50.782***	30.499***	34.332***	52.809***	31.723***	31.228***	53.347***
	-8.62	(4.01)	(4.04)	(10.33)	(5.40)	(6.85)	(11.52)
Gini Income	-0.637***	-0.347**	-0.411**	-0.411**	-0.316**	-0.288*	-0.406**
	(-6.08)	(-2.12)	(-2.35)	(-2.55)	(-2.46)	(-1.87)	(-2.50)
Linguistic	0.232*	0.171	0.186	0.145	0.051	0.019	0.067
	-1.85	(1.27)	(1.49)	(0.96)	(0.45)	(0.18)	(0.50)
Linguistic^2	-0.004***	-0.002	-0.003*	-0.001	-0.001	-0.000	-0.000
	(-2.73)	(-1.45)	(-1.70)	(-0.70)	(-0.54)	(-0.28)	(-0.26)
Protestants	0.322***	0.335***	0.347***	0.316***	0.309***	0.301***	0.299***
	-4.75	(6.11)	(6.21)	(5.49)	(5.64)	(5.12)	(5.29)
Catholic	-0.032	0.032	0.0276	-0.032	0.014	0.009	-0.049
	(-0.66)	(0.91)	(0.81)	(-0.62)	(0.42)	(0.27)	(-1.00)
Muslim	-0.05	0.098	0.071	0.038	0.041	0.046	0.016
	(-1.02)	(1.19)	(0.94)	(0.44)	(0.96)	(1.07)	(0.30)
Orthodox	-0.170***	0.054	-0.028	-0.042	0.004	-0.034	-0.046
	(-2.86)	(0.83)	(-0.34)	(-0.57)	(0.06)	(-0.48)	(-0.78)
WB Governance Index 1996		7.415***	5.565*		7.441***	7.926***	
		(2.51)	(1.71)		(3.26)	(2.66)	
Freedom House '73, '80, '90				-4.441**			-4.425**
				(-2.07)			(-2.46)
R-square	0.52	0.66	0.66	0.71	0.68	0.66	0.71
Test of Inst. (p)		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
Sargan		1.89	0.60	1.48	0.39	0.20	0.55
Mean, D.V.	26.61	26.71	26.80	26.82	25.88	25.75	26.02

***p<.01,**p<.05,*p<.10; t-statistics in parentheses calculated using a heteroskedasticity consistent covariance matrix

[32] Only second-stage results are presented here. All of the instruments in all of the specifications passed the Sargan and joint significance tests.

substituted for beginning trust values used in the original specification. When using ending trust and excluding outliers, Gastil 1990 is significantly related to trust.

With certain modifications to the specification, the 1990 Gastil measure does end up being significantly and negatively related to trust. Those modifications include swapping the linguistic polarization measure for ethnic fractionalization and also when excluding outliers (via LTS and high CV/low-trust radius countries).

Not surprisingly, the only Gastil observations significantly related to trust, were for the set of observations drawn from 1990 (Table 14, equations 4 & 7). The mean year of the beginning trust values drawn from across all countries is 1995, while the end values on average were drawn from 2007. Given the significant change in formal institutional quality that occurred between 1970-1990 it probably makes sense that institutional quality levels in 1990 are more closely related to trust levels that, on average, were drawn from the mid-2000s (vs. 1973 or 1980). Seeing as the 1990 Gastil measure was related to the ending trust values but not beginning trust values, this might suggest that formal institutional quality (or government policy) effects societal trust with a lag. Social theory likely supports this suggestion. In many cases it might take years or decades for government social policy to affect trust (i.e. civil rights laws).

The expected sign on the Gastil Index coefficient is negative due to the scaling of the index. A value of 1 represents those countries that have the highest levels of political and civil liberties, while a value of 7 represents countries that have severely curtailed levels of freedom. The magnitude of the Gastil Index 1990 coefficient suggests that a movement from “Not Free” to “Partly Free” (an increase of 2 on the Gastil scale) would produce a roughly 9% increase in societal trust. Keep in mind that the negative coefficient is the expected sign; as the Gastil Index increases, civil and political liberties

decrease. As with other specifications that include a significant institutions coefficient, the inclusion results in a weakening of the Gini income magnitude and linguistic polarization is rendered insignificant.

Equations 5-7 mimic the same specifications cited directly above, but use the LTS technique to identify outliers. Appendix 4.5 lists the excluded countries identified as outliers. Again the WB governance index is significant and positively related to trust using both colony/density and socialist legal origin (with the colony dummy) as instruments. The Gastil 1990 measure is also significantly related to trust, with the expected negative sign, when excluding outliers and instrumenting with colony/density. In all instances where the LTS outliers were excluded, linguistic polarization weakened and was not significantly different from zero when including a formal institution variable as a regressor. In all cases, Gini income weakened in significance and magnitude when including a formal institution measure. In the particular case where socialist legal origin was used as an instrument (equation 6), the statistical significance of Gini income weakened dramatically.

In summary, there is some evidence to suggest that formal institutional quality does influence trust. The degree with which institutional quality varied over time presented some challenges in creating proper specifications given the lower availability of trust data (through time); however when specified in a way where trust and formal institution observations are more closely aligned temporally, institutional quality appears to be a determinant of trust. To the extent that we expect formal institutions to be related to trust, this might support the conclusion that societal trust does observably change over time.

An intriguing finding is that colonization and population density in 1500, the "Reversal of Fortunes" instrument inspired by Acemoglu, Johnson, and Robinson (2002), explains differences in institutional quality that later are reflected in societal trust. Instrumenting with the colony and density variables, governance is shown to be positively and significantly related to trust. Further, the effects of

income inequality and social diversity on trust appear to be transmitted through the quality of governance.

5.3 Trust and Colonization

Given the potential significance of colonization as a determinant of trust, through its effect on formal institutions, it is worth exploring in more detail the relationship between colonization and trust. Interesting differences begin to emerge when looking at mean values of critical variables on a univariate basis between those countries that were colonized and those that were not. When speaking of colonization, this refers specifically to European colonization that occurred principally between the 16th and 20th centuries.

Looking at Table 15, countries that have no colonial legacy have trust values that are on average roughly 50% higher, income inequality that is 30% lower, and levels of ethnic/linguistic fractionalization that are 30-35% lower. Countries that were colonized have an average formal institutional quality, as measured by the World Bank governance index, just below the world average. Conversely, countries in the sample that were not colonized have institutional quality measures that are one-half of a standard deviation above the mean. The directional influence of this comparison, colony vs. non-colony, coincides with the signs obtained in the regression analysis performed in the last chapter, conditional on those countries that had high population densities in 1500. Essentially, the univariate comparisions suggest that the relationships observed between trust and key determinants could be driven by whether a country was colonized.

Table 15: Descriptive Statistics, Colony vs. Non-Colony

Variable	Mean (Colony=0)	Mean (Colony=1)
Trust (ending)	31.65***	21.34
Gini Income	32.93***	46.27
Ethnic	30.27***	49.87
Linguistic	28.89***	41.79
Religious	39.93	44.87
Protestant	12.11	9.78
Catholic	28.41*	40.98
Muslim	17.83	16.89
Orthodox	14.71***	1.13
WB Formal Institutions Index	0.47***	-0.14

***p<.01,**p<.05, *p<.10

Applying regression analysis to further examine the trends apparent in the univariate measures, equations 1 and 2 in Table 16 are results generated regressing income inequality, linguistic fractionalization, and the religious composition variables on trust. Equation 1 includes those countries that were not colonized while equation 2 includes those that were colonized. Notably, income inequality and linguistic fractionalization are both statistically significant for those countries that were colonized. On the contrary, both of these variables are insignificant for those countries that were not colonized.

Equations 3 and 4 substitute religious fractionalization for linguistic fractionalization. Again, in the case of those countries that were colonized, Gini income and the religious fractionalization measure are highly significant. As for religious fractionalization, the marginal effect is even greater in magnitude than that for linguistic fractionalization. One major difference when substituting religious fractionalization for linguistic, is that the religious measure is significantly and positively related to trust for countries that were not colonized. It is interesting that religious fractionalization is significant with opposing signs depending on whether the sample of countries was or was not colonized. Religious diversity appears to be associated with social division, i.e. lower trust, in only those countries that were

Table 16: Results, Trust and Colonization

Equation	1	2	3	4	5	6	7	8	9	10
N	53	55	53	55	53	54	53	54	56	54
Colony:	No	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes
D.V.:	Trust	Trust	Trust	Trust	Trust	Trust	Trust	Trust	WB 2005	Trust
Constant	25.315	57.139***	5.465	70.271***	25.155	52.440***	3.471	72.279***	-0.301*	51.446***
	(-1.42)	(5.00)	(0.28)	(5.52)	(1.69)	(6.22)	(0.18)	(6.11)	(-1.75)	(4.83)
Gini Income	-0.063	-0.569**	0.265	-0.700**	-0.062	-0.529**	0.293	-0.664***		-0.515**
	(-0.11)	(-2.34)	(0.50)	(-3.17)	(-0.11)	(-2.51)	(0.55)	(-3.77)		(-2.44)
Linguistic	0.043	-0.118**			0.043	-0.088*				-0.071
	(0.54)	(-2.51)			(0.55)	(-1.79)				(-1.48)
Religious			0.196**	-0.235**			0.213***	-0.311***		
			(2.26)	(-2.28)			(2.70)	(-3.34)		
Protestant	0.474***	0.087	0.538***	0.316	0.415***	0.046	0.466***	0.343**		0.007
	(6.86)	(0.38)	(7.59)	(1.36)	(4.95)	(0.25)	(5.61)	(2.11)		(0.04)
Catholic	0.044	-0.079	0.084*	-0.118	0.009	-0.029	0.042*	-0.101		(0.102)
	(0.97)	(-1.20)	(1.90)	(-1.44)	(0.17)	(-0.40)	(0.87)	(-1.34)		(-1.42)
Muslim	0.014	-0.122*	0.054	-0.240**	0.046	-0.065	0.099	-0.213**		-0.139**
	(0.21)	(-1.78)	(0.78)	(-2.60)	(0.52)	(0.09)	(1.30)	(-2.24)		(-1.98)
WB Governance '96					3.048	5.473***	3.988	6.903***		7.753***
					(1.09)	(3.16)	(1.67)	(4.75)		(3.82)
Socialist Leg. Origin									-0.766***	
									(-3.01)	
French Leg. Origin									-0.278**	6.250**
									(-2.02)	(2.19)
Pop. Density 1500									-0.249***	
									(-6.56)	
Trust (beginning)									0.018***	
									(2.82)	
French x WB 2005										-5.266*
										(-1.81)
R-square	0.56	0.27	0.59	0.26	0.56	0.40	0.61	0.47	0.60	0.47
Mean, D.V.	32.14	21.27	32.14	21.27	32.14	21.6	32.14	21.27	-0.14	21.6

***p<.01, **p<.05,*p<.10; t-statistics in parentheses are white-corrected

colonized. The act of colonization, independent of the effect of colonization on formal institutional quality, appears to have altered the ability of society to effectively deal with religious diversity.

Linguistic fractionalization weakens considerably in magnitude (roughly 30%) and in significance when the formal institution measure is included versus not included (equation 6 vs. equation 2, Table 16). This suggests the negative influence of linguistic fractionalization on trust appears to be partially transmitted through formal institutions, and only in those countries that were colonized. For a significant portion of countries colonized, colonizers created governance systems that consolidated their power at the expense of freedoms and rights of those colonized. While most countries have transitioned to some form of democracy, this legacy of consolidated state power persists in many cases today. A combination of democracy, weak institutions, and social diversity can be a recipe for corruption and identity politics aimed to reap the benefits that consolidated power and corruption have to offer. When distinct groups in society, in this case linguistic, take advantage of weak institutions to abuse government power for their own benefit this likely would lead to mistrust between those groups competing. Democracy might actually exacerbate this situation as different groups vie for and alternate power, leading to a steady decline in trust.

Again, these differing results between those countries colonized and those that were not, reflects the disparate ethnicities brought together, often by force, under Spanish, French, Portuguese, and to a lesser extent, English rule[33]. In the case of French, Portuguese, and Spanish colonization, institutions initially developed for the purpose of consolidating power under the conquering, or ruling class, which in many cases were an ethnically homogeneous minority. Later, those countries adopted

[33] The Dutch, Belgians, and Germans were also colonizers, however do not have a large colonizing footprint in the data sample, thus are off the hook in this analysis.

legal systems based on civil law, which again, tended to consolidate legal authority under government control. Equation 9 in Table 16 shows how French legal origin, a proxy for both civil legal system and Spanish/Portuguese/French colonization, is negatively related to formal institution quality (WB governance index 2005).[34] Ultimately, these "extractive" institutions that tend to be associated with civil legal systems manifested themselves in the form of lower societal trust. In equation 10, an interaction term between French legal origin and the WB governance index is negative and significant. The resulting positive marginal effect of formal institutional quality on trust is significantly lower for countries that were colonized and adopted French legal systems versus those colonized countries that adopted other systems (principally English).

Also in equation 10, linguistic fractionalization loses its significance suggesting that institutions based in civil law are responsible for lowering societal trust in the presence of increased linguistic fractionalization. While not presented here, when substituting religious fractionalization in the place of linguistic fractionalization, religious fractionalization remains significant in the presence of the governance variable. This suggests that religious fractionalization, for countries that were colonized, has a negative effect on trust independent of those mediated by civil law-based institutions.

The above results present an interesting question: if not poor governance, what might cause trust to remain sensitive to income inequality and fractionalization 50 to 200 years post-independence in former colonies? The majority of former European colonies are located in Africa or Latin America, with the colonial experience of those two (admittedly large and diverse regions) being quite distinct.

[34] Napolean Bonaparte was responsible for importing civil law to Spain and Portugal during the Napoleonic Wars.

For now, it is suffice to say that results suggest colonization left a distinct and lasting imprint on informal institutions independent of formal governance.[35]

5.4 Trust as a Determinant of Formal Institutions

Given that formal institutions appear to exert a significant effect on societal trust, particularly as a consequence of historical colonial legacies, the next step is to see if there is a feedback effect in which levels of societal trust influence formal institutional development. Equation 1 in Table 17 shows results for formal institutions, proxied by the World Bank governance index from 2005, regressed on beginning levels of trust and controls. The coefficient for trust is not significantly different from zero, implying that there is not an influence in the other direction, from trust to formal institutions.

However, we know that there is a strong case to be made that the specification presents an endogeneity problem even using the earliest, mostly predetermined observations of trust in the sample. The conceptual and empirical studies cited in chapter 2 treat formal institutions as a potential determinant of trust giving reason to consider using an IV technique. Further, in the previous section empirical evidence was presented that implied formal institutions are a strong determinant of trust. In order to test the potential feedback loop between trust and formal institutions, a 2SLS analysis will be employed.

Equation 3 (Table 17) uses percent Protestant and Gini income as instruments for trust in an IV/2SLS estimation.[36] Using 2SLS estimation changes the results dramatically, with trust becoming highly

[35] Outlier analysis was conducted and the results were not only confirmed, but strengthened. These results are available at request.

[36] First-stage results are not included here but are available at request. Instrument validity tests are included in Table 17. All instruments are valid according to the respective tests in each of the specifications.

Table 17: Trust IV Results

Equation	1	2	3	4	5	6	7	8
N	112	112	106	106	106	106	92	100
Instruments:	N/A	N/A	Protestant/Gini	Orthodox/Gini	Protestant/Gini	Orthodox/Gini	Protestant/Gini	Protestant/Gini
Estimator:	OLS	OLS	2SLS	2SLS	2SLS	2SLS	IV/CV-Radius	IV/LTS
Dependent Variable:	WB	FH	WB	WB	FH	FH	WB	WB
Constant	0.678**	2.306***	-1.207***	-1.079	4.972***	4.090**	-0.962	-1.079
	(2.10)	(2.58)	(-1.31)	(-1.08)	(2.61)	(2.34)	(-1.37)	(-1.14)
Ethnic	-0.006*	0.000	-0.001	-0.007	0.010	0.010	-0.004	-0.007
	(-1.82)	(0.10)	(-1.29)	(-1.25)	(0.93)	(1.08)	(-0.82)	(-1.36)
Legal Origin Socialism	-0.797***	-0.867	-0.527	-0.545	0.708***	0.831	-0.504	-0.476
	(-3.71)	(1.48)	(-1.42)	(-1.58)	(0.82)	(1.08)	(-1.59)	(-1.38)
Legal Origin France	-0.291*	-0.044	-0.141	-0.153	-0.182	-0.097	-0.077	-0.071
	(1.90)	(-0.13)	(-0.55)	(-0.59)	(-0.43)	(-0.25)	(-0.31)	(-0.27)
Legal Origin Scandinavia	0.601***	-1.181	-0.968	-0.870	-1.798	1.121	-0.770	-0.722
	(2.44)	(-2.14)	(-1.32)	(-1.03)	(1.29)	(0.87)	(-1.61)	(-0.21)
Colony	-0.405	0.317	-0.159	-0.173	0.190	0.287	-0.264	-0.207
	(-1.63)	(0.48)	(-0.32)	(-0.37)	(0.17)	(0.29)	-0.65	(-0.44)
Density (1500)	0.110	-0.274	0.032	0.037	-0.009	-0.047	0.112	0.044
	(1.51)	(-1.33)	(0.24)	(0.29)	(-0.03)	(-0.16)	(1.14)	(0.34)
Colony x Density	-0.361***	0.726***	-0.189	-0.200	0.318	0.391	-0.282**	-0.192
	(-4.17)	(3.07)	(-1.10)	(-1.21)	(0.82)	(1.15)	(-2.32)	(-1.14)
Trust (begin)	0.004	0.013	0.071**	0.067*	-0.107*	-0.076	0.059***	0.064*
	(0.58)	(0.85)	(2.35)	(1.96)	(-1.73)	(-1.34)	(3.18)	(1.96)
R-square	0.54	0.27	N/A	N/A	N/A	N/A	0.38	N/A
Mean, D.V.	0.14	2.77	0.14	0.14	2.82	2.82	0.19	0.09
Sargan	N/A	N/A	0.18	0.01	3.15	0.00	1.58	1.43
Test of Inst. (p)	N/A	N/A	0.02	0.07	0.02	0.07	0.001	0.05

***p<.01,**p<.05,*p<.10; t-statistics in parentheses calculated using a heteroskedasticity consistent covariance matrix

significant both statistically and with respect to the marginal effect of trust on governance. The model suggests that a 10% increase in societal trust (2.69 percentage points) is associated with an increase of .19 in the WB governance index. As a reference, the elasticity associated with this magnitude is roughly half of that associated with having a socialist legal system, which is generally considered to be strongly detrimental to institutional quality. Similar results are attained using percent Orthodox as an instrument for trust in equation 4.

Equations 5 and 6 use the same specification substituting Gastil 2009 as the dependent variable. When using percent Protestant and Gini income as instruments, the Gastil Index is negatively related to societal trust. In this case a 10% increase in societal trust is associated with a .28 decrease in the Gastil Index. Again using socialist legal origin as a benchmark, this is roughly half the elasticity associated with that particular variable. When using percent Orthodox as an instrument, the Gastil Index is not significantly associated with trust.

The results that pertain to the WB governance index are robust to removing outliers using the same techniques utilized thus far in this chapter. Equations 7 and 8 contain these respective results. On the contrary, the results do not hold when removing outliers for specification including the Gastil Index. Removing either high CV/low radius countries, or outliers identified by LTS, result in the Gastil Index not being significantly related to trust when instrumented with percent Protestant and Gini income.[37]

With evidence that the causal relationship flows both ways between trust and formal institutions, it would be more appropriate to model the relationship in a way that can account for this feedback loop. In an effort to do so, Table 18 includes results taken from a non-recursive specification modeling trust and formal institutions simultaneously. Trust is a determinant in an equation that includes the WB governance index as the dependent variable. In a parallel fashion, the same WB

[37] These results are not published here but available at request.

governance index is a regressor in a separate trust equation. The WB governance index values are taken from 1996 and beginning trust values with an average collection date of 1995 are used. Three different estimators are utilized, FIML, 3SLS, and GMM, with comparable results. Robust standard errors are generated for the 3SLS estimator.

FIML, 3SLS, and/or GMM are the appropriate estimators to use for this particular model given its non-recursive nature; correlation of the equation errors is a foregone conclusion. The results of the three estimators should approximate one another under the conditions of conditional homoskedasticity, non-clustering of errors (no serial autocorrelation), and when using the same instruments. An important condition unique to FIML is that errors should be normally distributed. In theory, the results should be similar for all estimators, however, in practice even when all the noted conditions are satisfied the estimations can numerically be quite different due to sampling variation.

The condition of normality of residuals is explicitly tested. The p-value for the Shapiro-Wilk W statistic is reported for all specifications of simultaneous equation models using FIML going forward. The null hypothesis is that errors are normally distributed, so ideally the p-value will be large. In cases where the errors are not normally distributed, the 3SLS and GMM estimators will provide more consistent and unbiased results. Given the additional condition of normality for the FIML estimator, it would seem to make the most sense to concentrate on results generated with 3SLS and GMM. However, when using SAS, FIML estimation has the added benefit of allowing for easy calculation of the decomposition of marginal effects into direct, indirect, and total effects. Effect decomposition from the FIML estimation is reported with all results going forward.

Heteroskedasticity was not explicitly tested for, but is typically present in some degree in cross-sectional regression analysis. The 3SLS specifications have been estimated with a heteroskedastic

Table 18: Non-Recursive Simultaneous Model Results – Trust : Institution

Equation	**1**	**1**	**1**		**2**	**2**	**2**
Estimator:	FIML	3SLS	GMM	Estimator:	FIML	3SLS	GMM
Dependent Variable:	Trust	Trust	Trust		WB 1996	WB 1996	WB 1996
Constant	36.201***	38.313***	38.762***	Constant	-0.906*	-0.863	-1.021***
	(7.46)	(6.18)	(8.14)		(-1.87)	(-1.50)	(-2.73)
Gini Income	-0.355***	-0.362***	-0.346***	Socialist	-0.482***	-0.507	-0.409**
	(-2.85)	(-2.71)	(-3.02)		(-2.74)	(-1.49)	(-2.59)
Linguistic	0.004	0.107	0.063	Ethnic	-0.005**	-0.005	-0.006**
	(0.15)	(0.81)	(0.80)		(-1.98)	(-1.24)	(-2.59)
Linguistic^2		-0.001	-0.000	Colony	-0.174	-0.150	-0.054
		(-0.73)	(-0.77)		(-0.98)	(-0.35)	(-0.34)
Protestant	0.126**	0.140**	0.142***	Density	0.024	0.040	0.045
	(2.48)	(2.05)	(3.03)		(0.47)	(0.40)	(1.04)
Orthodox	-0.061	-0.064	-0.058*	Colony x Density	-0.243***	-0.256**	-0.240***
	(-1.58)	(-1.19)	(-1.89)		(-2.93)	(-2.27)	(-3.57)
WB Gov. Index	5.267*	4.976***	5.163***	Trust	0.055***	0.053***	0.054***
	(1.76)	(4.25)	(2.52)		(4.09)	(4.25)	(5.98)
Mean, D.V.		27.04		Mean, D.V.		0.16	
Sargan/Hansen	3.15	4.074	3.19	Sargan/Hansen	0.452	0.452	3.19
Test of Inst. (p)		<0.0001		Test of Inst. (p)		<0.0001	
RMSEA	0.000			RMSEA	0.000		
Shapiro-Wilk (p)*	0.001			Shapiro-Wilk (p)	<0.001		

***p<.01,**p<.05,*p<.10; N=105; 3SLS t-statistics calculated using a heteroskedasticity consistent covariance matrix

consistent covariance matrix.[38] GMM estimation implicitly estimates a covariance matrix robust to heteroskedasticity. FIML, as estimated here, is not robust to heteroskedasticity. Any differences seen in the statistical significance of variables between estimators (specifically GMM/3SLS vs. FIML) could be attributable to heteroskedasticity.

It is important to note that any specification error is imported from one equation to the other when using full-information estimators, potentially biasing coefficient estimates. This is generally true for all three estimators: GMM, 3SLS, and FIML. In cases where coefficient estimates are markedly different across estimators, bias from an omitted variable somewhere in the system could be the source.

Fortunately, in Table 18, parameter coefficients and standard errors are remarkably similar across all three estimators. Given the limited variation in coefficient magnitudes across the estimators this gives more confidence that the multitude of conditions necessary to estimate the full-information estimators have been satisfied.

In all cases, trust is significantly and positively related to formal institutional quality, while likewise formal institutions are positively related to societal trust. The level of significance and magnitudes of the coefficients related to these variables increase when using 3SLS vs. 2SLS (earlier in this section and in section 5.2).

The effect of governance on trust varies in magnitude between 4.98 and 5.27 depending on the estimator used. This implies that a roughly one-standard deviation increase in institutional quality (increase = 1), would result in a 5.0 – 5.3% increase in societal trust. As a benchmark, a 5.0% increase in trust is equivalent to a move from the 25th percentile to 35th percentile. Based on coefficient estimates

[38] Using SAS, the 3SLS estimator is estimated with a heteroskedastic consistent covariance matrix using the first of three modifications to the classic White estimator (proc model option: HCCME=1) proposed by Davidson and MacKinnon (1993).

of 0.053-0.055, a corresponding 5.0% increase in trust would result in an increase of .25 in the WB governance index. This is an even stronger impact, moving a country from the 25th percentile of governance to just over the 40th percentile.

The respective coefficients underestimate the true marginal effect of trust on institutions and vice-versa. If the trust-institution system is in equilibrium it is appropriate to discuss marginal effects in terms of the total effect that trust has on formal institutional quality that is magnified due to the feedback effect that institutional quality has on trust. At first glance, interpretation of the FIML results might be complicated by the high p-values obtained across all equations with the univariate Shapiro-Wilk test. However, the multivariate Henze-Zirkler test suggests that the errors are, in fact, distributed normally.

Table 19 shows the decomposition of effects taken from the FIML model for variables of interest. When incorporating the feedback effect that trust has on institutions the magnitude of the total effect of trust on institutional quality increases to .077. The total effect is comprised of the .055 direct effect and an indirect effect of .022. The indirect effect of trust on governance is a signal of a positive feedback loop from trust to governance and vice-versa. Increases in societal trust have a positive impact on governance quality, which in turn increases trust, feeding back into a marginally smaller additional increase in governance quality, until settling at the total effect point estimate. Putting the statistically significant .077 increase into percentile terms, the same one-standard deviation increase in trust mentioned above would move a country's societal trust level from the 25th percentile to near the median (47th percentile).

Table 19: Non-Recursive Simultaneous Model, Direct Effects

D.V:	Trust			WB Governance		
Effect:	Direct	Indirect	Total	Direct	Indirect	Total
Trust				0.055***	0.022	0.077**
				(4.08)	(1.09)	(2.41)
WB Governance	5.267**	2.139	7.406			
	(2.33)	(0.87)	(1.58)			
Ethnic				-0.005**	-0.002	-0.007**
				(-1.98)	(-1.44)	(-2.21)
Gini Income	-0.355***	-0.144*	-0.500***		-0.027***	
	(-2.85)	(-1.92)	(-4.45)		(-3.88)	

***p<.01,**p<.05,*p<.10; t-statistics in parentheses

The same corresponding adjustment made to the effect of trust on institutional quality results in a total effect of 7.406, although in this case the total effect is not statistically significant. This suggests that the feedback effect principally impacts the directional path that flows from trust to institutional quality. This is consistent with the conceptual model, where there is a strong causal impact from trust to institutions with a somewhat mixed magnitude and significance of impact from institutions to trust.

Ethnic fractionalization and income inequality have amplified marginal effects with regard to governance and trust, respectively. A one-standard deviation increase in income inequality would result in a 5% absolute decrease in societal trust. An increase in income inequality also has a statistically significant indirect effect on governance, mediated through its impact on trust. The one-standard deviation increase in income inequality equates to a 0.27 decrease in the governance index. The inclusion of linguistic fractionalization in the trust equation has a confounding influence on the effect of ethnic fractionalization on trust. When excluding linguistic fractionalization from the trust equation, ethnic fractionalization has an indirect, statistically significant, mediated effect on trust through governance. This confirms results attained in previous sections of this chapter.

Overall, these magnitudes are quite large and imply a powerful impact that societal trust has on institutional quality. More importantly, the nature of this system where decreases in trust or institutional quality amplify the changes in the other suggests that an institutional quality-societal trust trap exists. Worsening institutional quality results in lower societal trust which lowers institutional quality even further, until a country arrives at a sub-optimal low trust, low institutional quality equilibrium.

In further confirmation of previous results, income inequality is a significant characteristic of the trust-formal institution system. The feedback effect appears to be conditional on the inclusion of income inequality as a feature of the system. When taking income inequality out of the trust equation, the indirect effects between trust and governance are rendered insignificant, weakening the link. Results are mostly robust to removal of outliers.

Table 20 and Table 21 present results with outliers removed using the two principal methods employed throughout this chapter. Please note that these tables have been abbreviated and only show coefficient estimates and t-values for variables of interest; however, the equation specifications are exactly the same for Table 18, Table 20, and Table 21. This abbreviated format is used going forward for results tables taken from samples where outliers have been excluded. Appendix 4.6 and 4.7 include information about the 10 countries removed as part of the LTS procedure. Due to the simultaneous equation approach, the set of countries identified as outliers varied depending on whether LTS was run on the trust equation or the governance equation. Instead of removing all 18 countries, nearly 20% of the sample, the largest 5 outliers from each LTS specification were removed for a total of 10 countries. There were no formal criteria related to the decision to remove 10 countries. The removal of 10 represents a compromise between the roughly 5-7 countries removed as part of LTS in the previous stages of analysis as compared to the 18 total countries identified as outliers at this current stage.

Table 20: Non-Recursive Simultaneous Model Results - Trust:Institutions w/o Outliers (CV-Radius)

Equation	**1**	**1**	**1**		**2**	**2**	**2**
Estimator:	FIML	3SLS	GMM	Estimator:	FIML	3SLS	GMM
Dependent Variable:	Trust	Trust	Trust		WB 1996	WB 1996	WB 1996
Gini Income	-0.333***	-0.319**	-0.261***	Ethnic	-0.004	-0.005	-0.004*
	(-3.27)	(-2.55)	(-2.47)		(-1.47)	(-1.26)	(-1.81)
WB Gov. Index	5.674***	5.441**	6.159***	Trust	0.049***	0.042***	0.043***
	(3.01)	(2.47)	(3.33)		(4.08)	(4.74)	(5.74)
Mean, D.V.		26.27		Mean, D.V.		0.21	
Sargan/Hansen	2.60	2.87	10.03	Sargan/Hansen	7.34	7.82	10.03
Test of Inst. (p)		0.0001		Test of Inst. (p)		0.0001	
RMSEA	0.000			RMSEA	0.000		
Shapiro-Wilk (p)	0.28			Shapiro-Wilk (p)	0.001		

***p<.01,**p<.05,*p<.10; N=91; 3SLS t-statistics calculated using a heteroskedasticity consistent covariance matrix; Note: the table is condensed and only includes variables of interest.

Table 21: Non-Recursive Simultaneous Model Results - Trust:Institutions w/o Outliers (LTS)

Equation	**1**	**1**	**1**		**2**	**2**	**2**
Estimator:	FIML	3SLS	GMM	Estimator:	FIML	3SLS	GMM
Dependent Variable:	Trust	Trust	Trust		WB 1996	WB 1996	WB 1996
Gini Income	-0.315***	-0.305***	-0.282***	Ethnic	-0.004*	-0.004	-0.004**
	(-3.12)	(-2.86)	(-2.80)		(-1.85)	(-1.31)	(-1.91)
WB Gov. Index	5.589***	5.425***	4.978***	Trust	0.057***	0.049***	0.050***
	(3.38)	(2.94)	(3.17)		(4.08)	(3.90)	(4.05)
Mean, D.V.		24.61		Mean, D.V.		0.13	
Sargan/Hansen	2.54	2.54	8.36	Sargan/Hansen	4.57	4.57	8.36
Test of Inst. (p)		<0.0001		Test of Inst. (p)		<0.0001	
RMSEA	0.06			RMSEA	0.06		
Shapiro-Wilk (p)	0.11			Shapiro-WIlk (p)	0.69		

***p<.01,**p<.05,*p<.10; N=95; 3SLS t-statistics calculated using a heteroskedasticity consistent covariance matrix; Note: the table is condensed and only includes variables of interest.

Removal of outliers results in an increase in the effect of governance on trust, both in terms of significance and in magnitude in Table 20 and Table 21. The higher total effect of governance on trust, a result of the feedback, turns significant in both instances of removing outliers (Table 22 and Table 23). The total effect from trust to governance remains significant with outlier removal, as well. Income inequality maintains its prominent role in the system.

Ethnic fractionalization has a negative and significant effect on governance in the full sample and is robust to removing outliers identified through LTS. In the LTS specification, ethnic fractionalization has a negative, indirect effect on trust. Overall, this confirms previous results suggesting that the effect of ethnic fractionalization on trust is a function of the lower institutional quality resulting in the presence of high levels of ethnic fractionalization unless the LTS sample is used. This contradicts results from the previous section suggesting that colonization has an effect on trust independent of governance. If this were the case, we would expect to see a large and significant indirect effect of colonization and the same for the interaction term between colonization and population density on governance. It is possible that the effect is not observable due to the specification, which leaves out a few controls in order to meet the identification and instrument validity requirements of these particular estimators.

On a final note, colonization and population density do not exhibit an indirect effect on trust unless the LTS sample is used. This contradicts results from the previous section suggesting that colonization has an effect on trust independent of governance. If this were the case, we would expect to see a large and significant indirect effect of colonization on trust in the full sample.

Table 22: Non-Recursive Simultaneous Model Results - Trust:Institutions w/o Outliers (CV-Radius) , Direct Effects

D.V:	Trust			WB Governance		
Effect:	Direct	Indirect	Total	Direct	Indirect	Total
Trust				0.049***	0.019	0.067***
				(4.08)	(1.22)	(2.58)
WB Governance	5.674***	2.162	7.835**			
	(2.33)	(1.08)	(2.05)			
Ethnic				-0.004	-0.002	-0.006
				(-1.48)	(-1.29)	(-1.54)
Gini Income	-0.333***	-0.127**	-0.460***		-0.022***	
	(-3.27)	(-2.08)	(-4.35)		(-3.19)	

***p<.01,**p<.05,*p<.10; t-statistics in parentheses

Table 23: Non-Recursive Simultaneous Model Results - Trust:Institutions w/o Outliers (LTS) , Direct Effects

D.V:	Trust			WB Governance		
Effect:	Direct	Indirect	Total	Direct	Indirect	Total
Trust		0.462*		0.057***	0.026	0.083**
		(1.70)		(4.08)	(1.29)	(2.53)
WB Governance	5.590***	2.581	8.170**		0.462*	
	(3.38)	(1.19)	(2.18)		(1.70)	
Ethnic				-0.004*	-0.002	-0.006**
				(-1.85)	(-1.53)	(-1.96)
Gini Income	-0.315***	-0.145**	-0.460***		-0.026***	
	(-3.12)	(-2.42)	(-4.51)		(-3.66)	
Colony		-3.085*		-0.373**	-0.200*	-0.573**
		(-1.91)		(-1.99)	(-1.72)	(-2.35)
Colony x Density		-0.165**		-0.200***	-0.107**	-0.307***
		(-2.35)		(-2.80)	(-2.00)	(-3.75)

***p<.01,**p<.05,*p<.10; t-statistics in parentheses

5.5 GDP Growth and Trust

The preceding material laid the foundation necessary to establish a model that relates trust to economic development. In this case, long-term GDP growth (% annual, per capita, PPP, constant 2005

prices) is used as a proxy for development. While some might argue against economic growth being the most important determinant of development, one would be hard pressed to not include growth as one of several critical determinants affecting development.

Table 24 is the base model, regressing 1970-2009 GDP growth (% annual, per capita, PPP, constant 2005 prices) on the earliest values of trust for a sample of 92-94 countries. Using an OLS estimator in equation 1, trust does not appear to be related to economic growth. Much of the model's explanatory power stems from significant relationships between an initial GDP (per capita, PPP, constant 2005 prices) convergence variable and a control for education, a Barro-Lee 15+ educational attainment variable. The GDP (per capita, PPP, constant 2005 prices) and education variables have the expected negative and positive signs, respectively. Price of investment goods, a variable meant to capture investment as a determinant of growth, is not significant but has the expected negative sign.

Using the more consistent IV estimator paints a different picture. Equations 2 – 8, use 2SLS with Gini income as an instrument for trust in each of the equations. A second instrument in the form of one of the religious composition or fractionalization variables is used as well. All of the instrument combinations pass a joint significance test indicating religious composition, fractionalization, and income inequality are valid instruments for trust. In every instance where the model is overidentified, trust is significantly and positively related to economic growth. Magnitudes of the trust coefficients range from .08 to .14. According to the results, moving from the 25^{th} percentile to the 50^{th} percentile of trust (11%) translates into an annual increase in economic growth between .88 – 1.54%. As a comparison, a corresponding move in educational attainment (1.78 years) is associated with a .49-.61% annual increase in GDP growth (annual %, per capita, PPP, constant 2005 prices).

Based on results attained in the chapter, we know that trust and governance have an interdependent relationship. Given this is the case, a more effective way to model the

Table 24: GDP Growth (Annual %, 1970-2009, PPP, Constant 2005 Prices, Per Capita) Results

Equation	1	2	3	4	5	6	7	8
N	94	92	92	92	92	93	93	93
Instrument:	N/A	Gini/Catholic	Gini/Muslim	Gini/Orthodox	Gini/Protestant	Gini/Ethnic	Gini/Linguistic	Gini/Religious
Constant	1.214***	-0.141	-1.047	-0.524	1.058*	-1.496	-1.716	-1.204
	(3.25)	(-0.20)	(-0.64)	(-0.42)	(1.95)	(-0.77)	(-0.85)	(-0.88)
GDP (000s, 1970, PPP, Constant 2005 Prices, Per Capita)	-0.087***	-0.200***	-0.250***	-0.221***	-0.134***	-0.277**	-0.289**	-0.261***
	(-3.34)	(-3.33)	(-2.67)	(-2.94)	(-2.85)	(-2.47)	(-2.47)	(-2.88)
Education	0.275***	0.335***	0.327**	0.331***	0.345***	0.332**	0.330**	0.335**
	(3.89)	(3.43)	(2.58)	(3.06)	(4.63)	(2.36)	(2.23)	(2.60)
Price of Investment Goods	-0.004	-0.004	-0.004	-0.004	-0.005	-0.005	-0.005	-0.005*
	(-1.52)	(-1.64)	(-1.61)	(-1.64)	(-1.54)	(-1.64)	(-1.61)	(-1.68)
Trust	0.015	0.080**	0.126	0.099*	0.020	0.148	0.159*	0.134**
	(0.95)	(2.39)	(1.61)	(1.79)	(0.89)	(1.63)	(1.70)	(2.22)
R-square	0.21	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mean, D.V.	1.96	1.99	1.99	1.99	1.99	2.01	2.01	2.01
Sargan	N/A	3.87	3.99	3.60	10.19	6.05	1.70	1.19

***p<.01,**p<.05,*p<.10; t-statistics in parentheses are white-corrected

relationship between trust and growth is using a simultaneous equation specification with separate equations for trust, governance, and growth in GDP (% annual, per capita, PPP, constant 2005 prices). Trust and governance are included on both the left-hand side and right-hand side of their respective equations, consistent with the feedback effect existing between the two variables. Concurrently, governance and trust are included as independent variables in the GDP growth (% annual, per capita, PPP, constant 2005 prices) equation. As was done in the previous section, three different estimators were tested, FIML, 3SLS, and GMM for comparison purposes.

Parameter estimates in Table 25 varied depending on the estimator used. It is difficult to determine what might be the cause of these differences. When comparing 3SLS and GMM, the results are fairly similar. In the event that errors are clustered, perhaps due to regional similarities, GMM would be more efficient. While tests seem to indicate that the residuals in the system are normally distributed, FIML is sensitive to non-normality, and a violation of this condition might drive differing results. An omitted variable such as GDP (per capita, PPP, constant 2005 prices), hypothesized by the conceptual model to be a determinant of both trust and governance, could bias estimates differently depending on the method of estimation.

In any case, the principal source responsible for the variation in parameter estimates across estimation methods is unknown. Fortunately, the effects for variables of interest are similar across methods. In cases where they vary, the reliability of the estimates diminishes and will be taken into consideration in the discussion that follows.

Table 25 has results based on the above described specification. Consistent with results attained to this point, trust and governance are positively and significantly related to one another. When including growth as part of the system, trust appears to have a stronger effect on governance

Table 25: Simultaneous Equation Model Results: GDP Growth 1970-2009, n=89

Equation	**1**	**1**	**1**		**2**	**2**	**2**		**3**	**3**	**3**
Estimator:	FIML	3SLS	GMM	Estimator:	FIML	3SLS	GMM	Estimator:	FIML	3SLS	GMM
Dependent Variable:	Growth	Growth	Growth		FH 1973	FH 1973	FH 1973		Trust	Trust	Trust
Constant	-2.828**	-6.198**	-4.385***	Constant	8.818***	9.850***	8.956***	Constant	55.431***	50.340***	55.573***
	(-1.19)	(-2.70)	(-3.18)		(7.03)	(4.38)	(10.37)		(9.21)	(7.72)	(12.61)
GDP / cap (000s)	-0.127***	-0.151	-0.094	Socialist	1.969***	0.597	1.247***	Gini Income	-0.423***	-0.115	-0.295***
	(-3.14)	(-0.73)	(-1.53)		(2.90)	(0.38)	(-1.05)		(-2.82)	(-0.68)	(-3.51)
Education	0.274***	0.297	0.255***	Colony	-0.913	-0.377	-0.401	Linguistic	-0.058**	-0.017	-0.001
	(3.27)	(1.43)	(3.74)		(-1.49)	(-0.21)	(-1.06)		(-2.09)	(-0.29)	(0.29)
Price of IG	-0.004**	-0.005	-0.004	Density	-0.265	-0.017	-0.014	% Orthodox	-0.084	-0.003	-0.004
	(-2.16)	(-1.65)	(-1.65)		(-1.31)	(-0.03)	(-0.12)		(-1.63)	(-0.03)	(-0.18)
Trust	0.118**	0.192*	0.134***	Colony x Density	0.586**	0.088	0.100	FH '73	-1.987*	-4.296***	-3.990***
	(2.19)	(1.98)	(2.82)		(2.21)	(0.14)	(0.76)		(-1.69)	(-3.60)	(-7.16)
FH '73	0.353	0.698*	0.604***	Trust	-0.152***	-0.203***	-0.179***				
	(1.35)	(1.71)	(4.03)		(-3.65)	(-3.88)	(-6.88)				
Mean, D.V.		1.94		Mean, D.V.		4.05		Mean, D.V.		27.62	
Sargan/Hansen	3.53/1.68		16.17	Sargan/Hansen	4.46		16.17	Sargan/Hansen	3.56		16.17
Test of Inst. (p)	<0.0001/0.059			Test of Inst. (p)		0.010		Test of Inst. (p)		<0.0001	
RMSEA	0.18			RMSEA	0.18			RMSEA	0.18		
Shapiro-Wilk (p)	0.49			Shapiro-Wilk (p)	0.10			Shapiro-Wilk(p)	0.07		

Contrary to the Shapiro-Wilk test, a Henze-Zirkler multivariate normality test indicates normally distributed residuals. ***p<.01, **p<.05,*p<.10; 3SLS t-staistics calculated using a heteroskedasticity consistent covariance matrix

than governance on trust. The trust coefficient in the governance equation ranges from -0.15 to -0.20. An 11% increase in trust, or movement from the 25th to 50th percentile, is associated with a 1.5 – 2.2 decrease in the Gastil Index measure, corresponding to a movement from "Not Free" to "Partially Free" (roughly 2 units separate the categories, "Not Free", "Partially Free", and "Free").

A decomposition of the effect of trust on governance and governance on trust is provided in Table 26. The decomposition is based on estimates using FIML. The feedback effect of trust on governance, or total effect, is statistically significant increasing to -0.22 compared to -0.15 for the direct effect alone. Judging by the effect decomposition, the effect of trust on governance appears to be stronger than the effect in the opposite direction, from governance to trust. Only the direct effect of governance on trust is statistically significant, while the indirect and total effects are not. This is consistent with the conceptual model presented earlier in the paper. Trust, or social capital, has a strong observable effect on formal institutional development; however, the strength of the effect in the opposite direction varies depending on whether a country is headed towards the "good" trust-institution equilibrium or "bad" equilibrium.

Table 26: Simultaneous Model Results: GDP Growth 1970-2009, Direct Effects (FIML)

D.V:	Trust			Gastil 1973			Growth		
Effect:	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Trust				-0.152***	-0.066	-0.218**	0.118**	-0.026	0.092*
				(-3.65)	(-1.01)	(-2.31)	(2.19)	(-0.76)	(1.85)
Gastil 1973	-1.987*	-0.862	-2.849						
	(-1.69)	(-0.70)	(-1.20)						
Linguistic	-0.059**	-0.026	-0.086***		0.013**			-0.005*	
	(-2.08)	(-1.45)	(-2.64)		(2.61)			(-1.87)	
Gini Income	-0.423***	-0.184	-0.607***		0.092***			-0.034**	
	(-2.82)	(-1.57)	(-4.49)		(4.30)			(-2.29)	

***p<.01,**p<.05,*p<.10; t-statistics in parentheses

It should be noted, that the coefficient estimates for the effect of governance on trust are one of the instances where there is substantial inconsistency across estimators. The coefficient estimate attained by FIML estimation is roughly half that generated when using 3SLS or GMM. However, this difference does not change the interpretation given in the preceding paragraph; namely, trust appears to have a greater effect on governance than vice-versa. This interpretation still holds when using parameter estimates from GMM; the effect governance has on growth is higher when estimating with GMM than those generated through FIML. A one-standard deviation change in trust (14.5%) using GMM estimates would increase governance quality by roughly 2 units, while a one-standard deviation increase in governance quality (2) would increase trust roughly 8%.

Depending on the estimator used, income inequality and linguistic diversity are negatively and significantly related to trust. Gini income is significant at the 1% level using both the GMM and FIML estimators, and is not significant when using 3SLS. When significant the magnitude of the coefficient for income inequality varies between -0.28 and -0.42. This implies that a one-standard deviation increase in income inequality in a country (std. deviation = 10) lowers trust 2.8 – 4.2%. This magnitude is not quite as strong as that of governance, but non-trivial, nonetheless.

Effect decomposition again shows that income inequality is an important component driving the relationship between trust and governance. All effects, direct, indirect, and total of income inequality on trust are significant. The total effect is -0.61, nearly 50% higher than the direct effect alone. Given the strength of significance it is not surprising to see that there also is an observable, statistically significant indirect effect of income inequality on governance. The same one-standard deviation increase in income inequality noted above, would eventually decrease societal trust by roughly 6%. Further, this initial increase in income inequality would result in a decrease in governance quality, as

measured by the Gastil Index, of roughly 0.87, mediated through the effect of income inequality on trust.

By virtue of its effect on trust and governance, income inequality also has a negative effect on growth. A one-standard deviation in income inequality lowers predicted values of annual growth .34%. An examination of pairwise elasticities of the effect of income inequality on growth reveals interesting findings.

The elasticity of income inequality on growth is dramatically different depending on whether a country was colonized, and further, the type of legal origin inherited from the colonizer. Table 27 shows how countries that have no history of colonization have a relationship between income inequality and growth that is relatively inelastic. The average inequality for those countries is -.60, implying that a 1% increase in income inequality will decrease growth by .6%.[39] Growth in countries that were colonized are more sensitive to changes in income inequality, ranging from -1.07 to -1.29 depending on legal origin. This finding is consistent with those in section 5.3, namely that income inequality affects countries differently depending on their colonial history. The implications derived from this result are discussed in further detail in the conclusion.

Returning back to Table 26, the effect of linguistic fractionalization appears to have a role when introducing economic growth into the system of equations. Granted, linguistic fractionalization is only statistically significant using the FIML estimator. However, if the reliability of the FIML estimates are to be trusted, linguistic fractionalization has a negative, significant total effect on trust, roughly 33% greater than the direct effect alone. There is also a statistically significant indirect effect of

[39] Countries with positive elasticities (i.e. income inequality increases growth) and elasticities less than -10 have been removed from the averages. Those elasticities are driven by the fact those countries had long-term growth rates near 0% or negative. Leaving in those values result in erroneous predictions, e.g. it is unlikely that countries with negative or no-growth will have their growth respond positively to increases in income inequality.

Table 27: Elasticity of Gini Income on Growth, by Colony and Legal Origin

colony = 0		French Legal Origin colony = 1		English Legal Origin colony = 1	
Albania	-0.41	Algeria	-1.13	Australia	-0.56
Austria	-0.45	Argentina	-1.53	Bangladesh	-0.72
Belgium	-0.56	Benin	-2.23	Botswana	-0.38
Bulgaria	-0.30	Bolivia	-2.45	Canada	-0.61
Cambodia	-1.14	Brazil	-1.03	Ghana	-1.99
China	-0.18	Burkina Faso	-1.30	India	-0.37
Denmark	-0.50	Chile	-0.73	Kenya	-3.63
Finland	-0.42	Colombia	-0.84	Lesotho	-0.87
France	-0.64	Costa Rica	-1.15	Malawi	6.44
Germany	-0.54	Dominican Republic	-0.54	Malaysia	-0.35
Greece	-0.56	Ecuador	-1.06	Namibia	-16.83
Hungary	-0.45	Egypt	-0.31	New Zealand	-0.89
Iceland	-0.34	El Salvador	-1.57	Nigeria	-1.55
Iran	-3.23	Ethiopia	-1.11	Singapore	-0.28
Iraq	2.80	Guatemala	-1.65	South Africa	-2.19
Ireland	-0.38	Honduras	-1.70	Sri Lanka	-0.40
Israel	-0.71	Indonesia	-0.32	Tanzania	-0.73
Italy	-0.72	Madagascar	2.54	Uganda	-1.64
Japan	-0.42	Mali	-0.76	United States	-0.77
Jordan	-0.94	Mexico	-1.14	Zambia	2.50
South Korea	-0.19	Morocco	-0.66	Zimbabwe	0.78
Luxembourg	-0.31	Mozambique	-0.99		
Malta	-0.23	Nicaragua	1.38		
Mongolia	-0.54	Panama	-0.66		
Netherlands	-0.54	Paraguay	-1.27		
Norway	-0.32	Peru	-1.89		
Poland	-0.44	Philippines	-1.00		
Portugal	-0.52	Rwanda	-2.45		
Romania	-0.36	Senegal	-3.45		
Spain	-0.54	Uruguay	-0.71		
Sweden	-0.54	Venezuela	-30.96		
Switzerland	-1.05				
Thailand	-0.35				
Turkey	-0.69				
United Kingdom	-0.63				
Avg. (w/o Iraq):	-0.59	Avg. (w/o Madagascar, Nicaragua, Venezuela):	-1.27	Avg. (w/o Malawi, Namibia, Zambia, Zimbabwe):	-1.07

fractionalization on governance, through its effect on trust. A one-standard deviation increase in fractionalization (s.d. = 29.4) is associated with a relatively mild decrease on trust and governance,

respectively, of 2.5 % and 0.38. Linguistic fractionalization also has a statistically significant indirect effect on growth, however the size of the effect is small. A one-standard deviation increase in linguistic fractionalization would result in an annual decrease in growth of .15%

Regardless of estimator, trust appears to be significantly related to economic growth. Zak and Knack (2001) reported trust coefficients ranging from .043 - .062 in their trust regressions and in every case the coefficients were statistically significant. For the most part, the trust coefficients attained in table 24 and table 25 are clearly much higher than those attained by Zak and Knack. A one-standard deviation increase in trust using results in Table 25, is associated with an annual increase in economic growth ranging from 1.7% to 2.8%. In contrast, Zak and Knack's results imply a .6% to .9% annual increase in economic growth. A 1.7% annual increase in growth would be substantial. Over 40 years a country's per capita income nearly doubles. An addition to annual growth of 2.8% would move a country from low middle-income status to high-income status in just 40 years.

The sensitivity of economic growth to trust seems overstated compared to those attained by Zak and Knack (2001) and also to what seems reasonably possible. The conceptual model used to describe the empirical model does not give guidance with regards to expectations of the magnitude of the effect of trust on growth. Based on the theoretical literature, one might expect the effect of trust to be mediated through variables or activities that necessitate higher levels of societal cooperation. Governance fits neatly into this category.

The governance coefficient is significantly related to growth when estimating by GMM or 3SLS, however the direction of influence is opposite of that expected. As quality of governance increases, growth decreases according to these estimates. Theoretically, there is reason to believe that governance is positively related to growth; anecdotally, the evidence seems mixed. While not modeled here, it is possible that at low levels of income, governance is not a factor in economic growth.

However, it is possible that sustained growth from a higher base of income is dependent on good governance. Perhaps, the "middle income trap" could be partially explained by the inability of countries to improve governance quality. The estimates are likely driven by the fact that a handful of Asian countries exhibited strong economic growth over the sample frame, despite low governance quality, led by China. However, when excluding outliers that include China (Table 28 and Table 29) the Gastil Index continues to be positively related to growth.

Table 28: Simultaneous Model Results: GDP Growth 1970-2009 w/o Outliers (CV-Radius)

Equation	**1**		**2**		**3**
D.V.:	Growth		FH 1973		Trust
Trust	0.119**	Colony	-1.169**	Gini Income	-0.268***
	(2.16)		(-2.21)		(-3.17)
FH '73	0.410***	Colony x Density	0.591***	Linguistic	-0.002
	(4.84)		(3.46)		(-0.13)
		Trust	-0.133***	FH '73	-4.817***
			(-8.23)		(-8.34)
Mean D.V:	1.80		3.74		26.79

N=75, Estimator=GMM, Hansen-J = 19.45, ***p<.01,**p<.05,*p<.1; t-statistics in parentheses; Note: the table is abbreviated and only includes variables of interest.

Table 29: Simultaneous Model Results: GDP Growth 1970-2009 w/o Outliers (LTS)

Equation	**1**		**2**		**3**
D.V.:	Growth		FH 1973		Trust
Trust	0.095**	Socialist	1.157***	Gini Income	-0.302***
	(2.53)		(4.24)		(-3.89)
FH '73	0.338***	Trust	-0.153***	FH '73	-4.565***
	(2.98)		(-8.86)		(-8.93)
Mean D.V:	1.80		3.98		27.56

N=84, Estimator=GMM, Hansen-J = 19.01, ***p<.01,**p<.05,*p<.10; ; t-statistics in parenthesis; Note: the table is abbreviated and only includes variables of interest.

Removing outliers, as seen in abbreviated results presented in Table 28 and Table 29, confirms all important results attained in Table 25. Table 28 removes high-CV, low-radius countries while Table 29 removes outliers identified by LTS. The LTS procedure was run for the specification, with resulting outlier countries shown in Appendix 4.8. Countries with the five highest standardized residuals were removed. For Table 28 and Table 29, only results using GMM are presented because the model failed Sargan overidentification and residual normality tests, severely diminishing the reliability of estimates attained using 3SLS and GMM.

In summary, results stemming from the empirical analysis were largely consistent with the conceptual model. For one, trust does appear to have a discernible and positive effect on economic growth. The magnitude of the effect of trust on growth is even greater than that attained in previous studies. According to results attained in this section, a one-standard deviation increase in trust could stimulate growth that would move a country from low-income status to high-income status in just 40 years. These results were robust to the exclusion of countries with substantial variation in trust across time, countries with low trust radiuses, and also, the exclusion of statistical outliers. Importantly, the study was expanded to include an expanded set of countries compared to previous studies, more representative of the world at large.

The establishment of an empirical relationship between trust and governance, consistent with the conceptual model, is an equally important contribution to existing trust literature. Where previous studies assumed governance as the principal driver of trust, empirical results attained in section 5.4 demonstrate there is a positive, interdependent relationship between trust and governance. The nature of the relationship, whereby a decrease in one results in amplified decreases in the other, infers the potential existence of a trust-governance trap. The treatment of the relationship as a non-recursive

simultaneous system of structural equations is a unique, and constructive, departure from previous econometric models in empirical studies involving trust and governance.

Income inequality and fractionalization were also shown to play important, intermediary roles in determining trust, governance, and ultimately, growth. High levels of social diversity, particularly ethnic, drive lower quality governance which results in lower trust and lower economic growth. An alternative measure of social diversity, namely income inequality, acts as a drag on societal trust, which ultimately manifests in lower quality governance and growth.

Finally, European colonization also played an important role in determining trust, governance, and economic growth. The legacy of European colonization was to establish a path for those countries that were colonized which resulted in high-quality institutions, high trust, and robust levels of economic growth, or conversely, low levels of all of these respective factors. As an extension of empirical work done by Acemoglu, Johnson, and Robinson (2002), colonization and high, historical population densities were shown to have a negative influence on current formal institutions. These lower institutional quality levels were then reflected in lower trust levels.

Chapter 6: Conclusion

The conceptual and empirical models presented in this thesis contribute to an existing body of literature related to societal trust and how trust contributes to higher quality governance, and ultimately, higher levels of economic growth. The conceptual underpinnings and empirical results related to the association of trust and governance in this thesis are novel and further the understanding of how trust, as a proxy for cooperation within civil society, reinforces formal institutional quality. An improvement is also made in our understanding of how income inequality and social diversity impact development, through civil society (i.e. trust), governance, and economic growth. Modeling governance, growth, and trust as a system confirms the findings of Zak and Knack (2001) that trust is an important determinant of economic growth. The robustness of these results are improved through the use of a larger sample, 89 countries, better representative of the global distribution of trust, governance, growth, and other characteristics of interest to this study.

The conceptual model used in the thesis was adapted from Greif (2008) and North (1994), incorporating the role of informal institutions as a determinant of both formal institutions and economic growth. When society is able to build and maintain a sufficient level of trust, this enables the creation of formal institutions that lay the foundation for sustained economic growth. Good governance has a positive, reinforcing effect on societal trust pushing society into a favorable equilibrium whereby high societal trust and good quality governance leads to high levels of economic growth. Countries can also be stuck in a low-trust trap, whereby low societal trust can lead to poor formal institutional quality, and ultimately, unfavorable economic outcomes.

A key empirical finding is that this strong link between formal institutions and informal institutions (i.e. trust) exists. Trust and governance quality, when modeled as a system, are positively and strongly associated with one another. This is contrary to suppositions made in previous empirical

literature, Hobbesian in nature, assuming that government policy (i.e. governance) is primarily responsible for laying the foundation for high societal trust. The effect of trust on governance was found to be stronger than vice-versa, with governance providing a positive, but smaller, reinforcement effect on trust. While the distinction may seem irrelevant, it has important policy implications. "State building", defined as the creation and support of formal institutions by an external party, is assumed to be a critical function of modern development agencies, both bilateral (e.g. USAID, U.S. State Dept.) and multilateral (e.g. World Bank, UNDP). The conceptual model and empirical results in this paper call into question the role external state building has in economic development. The focus should be not in building better top-down governance to support stronger societal cohesiveness, rather efforts should be focused on promoting activities that encourage cooperation within and across communities, empowering society to craft formal institutions that make sense for them and reinforcing societal trust.

A good place to start would be with activities that bridge barriers posed by ethnic, linguistic, and religious differences. High levels of income inequality also act as a constraint on achieving high levels of societal trust and consequent high levels of formal institutional quality. A typical solution proposed for these problems is to start by dictating the recognition of civil liberties, religious freedom, and social justice (i.e. income redistribution) directly into the rule of law and government policy. However, if societal participants have no experience with this policy, and worse yet disagree with it, these principles will not be internalized. Without those in society truly believing that civil rights, religious freedom and poverty alleviation are important, the costs of enforcement will be too high leading to no improvements where improvement is sought.

The role European colonization had in determining societal trust and governance quality (Section 5.3) provides further clues related to efficient means of promoting economic development. One way to promote higher levels of economic development is to not colonize countries. This may sound tongue-in-cheek, however a Harvard economic historian (Ferguson 2004) proposed this as

recently as 2004 as a potential economic development solution. A better way to state this would be: external parties imposing formal institutions by force is not an effective way of promoting development. Societal trust in those countries that were colonized is negatively affected and more sensitive to linguistic diversity, religious diversity, and income inequality. Lower societal trust, according to these empirical results, lowers the quality of governance and the sustainable rate of economic growth.

Military intervention, under the guise of development, is a common practice of Western governments, particularly the United States. One might think that the extensive documentation of the negative effects of colonization might deter modern policy makers from engaging in this form of "development". However, history does repeat itself. Global regime change in the name of development has been an activity in which the United States has been actively involved in for the better part of two centuries, initiating with the Monroe Doctrine and accelerating with the Roosevelt Corollary and the Cold War. Effectuating a change in institutions through military conflict tends to upset the social structure in unpredicted and unanticipated ways. One needs to look no farther than recent efforts made by the West, to encourage the "Arab Spring". It is far from clear whether Egypt, Libya, Tunisia, Iraq, Afghanistan, and/or Syria will be able to create and maintain formal institutions that encourage sustained economic growth. On the other hand, sectarian violence across religion and ethnicity, in many cases relatively mild prior to intervention, is escalating in those countries acting as a barrier to increased societal trust.

Religious diversity actually promotes higher trust in countries that were not colonized. As religion is an individual (or familial) characteristic that is flexible (in comparison to ethnicity and/or a person's native language), religious fractionalization likely acts as a proxy for religious freedom. The historic, external imposition of formal institutions on a society (i.e. colonization) acts as a barrier to religious freedom promoting lower societal trust and in turn, worse governance.

According to these results, income inequality drives lower trust. The effect of income inequality on trust also manifests in lower quality governance and lower economic growth. Trust in countries that were colonized are sensitive to changes in income inequality while for countries that were not colonized trust is not related to income inequality. Economic growth strategies that include the impoverished (i.e. inclusive growth or pro-poor growth) is an important goal of economic development practitioners. This is an effective way to stimulate economic growth as it has the added benefit of increasing societal trust which helps reinforce good governance and higher rates of economic growth. Many of the interesting results attained during the course of this study were driven by the relationship between income inequality and trust. However, it is far from clear that the relationship between income inequality and trust is truly endogenous. The potential endogenous relationship between trust and income inequality would be an interesting area of further research.

Societal trust has a strong, direct, positive effect on economic growth. Small increases in societal trust can result in a meaningful increase in rates of economic growth. Informal norms propagated by religion, and ultimately through the household, were shown to have a strong influence on trust. Learning to cooperate, the tolerance of other cultures, religions, ideas, and ultimately, the internalization of behavior that leads to wide-radius trust starts from an early age in the household (Platteau 1994b). Even when viewed as a potential, favorable change it is difficult to enact policy that will modify societal behavior developed over generations. An efficient means of allowing for positive, institutional change is to empower individuals to make the compromises necessary to craft formal institutions that suit the unique needs of their community. This can be done through investment in education, the encouragement of participation in civil society, and through freedom of religious association – activities that enable members of a community to engage in informed discourse and build informal networks that cross ethnic, linguistic, and religious lines.

As is typical with research of this nature, more questions were generated than answered. Empirical work was conducted, but not included in this thesis, where the model was extended to include feedback effects from income to both governance and trust. Additional controls for geography and natural resource wealth were also tested. While there was evidence of a feedback effect from income to both trust and governance, the results varied dramatically depending on the estimator used. Further research in this area would further the development of a fully specified empirical model stemming from the conceptual model.

Advancements have been made in the surveys sampled for this study, incorporating questions related to trust in familiars and trust in individuals of differing ethnicities, religions, and other social characteristics. It will soon be possible to create a large sample of trust, more indicative of the wide-radius trust hypothesized to be related to economic development. This would be a significant step towards accurately estimating the relationship between trust and other development indicators. Additional surveys may also provide the scale of data necessary to extrapolate trust values into a panel format. Panel estimation might better capture the dynamic nature of the relationship between trust, governance, and growth hypothesized by the conceptual model.

Economic growth is one of many variables that can be used as an indicator of economic development. Extending the model to other indicators of economic development such as prevalence of poverty, the Human Development Index (HDI), education, and nutrition might provide important insights. Trust data is currently captured as one small component of broad social surveys conducted at the household level. Examining the determinants of trust at a household level and the consequent relationship of trust with household indicators, such as expenditure, attitudes related to governance, resilience to shocks, and nutrition would be an interesting analysis.

Appendix 1: Fractionalization

When this study was initially undertaken, the key mediating variable of interest, with respect to the effect of trust on growth was fractionalization. During the course of research, the scope of the study expanded dramatically with focus shifting to the relationship between governance and trust. While fractionalization is still a key theoretical determinant in the governance-trust system, the intended emphasis on fractionalization as the principal mediator did not materialize. Nevertheless, much information was collected and processed regarding this important characteristic as a part of the research for this study. For those who may be interested, following is a more detailed explanation of how fractionalization is measured and its role as a determinant of trust.

1.1 The Measurement of Fractionalization

During the past 15 years, most economic analysis looking to use some measure of societal diversity to explain socioeconomic variables lead back to two seminal works: Easterly and Levine's (1997) study analyzing cross-country growth rate differences between Sub-Saharan Africa and East Asia and the cross-country analysis by Alesina, et al. (2003) documenting the effect of societal fragmentation on economic growth and quality of government. Following, we'll take a look at how the alternative measures were developed, discuss the benefits of the disaggregated measure advanced by Alesina, et al. (2003), and finally introduce a proposed alternative, namely, polarization.

Easterly and Levine's oft-cited measure of societal heterogeneity was drawn from a variable first constructed in 1960 by Soviet ethnographers and subsequently published in the Atlas Naradov Mira (1964). The ethnolinguistic measure (ELF) calculates the probability of two randomly drawn individuals

coming from different ethnolinguistic groups. Initially, the measure was popular with geo-linguistic scholars due to the comprehensiveness of the data and its high correlation with measures of ethnic conflict.[40] Easterly and Levine's principal finding was that ELF was negatively associated with economic growth. Of note, the strength of this finding was weakened by the research of controlling for public policy variables.

Alesina, et al. (2003) built on Easterly and Levine's (1997) findings in their seminal work on fractionalization using similar methodology. The primary improvement lies in the disaggregation of ethnicity and language. ELF relies on a subjective determination of a country's most relevant characteristic in order to discriminate between ethnicity and language. For instance, in Latin America ELF is more often calculated using racial segmentation, versus in Africa where ELF is almost exclusively measured according to linguistic differences. While in some cases a subjective determination is still necessary to determine Alesina's ethnic fractionalization variable (i.e. race, tribe, ethnic heritage), linguistic fractionalization is more objective and straightforward. Another significant contribution by Alesina was the introduction of a third religious fractionalization measure. On a final note, the disaggregation appears not to come at the expense of the breadth provided by ELF, as the ethnicity, linguistic, and religious measures are inclusive of 650, 1055, and 294 different groups respectively.

The formula used in the calculation of ELF was applied by Alesina, et al. (2003) to a different set of underlying sources[41] . Where:

$$Fractionalization_j = 1 - \sum_{i=1}^{N} s_{ij}^2 \quad \textit{Where } s_{ij} \textit{ is the share of group i in country j.}[42]$$

The main critique levied against both fractionalization measures is the potential for endogeneity bias, particularly in the case of ethnicity and religion, where group definitions can change both suddenly or

[40] The primary dataset contained 1600 languages vs. 200 used in a competing measure developed by Muller (1964).

[41] Sources include Encyclopedia Britannica, CIA, census data, among others; for full downloadable dataset and sources see: http://www.anderson.ucla.edu/faculty_pages/romain.wacziarg/downloads/fractionalization.xls.

[42] $\sum_{i=1}^{N} s_{ij}^2$ is known as the Herfindahl index.

over extended time periods. Alesina, et al. (2003) uses Somalia as an example. With the start of the civil war in 1991, the country segregated into six competing clans, whereas before the civil war the country self-identified as 85% Somali. Campos and Kuzeyev (2007) looking at data from 26 former Eastern Bloc countries between 1989-2002, argue that ethnic fractionalization has a negative effect on economic growth, however should be treated endogenously.[43]. Religious fractionalization variables are also cited by Alesina as an area vulnerable to endogeneity bias.[44] Authoritarian regimes, particularly those based on a state-religion, may discriminate against those who belong to different religious faiths. The result is an undercounting of the non-state religions due to some people being compelled to hide their religious affiliations.

A principal assumption made by those utilizing fractionalization measures is that the measures change very slowly, if at all, through time (Easterly and Levine, 1997; Alesina, et al., 2003). Most agree that it is a reasonable assumption that ethnic, religious, and linguistic cleavages are only subject to small variations over a 20-30 year time frame, however one would be remiss not to note the possibility of such variations.

An alternative measure of social heterogeneity, particularly as it relates to social conflict, is polarization. Oft-cited is one developed by Montalvo and Reynal-Querol (2005) as an adaptation of the fractionalization measure described above:

$$Polarization_j = 1 - \sum_{i=1}^{N} \left(\frac{0.5 - s_{ij}}{.5}\right)^2 s_{ij}$$ *Where s_{ij} is the share of group i in country j.*

[43] However, religion and language did not appear to change in the post-Soviet Bloc countries analyzed.

[44] They argue that it is relatively easy to change religions, while ethnicity and native language are less susceptible to change.

Polarization is interpreted as the likelihood of having two similarly sized groups facing each other within any given country. The maximum occurs with two groups in society and decreases as the number of groups increase[45].

Montalvo and Reynal-Quero argue that their polarization measure better captures the indirect effects of societal diversity on investment, civil war, and government spending relative to fractionalization measures.[46] Finally, Zak and Knack (2001) hypothesized that ethnic heterogeneity could be related to growth in a non-linear way, consistent with the polarization hypothesis. When regressing ethnic heterogeneity on trust they included a squared-term which was significant.

It is intuitive to think that competitive rent seeking may occur at its maximum where two equally sized groups in a society "face-off" against one another. However, there is an empirical problem with the measure of social distance. To mitigate this empirical problem those measuring polarization have adopted the assumption that social distance is equal between all groups.[47] Additionally, Alesina, et al. (2003) found that the polarization indices most correlated with fractionalization indices tended to be more significant in economic growth and governmental institution regressions. Further, those same polarization measures tended to give weaker results versus fractionalization measures in the same regression equations.

1.2 The Role of Fractionalization as a Determinant of Societal Trust

Empirical studies that include fractionalization, in any of the aforementioned measured forms, have principally used the measure in studies related to, primarily: (1) formal institutions and secondarily, (2) economic growth. In many cases, empirical models are run side-by-side examining the effects of fractionalization on formal institutions and economic growth. The corresponding hypothesis is

[45] See Montalvo and Reynal-Querol (2005, p.305).
[46] Like Alesina, polarization was measured along ethnic, linguistic, and religious lines.
[47] See Montalvo and Reynal-Querol (2005).

typically that societal diversity as measured by fractionalization has a strong indirect effect on economic growth, mostly by virtue of its effects on formal institutions.

Likewise, this thesis asserts that fractionalization has an indirect effect on economic development, however, alternatively conjectures the channel by which fractionalization exerts its influence is through societal trust. This is not contrary to the findings of the institutional economists, instead it can be viewed as complementary. Following is a review of three studies that examine the influence of fractionalization on levels of societal trust.

The effect of fractionalization on trust used as a dependent variable was first shown in a seminal paper by Knack and Keefer (1997) that explores the relationships between trust, civic mindedness, and group membership, as they relate to economic development. Responses to the Rosenberg question, as cited above, were drawn from the World Values Survey (1981 and 1990-1991 waves) for 29 countries and used as the basis for a dependent trust variable. Their ethnic heterogeneity variable was drawn from Sullivan (1991) and measures the percentage of a country's population represented by the largest "relevant" ethnolinguistic group, determined subjectively according to which characteristic Sullivan considered to be the defining societal differentiator. In this particular study, ethnic homogeneity was positively related to trust – for every 10% increase in homogeneity, societal trust increases 3.4%, or equivalently, a roughly 10% increase from the mean of societal trust (35.6%). Clear drawbacks of the study include the small sample size, subjectivity inherent in their ethnic heterogeneity measure, and lack of variation in the heterogeneity measure.

Zak and Knack (2001) later published an article that similarly utilized fractionalization as an explanatory variable in a regression having trust as the dependent variable. Their dependent variable was trust, as measured by the Rosenberg question, using data primarily from WVS. Three additional observations were included from Eurobarometer and a government study in New Zealand, both

modeled after the WVS. Their ethnic homogeneity measure, again from Sullivan (1991), had no linear relationship to trust, however was non-linearly related, lending support to the polarization hypothesis.

While detailed descriptive statistics for the Sullivan (1991) ethnic variable weren't provided, the measure is described as giving the country's share of its largest ethnic group.[48] Zak and Knack (2001) reference Knack and Keefer's (1997) study that used a smaller sample, which included both the Sullivan (1991) ethnic measure and WVS trust measure as his data source. The correlation of the Knack and Keefer (1997) ethnic homogeneity measure with the Alesina, et al. (2003) ethnic fractionalization measure is .865, suggesting that both social distance measures may produce similar statistical results. However, one should note that the variance of the fractionalization measure (as a percentage of its mean) is considerably higher than the homogeneity measure, and theoretically the idea of fractionalization (particularly when broadened to include language and/or religion) might be a more complete representation of social distance than that of just measuring the largest ethnic group in a country.

Finally, in an earlier empirical work published by Knack and Keefer (2003), their variable of interest was horizontal group associations. Ethnic homogeneity, as opposed to heterogeneity, was used as an explanatory variable in a cross-country trust regression of 39 countries where the trust measure is sourced from responses to the Rosenberg question from the World Values Survey (1990 and 1995). While the sign of the coefficient was positive as expected, in neither of their specifications was the variable statistically significant.

According to the authors, higher ethnic heterogeneity, all other things equal, should result in lower societal trust. They gave four reasons for why this might occur: (1) social ostracism of defectors is less likely between non-similar groups, (2) trust breeds trust, – however, social distance diminishes the

[48] Only mean and standard deviation are available.

link between trust and perceived trust, (3) heterogeneous groups are less likely to reach compromises in the resolution of collective action problems, and (4) altruism is higher in homogeneous groups. They go on to cite how higher ethnic heterogeneity has been shown both experimentally and empirically to be associated with lower level of civic cooperation, government performance, and even lower default rates in rotating credit associations.

1.3 Ethnic Fractionalization Example: Kenya, Algeria, USA

Ethnic Fractionalization

Source	Year	Country	Ethnic Group	Percentage
cia	2001	Kenya	Kikuyu	22.00
cia	2001	Kenya	Kenya Afr. Other	15.00
cia	2001	Kenya	Luhya	14.00
cia	2001	Kenya	Luo	13.00
cia	2001	Kenya	Kalenjin	12.00
cia	2001	Kenya	Kamba	11.00
cia	2001	Kenya	Kisii	6.00
cia	2001	Kenya	Meru	6.00
cia	2001	Kenya	Kenya Other	1.00
Ethnic Fractionalization:				0.8588
Total Groups:				9

Source	Year	Country	Ethnic Group	Percentage
eb	1992	Algeria	Arab	80.00
eb	1992	Algeria	Kabyle	13.00
eb	1992	Algeria	Shawia	6.00
eb	1992	Algeria	Other Berber	1.00
Ethnic Fractionalization:				0.3394
Total Groups:				4

Source	Year	Country	Ethnic Group	Percentage
census	2000	U.S.A.	White	69.132
census	2000	U.S.A.	Hispanic	12.546
census	2000	U.S.A.	Black	12.063
census	2000	U.S.A.	Asian	3.597
census	2000	U.S.A.	Other race or mixed	1.802
census	2000	U.S.A.	Native American	0.735
census	2000	U.S.A.	Pacific	0.126
Ethnic Fractionalization:				0.4901
Total Groups:				7

1.4 Linguistic Fractionalization Example: Kenya, Algeria, USA

Linguistic Fractionalization

Source	Year	Country	Language Group	Percentage
eb	2001	Kenya	Kikuyu	20.89
eb	2001	Kenya	Luhya	13.84
eb	2001	Kenya	Luo	12.75
eb	2001	Kenya	Kamba	11.27
eb	2001	Kenya	Kalenjin	10.77
eb	2001	Kenya	Gusil (Kisii)	6.16
eb	2001	Kenya	Meru	5.47
eb	2001	Kenya	Nyika (Mijikenda)	4.78
eb	2001	Kenya	Kenya Other	2.24
eb	2001	Kenya	Masai	1.58
eb	2001	Kenya	Turkana	1.35
eb	2001	Kenya	Embu	1.19
eb	2001	Kenya	Somali	1.02
eb	2001	Kenya	Taita	0.99
Linguistic Fractionalization:				0.8860
Total Groups:				30

Source	Year	Country	Language Group	Percentage
eb	2001	Algeria	Arabic	71.88
eb	2001	Algeria	Berber	11.71
eb	2001	Algeria	French	16.41
Linguistic Fractionalization:				0.4427
Total Groups:				3

Source	Year	Country	Language Group	Percentage
eb	2001	U.S.A.	English	86.18
eb	2001	U.S.A.	Spanish	7.52
eb	2001	U.S.A.	French	0.74
eb	2001	U.S.A.	German	0.67
eb	2001	U.S.A.	Italian	0.57
Linguistic Fractionalization:				0.2514
Total Groups:				51

1.5 Religious Fractionalization Example: Kenya, Algeria, USA

Religious Fractionalization

Source	Year	Country	Ethnic Group	Percentage
eb	2001	Kenya	Kenyan Traditional	30.29
eb	2001	Kenya	Protestant	28.21
eb	2001	Kenya	Roman Catholic	19.55
eb	2001	Kenya	African Christian	8.21
eb	2001	Kenya	Muslim	6.00
eb	2001	Kenya	Anglican	5.60
eb	2001	Kenya	Kenyan Other	2.14
eb	2001	Kenya	Nyika (Mijikenda)	4.78
eb	2001	Kenya	Kenya Other	2.24
Religious Fractionalization:				0.7765
Total Groups:				9

Source	Year	Country	Ethnic Group	Percentage
eb	2001	Algeria	Sunni Muslim	99.54
eb	2001	Algeria	Ibadiyah Muslim	0.39
eb	2001	Algeria	Algerian Other	0.07
Religious Fractionalization:				0.0091
Total Groups:				3

Source	Year	Country	Ethnic Group	Percentage
eb	2001	U.S.A.	Independent	25.68
eb	2001	U.S.A.	Protestant	21.11
eb	2001	U.S.A.	Roman Catholic	18.96
eb	2001	U.S.A.	Christian unaffiliated	14.36
eb	2001	U.S.A.	Nonreligious	8.20
eb	2001	U.S.A.	Other Christian	3.30
eb	2001	U.S.A.	Eastern Orthodox	1.88
eb	2001	U.S.A.	Jewish	1.84
eb	2001	U.S.A.	Muslim	1.35
eb	2001	U.S.A.	Buddhist	0.80
eb	2001	U.S.A.	Anglican	0.78
eb	2001	U.S.A.	Atheist	0.38
eb	2001	U.S.A.	US Other	0.37
eb	2001	U.S.A.	Hindu	0.34
eb	2001	U.S.A.	New Religionist	0.27
Religious Fractionalization:				0.8241
Total Groups:				19

Appendix 2: Empirical Model Data Sources and Descriptive Statistics

2.1 Trust

	Time Range	Expected Sign	Source
Dependent Variable:			
Trust	1981 - 2010		See Appendix 2.1
Explanatory Variables:			
GDP per capita ('000)	1970,1995	(+)/(-)	Heston, Summers, and Aten
Schooling Attainment	1970,1995	(+)	Barro-Lee
World Bank Governance	1996,2005	(+)	World Bank Dev. Indicators
Gastil Index	1973,'80, '90, '95	(-)	Freedom House
Gini Income (avg.)	1993-2009	(-)	UN WIDER
Ethnic	1981-2001	(-)	Alesina, et al. (2003)
Linguistic	2001	(-)	Alesina, et al. (2003)
Religious	2001	(+)/(-)	Alesina, et al. (2003)
% Catholic	1995	(-)	World Christian Encyclopedia
% Muslim	1995	(-)	World Christian Encyclopedia
% Orthodox	1995	(-)	World Christian Encyclopedia
% Protestant	1995	(+)	World Christian Encyclopedia

2.2 Formal Institutions

	Time Range	Expected Sign(*)	Source
Dependent Variable:			
Gastil Index	1973-2009		Freedom House
World Bank Governance	1996-2005		Kaufmann, Kraay, and Mastuzzi (2009)
Explanatory Variables:			
Colony	N/A	(-)	Acemoglu, Johnson, and Robinson (2002)
Population Density	1500	(+)/(-)	Acemoglu, Johnson, and Robinson (2002)
Colony x Density	N/A	(-)	Acemoglu, Johnson, and Robinson (2002)
Socialist	N/A	(-)	La Porta, et al. (1999)
English	N/A	(+)	La Porta, et al. (1999)
French	N/A	(-)	La Porta, et al. (1999)
German	N/A	(+)/(-)	La Porta, et al. (1999)
Scandinavian	N/A	(+)/(-)	La Porta, et al. (1999)
Ethnic	1981-2001	(-)	Alesina, et al. (2003)
Linguistic	2001	(-)	Alesina, et al. (2003)
Religious	2001	(+)/(-)	Alesina, et al. (2003)
Trust	1981 - 2010	(+)	See Appendix 2.1

*Signs are with respect to the World Bank Governance Index which increases with quality of governance. Because the Gastil Index is scaled such that the index increases as governance quality decreases, all expected signs should be reversed for the Gastil Index as a dependent variable.

2.3 Growth

	Theoretical Basis	Time Range	Expected Sign	Source
Dependent Variable:				
Avg. Annual Growth GDP (per capita, PPP, constant 2005 prices)	Income Growth	1993-2009		Heston, Summers, and Aten
Explanatory Variables:				
GDP (per capita, PPP, constant 2005 prices, 000s)	Income/Wealth	1970,1996	(-)	Heston, Summers, and Aten
Schooling Attainment	Income	1970,1995	(+)	Barro-Lee
Price of Investment Goods	Investment	1970,1996	(-)	Heston, Summers, and Aten
World Bank Governance	Formal Institutions	1996	(+)	Kaufmann, Kraay, and Mastuzzi (2009)
Gastil Index	Formal Institutions	1973,1995	(-)	Freedom House
Trust	Social Capital	1981-2009	(+)	See Appendix 2.1

2.4 Trust Descriptive Statistics (associated with Table 9)

Variable	Mean	Std Dev	N
Trust (ending)	26.27	15.23	118
GDP /cap ('000)	10.86	11.78	116
Education 1995	7.31	2.63	112
World Bank Governance Index 1996	0.17	0.91	117
Gastil 1995	4.72	1.83	118
Ethnic	40.09	24.04	118
Linguisitc	35.57	27.85	118
Religious	43.43	22.35	118
Gini Income	39.59	9.82	112
Post-Communist	0.19	0.39	118
% Catholic	34.55	37.55	117
% Muslim	17.80	30.37	117
% Orthodox	7.84	19.91	117
% Protestant	10.90	19.63	117

2.5 Growth 1970-2009 Descriptive Statistics (associated with Table 25, N=89)

Variable	Mean	Std. Dev.
Trust	27.62	14.50
Gini Income	40.98	10.10
% Orthodox	3.90	15.48
Socialist	0.11	0.32
GDP /cap 1970 ('000)	6.40	6.52
Education 1970	4.54	2.65
Price of Investment Goods	75.15	65.63
Density	1.26	1.91
Colony	0.61	0.49
Colony x Density	0.18	1.34
FH 73	4.05	2.09
Linguistic Fractionalization	34.86	29.43
Growth 1970-2009	1.94	1.50

Appendix 3: Sample Data - Trust, Governance, Growth, Fractionalization, Gini Income

3.1 Trust

Country	Beg. Source	End Source	# Obs.	Beg. Trust	End Trust	Beg. Year	End Year
Albania	WVS3	EVS4	3	27	10.6	1998	2008
Algeria	WVS4	Arab1	2	11.2	21.4	2002	2006
Argentina	WVS1	LB 2010	19	27	24.1	1984	2010
Armenia	WVS3	EVS4	2	24.7	20.5	1995	2008
Australia	WVS1	WVS5	3	47.8	46.1	1981	2005
Austria	WVS2/EVS2	EVS4	5	31.7	36.8	1990	2008
Azerbaijan	WVS3	EVS4	2	20.5	44.9	1996	2008
Bangladesh	WVS3	WVS4	2	20.9	23.5	1997	2002
Belarus	WVS2	EVS4	5	25.5	44.8	1990	2008
Belgium	WVS1/EVS1	EVS4	7	28.7	34.6	1981	2009
Benin	Afro3	Afro3	1	27.4	27.4	2005	2005
Bolivia	LB 1996	LB 2010	14	17.7	18.8	1996	2010
Bosnia and Herzegovina	WVS3	EVS4	3	28.3	26.6	1998	2008
Botswana	Afro1	Afro3	2	14.7	5.9	1999	2005
Brazil	LB 1996	LB 2010	17	6.7	10.2	1991	2010
Brunei	Asia 2004	Asia 2004	1	19.8	19.8	2005	2005
Bulgaria	WVS2/EVS2	EVS4	7	30.4	17.9	1990	2008
Burkina Faso	WVS5	WVS5	1	14.7	14.7	2007	2007
Cambodia	Asia 2004	East Asia 2	2	4.7	7.7	2004	2008
Canada	WVS1	WVS5	6	49.1	42.8	1982	2006
Cape Verde	Afro3	Afro3	1	3.4	3.4	2005	2005
Chile	WVS2	LB 2010	18	22.7	18	1990	2010
China	WVS2	East Asia 2	7	60.3	61.3	1990	2008
Colombia	LB 1996	LB 2010	16	23.1	20.5	1996	2010
Costa Rica	LB 1996	LB 2010	14	11.3	18.8	1996	2010
Croatia	WVS3	EVS4	4	25.1	19.7	1996	2008
Cyprus	WVS5	EVS4	2	9.9	9.2	2006	2008
Czech Republic	WVS2/EVS2	EVS4	6	27.4	30.1	1991	2008
Denmark	WVS1/EVS1	EVS4	7	51.3	76	1981	2008
Dominican Republic	WVS3	LB 2010	8	26.4	31.3	1996	2010
Ecuador	LB 1996	LB 2010	14	20.3	16.8	1996	2010
Egypt	WVS4	WVS5	2	37.9	18.5	2000	2008
El Salvador	LB 1996	LB 2010	15	24.6	26.4	1996	2010
Estonia	WVS2/EVS2	EVS4	6	27.6	32.6	1990	2008
Ethiopia	WVS5	WVS5	1	24.4	24.4	2007	2007
Finland	WVS2/EVS2	EVS4	7	62.7	64.7	1990	2009
France	WVS1/EVS1	EVS4	8	24	27.2	1981	2008
Georgia	WVS3	WVS5/EVS4	3	18.7	18.1	1996	2008

Country	Beg. Source	End Source	# Obs.	Beg. Trust	End Trust	Beg. Year	End Year
Germany	WVS1/EVS1	EVS4	9	30.7	38.8	1981	2008
Ghana	Afro3	Afro3	2	15.7	8.5	2005	2007
United Kingdom	WVS1/Evs1	EVS4	9	43.9	40.3	1981	2009
Greece	WVS4/EVS3	EVS4	3	23.7	21.3	1999	2008
Guatemala	LB 1996	LB 2010	15	29.7	18.9	1996	2010
Honduras	LB 1996	LB 2010	14	25.2	21.8	1996	2010
Hong Kong	East Asia 1	WVS5	2	29.6	41.1	2001	2005
Hungary	WVS1	EVS4	7	33.1	21.2	1982	2008
Iceland	WVS1	EVS4	7	41.2	51.4	1984	2009
India	WVS2	WVS5	5	35.4	23.3	1990	2006
Indonesia	WVS4	WVS5	4	51.6	42.6	2001	2006
Iran	WVS4	WVS5	2	65.3	19	2000	2005
Iraq	WVS4	WVS5	2	47.6	40.8	2004	2006
Ireland	WVS1/EVS1	EVS4	7	41.6	38.9	1981	2008
Israel	WVS4	WVS4	1	23.5	23.5	2001	2001
Italy	WVS1/EVS1	EVS4	8	25.4	30.8	1981	2009
Japan	WVS1	WVS5	8	40.8	39.1	1981	2005
Jordan	WVS4	WVS5	3	27.7	30.9	2001	2007
Kenya	Afro3	Afro3	1	9.8	9.8	2005	2005
Korea, South	WVS1	Global 2007	9	38	28.2	1982	2006
Kuwait	Arab1	Arab1	1	23.3	23.3	2006	2006
Kyrgyzstan	WVS4	WVS4	1	16.7	16.7	2003	2003
Latvia	WVS2/EVS2	EVS4	6	19	25.5	1990	2008
Laos	Asia 2004	Asia 2004	1	23.8	23.8	2004	2004
Lebanon	Global 2007	Global 2007	1	16.2	16.2	2007	2007
Lesotho	Afro1	Afro3	2	4	16.6	1999	2005
Lithuania	EVS2	EVS4	6	30.8	29.9	1990	2008
Luxembourg	WVS4/EVS3	EVS4	3	26	31.1	1999	2008
Macedonia	WVS3	EVS4	3	8.2	20.1	1998	2008
Madagascar	Afro3	Afro3	1	32.8	32.8	2005	2005
Malawi	Afro1	Afro3	2	44.8	6.9	1999	2005
Malaysia	Asia 2003	WVS5	3	9.1	8.8	2003	2006
Mali	Afro1	WVS5	3	12.8	17.5	2001	2007
Malta	WVS1/EVS1	EVS4	7	10	21.7	1983	2008
Mexico	WVS2	LB 2010	18	33.5	26.7	1990	2010
Moldova	WVS3	EVS4	4	22.2	12.5	1996	2008
Mongolia	East Asia1	East Asia 2	2	12.6	10.1	2003	2006
Morocco	EVS4	WVS5/Arab1	3	23.5	19	2001	2006
Mozambique	Afro3	Afro3	1	25.2	25.2	2005	2005
Myanmar	Asia 2003	Asia 2004	2	27.1	5.6	2003	2004

Country	Beg. Source	End Source	# Obs.	Beg. Trust	End Trust	Beg. Year	End Year
Namibia	Afro1	Afro3	2	35.1	28.2	1999	2006
Netherlands	WVS1	EVS4	8	43.6	61.7	1981	2008
New Zealand	WVS3	WVS5	2	49.1	51.2	1998	2004
Nicaragua	LB 1996	LB 2010	14	20.8	16.9	1996	2010
Nigeria	WVS2	Afro3	5	23.2	12.6	1990	2005
Norway	WVS1/EVS1	EVS4	7	60.9	75.1	1982	2008
Panama	LB 1996	LB 2010	14	24.9	21.4	1996	2010
Paraguay	LB 1996	LB 2010	14	23.6	13.8	1996	2010
Peru	WVS3/LB '96	LB 2010	17	9.8	14.5	1996	2010
Philippines	WVS3	East Asia 2	5	5.5	8.6	1996	2005
Poland	WVS2/EVS2	EVS4	7	31.8	27.6	1990	2008
Portugal	WVS2/EVS2	EVS4	5	21.4	17.2	1990	2008
Romania	WVS2/EVS2	EVS4	7	16.1	17.6	1993	2008
Russian Federation	WVS2/EVS2	EVS4	6	37.5	29.9	1991	2008
Rwanda	WVS5	WVS5	1	4.9	4.9	2007	2007
Saudi Arabia	WVS4	WVS4	1	53	53	2003	2003
Senegal	Afro3	Afro3	1	26.8	26.8	2005	2005
Serbia	WVS3	EVS4	4	30.2	18.3	1996	2008
Singapore	WVS4	East Asia 2	2	16.9	29.7	2002	2006
Slovakia	EVS2	EVS4	6	22	12.6	1991	2008
Slovenia	WVS2	EVS4	7	17.4	24.2	1990	2008
South Africa	WVS2	WVS5	6	28.3	18.8	1990	2007
Spain	WVS1/EVS1	LB 2010	21	34.4	38.3	1981	2010
Sri Lanka	Asia 2003	Asia 2003	1	11.2	11.2	2003	2003
Sweden	WVS1/EVS1	EVS4	9	56.7	70.7	1982	2009
Switzerland	WVS2	EVS4	4	43.2	55.4	1990	2008
Taiwan	WVS2	East Asia 2	4	38.2	29.3	1994	2006
Tanzania	WVS4/Afro1	Afro3	3	9	12.6	2001	2005
Thailand	East Asia 1	WVS 5	5	17.7	41.6	2002	2007
Trinidad and Tobago	WVS5	WVS5	1	3.8	3.8	2006	2006
Turkey	WVS2	EVS4	6	10	11	1990	2009
Uganda	Afro1	Afro3	3	15.9	17.3	2000	2005
Ukraine	WVS3	EVS4	5	31	28.9	1996	2008
United States	WVS1/EVS1	WVS5	7	40.5	35.8	1982	2006
Uruguay	WVS3/LB '96	LB 2010	16	33.3	30.9	1996	2010
Venezuela	WVS3/LB '96	LB 2010	16	12.7	24.1	1996	2010
Vietnam	WVS4	WVS5	5	41.1	52.1	2001	2006
Zambia	Afro1	WVS5	3	20	11.5	1999	2007
Zimbabwe	Afro1	WVS4	2	13.3	11.9	1999	2001

World Values Survey w.1 (WVS1): 1981-1984
World Values Survey w.2 (WVS2): 1989-1993
World Values Survey w.3 (WVS3): 1994-1999
World Values Survey w.4 (WVS4): 1999-2004
World Values Survey w.5 (WVS5): 2004-2008

European Values Survey w.1 (EVS1): 1981-1984
European Values Survey w.2 (EVS2): 1990-1993
European Values Survey w.3 (EVS3): 1999-2001
European Values Survey w.4 (EVS4): 2008-2009

Arabbarometer 1 (Arab1): 2006
Afrobarometer 1 (Afro1): 1999-2001
Afrobarometer 3 (Afro3): 2005-2006

Asiabarometer 2003 (Asia 2003): 2003
Asiabarometer 2004 (Asia 2004): 2004
East Asiabarometer 1 (East Asia 1): 2001-2003
East Asiabarometer 2 (East Asia 2): 2005-2008
Globalbarometer (Global): 2001-2003
Latinobarometer (LB 1996, LB '96, LB 2010): 1996-2010

3.2 Governance

	World Bank Governance Index +2.5 =Best, -2.5=Worst		Gastil Index 1=Best, 7=Worst			
Country	1996	2005	1973	1980	1990	2009
Albania	-0.75	-0.51	7	7	6.5	3
Algeria	-1.10	-0.62	6	6	4	5.5
Andorra	1.38	1.32	.	3.5	1.5	1
Argentina	0.19	-0.24	4.5	5.5	2	2
Armenia	-0.49	-0.29	.	.	.	5
Australia	1.56	1.57	1	1	1	1
Austria	1.68	1.60	1	1	1	1
Azerbaijan	-1.07	-0.85	.	.	.	5.5

	World Bank Governance Index +2.5 =Best, -2.5=Worst		Gastil Index 1=Best, 7=Worst			
Country	1996	2005	1973	1980	1990	2009
Bangladesh	-0.71	-1.11	3	3.5	5	3.5
Belarus	-0.69	-1.00	.	.	.	6.5
Belgium	1.39	1.30	1	1	1	1
Benin	-0.10	-0.37	6	6.5	5	2
Bolivia	-0.23	-0.67	4.5	6	2.5	3
Bosnia and Herzegovina	-0.58	-0.38	.	.	.	3.5
Botswana	0.69	0.78	3.5	2.5	1.5	2.5
Brazil	-0.07	-0.10	5	3.5	2.5	2
Brunei	0.69	0.39	5.5	.	.	5.5
Bulgaria	-0.23	0.22	7	7	3.5	2
Burkina Faso	-0.51	-0.35	3.5	5.5	5.5	4
Cambodia	-0.81	-0.87	5.5	7	7	5.5
Canada	1.66	1.55	1	1	1	1
Cape Verde	.	0.26	5.5	6	5	1
Chile	1.13	1.25	1.5	5.5	2	1
China	-0.42	-0.56	7	6	7	6.5
Colombia	-0.64	-0.53	2	2.5	3.5	3.5
Costa Rica	0.63	0.53	1	1	1	1
Croatia	-0.32	0.36	.	.	.	1.5
Cyprus	1.09	0.94	2.5	3	1.5	1
Czech Republic	0.87	0.87	7	6.5	2	1
Denmark	1.79	1.81	1	1	1	1
Dominican Republic	-0.23	-0.41	2.5	2.5	2.5	2
Ecuador	-0.52	-0.75	5	2	2	3
Egypt	-0.25	-0.51	6	5	4.5	5.5
El Salvador	-0.49	-0.21	2.5	5	3.5	2.5
Estonia	0.66	0.97	.	.	.	1
Ethiopia	-1.13	-1.07	5.5	7	7	5
Finland	1.76	1.91	2	2	1	1
France	1.19	1.26	1.5	1.5	1.5	1
Georgia	-1.05	-0.47	.	.	.	4
Germany	1.58	1.49	1	1.5	1.5	1
Ghana	-0.28	-0.07	6	2.5	5.5	1.5
Greece	0.69	0.73	6	1.5	1.5	1.5
Guatemala	-0.67	-0.68	2.5	6	3.5	4
Honduras	-0.72	-0.62	5	3.5	2.5	4
Hong Kong	1.03	1.45	.	3	3.5	3.5
Hungary	0.83	0.91	6	5.5	2	1
Iceland	1.48	1.83	1	1	1	1
India	-0.18	-0.18	2.5	2.5	2.5	2.5

Country	World Bank Governance Index +2.5 =Best, -2.5=Worst 1996	2005	Gastil Index 1=Best, 7=Worst 1973	1980	1990	2009
Indonesia	-0.52	-0.71	5	5	5.5	2.5
Iran	-0.80	-0.85	5.5	5	5.5	6
Iraq	-1.81	-1.75	7	6.5	7	5.5
Ireland	1.55	1.56	1.5	1	1	1
Israel	0.71	0.48	2.5	2	2	1.5
Italy	0.86	0.62	1.5	1.5	1	1.5
Japan	1.04	1.18	1.5	1	1	1.5
Jordan	-0.02	0.05	6	6	5	5.5
Kenya	-0.68	-0.72	4.5	4.5	6	4
Korea, South	0.54	0.77	5.5	5.5	2.5	1.5
Kuwait	0.27	0.27	4	5	7	4
Kyrgyzstan	-0.49	-0.99	.	.	.	5.5
Laos	-0.64	-1.19	5	7	6.5	6.5
Latvia	0.27	0.67	.	.	.	1.5
Lebanon	-0.37	-0.42	2	4	5.5	4
Lesotho	-0.24	-0.21	5.5	5	5.5	3
Lithuania	0.53	0.72	.	.	.	1
Luxembourg	1.72	1.63	1.5	1	1	1
Macedonia	-0.54	-0.41	.	.	.	3
Madagascar	-0.37	-0.17	4	6	4	5
Malawi	-0.36	-0.42	6.5	6.5	6.5	3.5
Malaysia	0.50	0.47	2.5	3.5	4.5	4
Mali	-0.41	-0.19	6.5	6.5	5.5	2.5
Malta	1.00	1.12	1.5	2.5	1	1
Mexico	-0.29	-0.11	4	3.5	4	2.5
Moldova	-0.19	-0.53	.	.	.	3.5
Mongolia	0.04	-0.13	7	7	4	2
Morocco	-0.04	-0.40	4.5	4	4	4.5
Mozambique	-0.39	-0.39	6.5	7	6	3.5
Myanmar	-1.53	-1.67	6	6.5	7	7
Namibia	0.51	0.19	5.5	5	2.5	2
Netherlands	1.80	1.65	1	1	1	1
New Zealand	1.84	1.73	1	1	1	1
Nicaragua	-0.47	-0.50	3.5	5	3	4
Nigeria	-1.17	-1.11	5	2.5	5	4.5
Norway	1.79	1.69	1	1	1	1
Pakistan	-0.80	-0.75	.	.	.	.
Panama	0.00	0.01	6.5	4	3	1.5
Paraguay	-0.65	-0.84	5	5	3.5	3
Peru	-0.31	-0.42	6	2.5	3.5	2.5

Country	World Bank Governance Index +2.5 =Best, -2.5=Worst 1996	2005	Gastil Index 1=Best, 7=Worst 1973	1980	1990	2009
Philippines	-0.06	-0.41	5	5	3	3.5
Poland	0.74	0.54	6	5	2	1
Portugal	1.33	1.15	5.5	2	1.5	1
Romania	0.01	0.01	6.5	6.5	5.5	2
Russian Federation	-0.72	-0.71	6	6.5	4.5	5.5
Rwanda	-1.45	-0.96	6.5	6	6	5.5
Saudi Arabia	-0.40	-0.33	6	6	6.5	6.5
Senegal	-0.21	-0.11	6	4	3.5	3
Singapore	1.53	1.47	5	5	4	4.5
Slovakia	0.52	0.82	.	.	.	.
Slovenia	1.14	0.94	.	.	.	1
South Africa	0.38	0.42	5.5	5.5	4.5	2
Spain	1.15	1.10	5.5	2.5	1	1
Sri Lanka	-0.38	-0.40	2.5	2.5	4.5	4
Sweden	1.73	1.68	1	1	1	1
Switzerland	1.71	1.68	1	1	1	1
Taiwan	0.81	0.90	5.5	5.5	3	1.5
Tanzania	-0.65	-0.45	6	6	5.5	3.5
Thailand	0.26	-0.03	6	3.5	2.5	4.5
Trinidad and Tobago	0.48	0.18	.	.	.	.
Turkey	-0.28	-0.02	3.5	5	3	3
Uganda	-0.71	-0.72	7	4	5.5	4.5
Ukraine	-0.61	-0.52	.	.	.	2.5
United Kingdom	1.66	1.40	1	1	1.5	1
United States	1.44	1.21	1	1	1	1
Uruguay	0.64	0.67	3.5	5	1.5	1
Venezuela	-0.62	-1.02	2	1.5	2	4.5
Vietnam	-0.41	-0.47	7	7	7	6
Zambia	-0.62	-0.58	5	5.5	5.5	3.5
Zimbabwe	-0.55	-1.57	5.5	3.5	5	6

3.3 GDP & GDP Growth

Country	GDP (per capita, PPP, constant 2005 prices) (per capita, PPP, constant 2005$, '000) 1970	Avg. Annual Growth GDP (per capita, PPP, constant 2005 prices) (%) 1970-2009
Albania	2.46	2.57
Algeria	4.02	1.06
Andorra	.	1.71
Argentina	7.81	1.10
Armenia	.	.
Australia	18.17	2.13
Austria	15.85	2.23
Azerbaijan	.	.
Bangladesh	0.79	1.46
Belarus	.	.
Belgium	15.90	2.02
Benin	0.89	0.59
Bolivia	2.78	0.80
Bosnia and Herzegovina	.	.
Botswana	1.13	5.44
Brazil	4.48	1.90
Bulgaria	2.74	3.61
Burkina	0.57	1.20
Cambodia	1.10	1.23
Canada	17.97	1.81
Cape Verde	1.36	2.66
Chile	4.55	2.52
China	0.39	7.69
Colombia	3.06	2.33
Costa Rica	6.49	1.41
Croatia	.	.
Cyprus	6.00	3.00
Czech Republic	.	.
Denmark	17.79	1.67
Dominican Republic	2.93	3.18
Ecuador	3.16	1.73
Egypt	1.33	3.42

Country	GDP (per capita, PPP, constant 2005 prices) (per capita, PPP, constant 2005$, '000) 1970	Avg. Annual Growth GDP (per capita, PPP, constant 2005 prices) (%) 1970-2009
El Salvador	4.15	1.09
Estonia	.	.
Ethiopia	0.46	1.02
Finland	13.91	2.17
France	15.68	1.75
Georgia	.	.
Germany	16.24	1.79
Ghana	0.94	0.71
Greece	12.30	2.06
Guatemala	4.05	1.13
Honduras	2.36	1.10
Hong Kong	7.03	4.30
Hungary	7.29	2.12
Iceland	14.15	2.50
India	0.89	3.38
Indonesia	0.86	4.07
Iran	8.95	0.44
Iraq	5.46	-0.38
Ireland	10.22	3.08
Israel	12.41	1.87
Italy	14.37	1.70
Japan	14.80	1.99
Jordan	2.75	1.36
Kenya	1.03	0.41
Kuwait	.	.
Kyrgyzstan	.	.
Laos	0.63	3.72
Latvia	.	.
Lebanon	17.69	-0.80
Lesotho	0.55	2.27
Lithuania	.	.
Luxembourg	22.79	3.42
Macedonia	.	.
Madagascar	0.95	-0.59
Malawi	0.72	-0.24
Malaysia	2.10	4.41

Country	GDP (per capita, PPP, constant 2005 prices) (per capita, PPP, constant 2005$, '000) 1970	Avg. Annual Growth GDP (per capita, PPP, constant 2005 prices) (%) 1970-2009
Mali	0.47	1.93
Malta	4.42	4.16
Mexico	6.35	1.57
Moldova	.	.
Mongolia	1.45	2.02
Morocco	1.48	2.08
Mozambique	0.41	1.58
Namibia	4.46	0.15
Netherlands	19.05	1.96
New Zealand	16.33	1.38
Nicaragua	3.67	-1.31
Nigeria	1.39	0.98
Norway	17.60	2.71
Panama	3.44	2.82
Paraguay	2.08	1.49
Peru	5.14	0.90
Philippines	1.57	1.52
Poland	6.06	2.58
Portugal	7.49	2.53
Romania	3.19	2.90
Russian Federation	.	.
Rwanda	0.79	0.69
Saudi Arabia	.	.
Senegal	1.28	0.40
Singapore	6.81	5.10
Slovenia	.	.
South Africa	5.28	0.93
Spain	11.98	2.17
Sri Lanka	1.12	3.33
Sweden	19.14	1.58
Switzerland	25.96	1.09
Tanzania	0.62	1.67
Thailand	1.58	4.18
Turkey	4.42	2.09
Uganda	0.82	0.88
Ukraine	.	.

Country	GDP (per capita, PPP, constant 2005 prices) (per capita, PPP, constant 2005$, '000) 1970	Avg. Annual Growth GDP (per capita, PPP, constant 2005 prices) (%) 1970-2009
United Kingdom	15.83	1.93
United States	20.48	1.80
Uruguay	4.86	2.13
Vietnam	0.57	4.24
Zambia	2.30	-0.68
Zimbabwe	0.34	-2.19

3.4 Gini Coefficient

Country	Avg. 1993-2009	No. of Obs.
Albania	31.2	5
Algeria	35.3	1
Argentina	49.5	7
Armenia	36.2	6
Australia	35.2	1
Austria	29.2	1
Azerbaijan	30.5	4
Bangladesh	30.8	3
Belarus	27.8	10
Belgium	33.0	1
Benin	38.6	1
Bolivia	58.0	3
Bosnia and Herzegovina	33.3	3
Botswana	61.0	1
Brazil	57.8	13
Bulgaria	31.8	6
Burkina Faso	45.7	3
Cambodia	41.5	3
Canada	32.6	1
Cape Verde	50.5	1
Chile	54.4	7
China	41.5	1
Colombia	57.8	7
Costa Rica	47.9	9

Country	Avg. 1993-2009	No. of Obs.
Croatia	29.9	6
Czech Republic	26.2	2
Denmark	24.7	1
Dominican Republic	50.4	7
Ecuador	54.1	6
Egypt	31.7	3
El Salvador	50.6	9
Estonia	36.2	8
Ethiopia	33.2	3
Finland	26.9	1
France	32.7	1
Georgia	38.7	10
Germany	28.3	1
Ghana	41.8	2
Greece	34.3	1
Guatemala	55.0	4
Honduras	54.7	6
Hong Kong	43.4	1
Hungary	27.9	8
India	36.8	1
Indonesia	37.9	3
Iran	41.8	3
Iraq	30.9	1
Ireland	34.3	1
Israel	39.2	1
Italy	36.0	1
Japan	24.9	1
Jordan	37.7	3
Kenya	44.1	3
Korea, South	31.6	1
Kyrgyzstan	37.1	6
Laos	34.8	3
Lesotho	57.9	3
Lithuania	33.3	8
Luxembourg	30.8	1
Macedonia	36.9	5
Madagascar	44.4	5
Malawi	44.7	2
Malaysia	45.4	4
Mali	43.2	3
Mexico	52.7	9

Country	Avg. 1993-2009	No. of Obs.
Moldova	36.7	6
Mongolia	32.3	4
Morocco	40.3	3
Mozambique	45.8	3
Namibia	74.3	1
Netherlands	30.9	1
New Zealand	36.2	1
Nicaragua	53.2	4
Nigeria	44.7	2
Norway	25.8	1
Panama	54.8	9
Paraguay	55.7	7
Peru	49.8	7
Philippines	44.7	5
Poland	33.6	10
Portugal	38.5	1
Romania	30.4	7
Russian Federation	41.0	7
Rwanda	49.9	2
Senegal	40.6	3
Serbia	28.2	1
Singapore	42.5	1
Slovakia	25.8	1
Slovenia	29.7	5
South Africa	60.3	4
Spain	34.7	1
Sri Lanka	38.9	3
Sweden	25.0	1
Switzerland	33.7	1
Tanzania	36.1	2
Thailand	42.6	6
Turkey	42.6	4
Uganda	42.6	5
Ukraine	29.6	5
United Kingdom	36.0	1
United States	40.8	1
Uruguay	44.6	8
Venezuela	46.9	8
Vietnam	37.2	6
Zambia	49.7	5
Zimbabwe	50.1	1

3.5 Fractionalization

Country	Ethnic	Linguistic	Religious
Albania	22.04	3.99	47.19
Algeria	33.94	44.27	0.91
Andorra	71.39	68.48	23.26
Argentina	25.50	6.18	22.36
Armenia	12.72	12.91	45.76
Australia	9.29	33.49	82.11
Austria	10.68	15.22	41.46
Azerbaijan	20.47	20.54	48.99
Bangladesh	4.54	9.25	20.90
Belarus	32.22	46.66	61.16
Belgium	55.54	54.09	21.27
Benin	78.72	79.05	55.44
Bolivia	73.96	22.40	20.85
Bosnia and Herzegovina	63.00	67.51	68.51
Botswana	41.02	41.10	59.86
Brazil	54.08	4.68	60.54
Brunei	54.16	34.38	44.04
Bulgaria	40.21	30.31	59.65
Burkina Faso	73.77	72.28	57.98
Cambodia	21.05	21.04	9.65
Canada	71.24	57.72	69.58
Cape Verde	41.74	0.00	7.66
Chile	18.61	18.71	38.41
China	15.38	13.27	66.43
Colombia	60.14	1.93	14.78
Costa Rica	23.68	4.89	24.10
Croatia	36.90	7.63	44.47
Cyprus	9.39	39.62	39.62
Czech Republic	32.22	32.33	65.91
Denmark	8.19	10.49	23.33
Dominican Republic	42.94	3.95	31.18
Ecuador	65.50	13.08	14.17
Egypt	18.36	2.37	19.79
El Salvador	19.78	0.00	35.59
Estonia	50.62	49.44	49.85

Country	Ethnic	Linguistic	Religious
Ethiopia	72.35	80.73	62.49
Finland	13.15	14.12	25.31
France	10.32	12.21	40.29
Georgia	49.23	47.49	65.43
Germany	16.82	16.42	65.71
Ghana	67.33	67.31	79.87
Greece	15.76	3.00	15.30
Guatemala	51.22	45.86	37.53
Honduras	18.67	5.53	23.57
Hong Kong	6.20	21.28	41.91
Hungary	15.22	2.97	52.44
Iceland	7.98	8.20	19.13
India	41.82	80.69	32.60
Indonesia	73.51	76.80	23.40
Iran	66.84	74.62	11.52
Iraq	36.89	36.94	48.44
Ireland	12.06	3.12	15.50
Israel	34.36	55.25	34.69
Italy	11.45	11.47	30.27
Japan	1.19	1.78	54.06
Jordan	59.26	3.96	6.59
Kenya	85.88	88.60	77.65
Korea, South	0.20	0.21	66.04
Kuwait	66.04	34.44	67.45
Kyrgyzstan	67.52	59.49	44.70
Laos	51.39	63.82	54.53
Latvia	58.67	57.95	55.56
Lebanon	13.14	13.12	78.86
Lesotho	25.50	25.43	72.11
Lithuania	32.23	32.19	41.41
Luxembourg	53.02	64.40	9.11
Macedonia	50.23	50.21	58.99
Madagascar	87.91	2.04	51.91
Malawi	67.44	60.23	81.92
Malaysia	58.80	59.70	66.57
Mali	69.06	83.88	18.20
Malta	4.14	9.07	12.23
Mexico	54.18	15.11	17.96
Moldova	55.35	55.33	56.03
Mongolia	36.82	37.34	7.99
Morocco	48.41	46.83	0.35
Mozambique	69.32	81.25	67.59

Country	Ethnic	Linguistic	Religious
Myanmar	50.62	50.72	19.74
Namibia	63.29	70.05	66.26
Netherlands	10.54	51.43	72.22
New Zealand	39.69	16.57	81.10
Nicaragua	48.44	4.73	42.90
Nigeria	85.05	85.03	74.21
Norway	5.86	6.73	20.48
Pakistan	70.98	71.90	38.48
Panama	55.28	38.73	33.38
Paraguay	16.89	59.75	21.23
Peru	65.66	33.58	19.88
Philippines	23.85	83.60	30.56
Poland	11.83	4.68	17.12
Portugal	4.68	1.98	14.38
Romania	30.69	17.23	23.73
Russian Federation	24.52	24.85	43.98
Rwanda	32.38	0.00	50.66
Saudi Arabia	18.00	9.49	12.70
Senegal	69.39	69.61	14.97
Singapore	38.57	38.35	65.61
Slovakia	25.39	25.51	56.55
Slovenia	22.16	22.01	28.68
South Africa	75.17	86.52	86.03
Spain	41.65	41.32	45.14
Sri Lanka	41.50	46.45	48.53
Sweden	6.00	19.68	23.42
Switzerland	53.14	54.41	60.83
Taiwan	27.44	50.28	68.45
Tanzania	73.53	89.83	63.34
Thailand	63.38	63.44	9.94
Trinidad and Tobago	64.75	12.51	79.36
Turkey	32.00	22.16	0.49
Uganda	93.02	92.27	63.32
Ukraine	47.37	47.41	61.57
United Kingdom	12.11	5.32	69.44
United States	49.01	25.14	82.41
Uruguay	25.04	8.17	35.48
Venezuela	49.66	6.86	13.50
Vietnam	23.83	23.77	50.80
Zambia	78.08	87.34	73.59
Zimbabwe	38.74	44.72	73.63

Appendix 4: Outlier Analysis - CV/Trust Radius, LTS

4.1 Trust Change, Minimum to Maximum

Change from Max to Min	
Country	% change
Iran	54.7
Korea, South	47.8
Indonesia	43.4
Vietnam	38.9
Malawi	37.9
Mexico	28.1
Thailand	28.1
Costa Rica	27.4
Nicaragua	24.5
Azerbaijan	24.4
Denmark	24.0
Ecuador	23.8
Dominican Republic	23.5
Guatemala	22.9
Botswana	22.4
Myanmar	21.6
Belarus	20.7
Argentina	20.1
Honduras	19.7
Venezuela	19.6
China	19.6
Egypt	19.4
Spain	19.1
Paraguay	18.2
India	17.7
Panama	17.6
El Salvador	17.6
Netherlands	17.5
Portugal	16.6
South Africa	16.5
Albania	16.4

Change from Max to Min	
Country	% change
Bolivia	16.1
Finland	15.9
United States	15.5
Senegal	14.9
Japan	14.6
Slovakia	14.4
Switzerland	14.4
Colombia	14.2
Norway	14.2
United Kingdom	14.0
Malta	14.0
Sweden	14.0
Canada	14.0
Uruguay	13.7
Russian Federation	13.7
Chile	13.4
Singapore	13.1
Poland	12.6
Bulgaria	12.5
Lesotho	12.5
Hungary	11.9
Macedonia	11.9
Hong Kong	11.5
Ireland	11.5
Estonia	11.1
Mongolia	10.9
Iceland	10.9
Nigeria	10.4
Romania	10.2
Zambia	10.1
Mali	10.1

4.2 Trust Coefficient of Variation

Country	Avg. Trust	St. Deviation	CV
Malawi	25.9	26.8	104%
Iran	38.0	38.7	102%
Myanmar	16.3	15.2	93%
Lesotho	10.3	8.9	87%
Indonesia	30.8	19.9	65%
Botswana	16.2	9.2	57%
Azerbaijan	32.7	17.3	53%
Paraguay	14.2	7.0	49%
Egypt	28.2	13.7	49%
Zambia	15.0	7.1	48%
Costa Rica	17.3	8.1	47%
Brazil	5.9	2.7	45%
Algeria	16.3	7.2	44%
Turkey	9.2	3.9	43%
Macedonia	13.9	6.0	43%
Albania	20.7	8.8	43%
Ghana	12.1	5.1	42%
Mongolia	14.8	6.0	40%
Korea, South	40.0	15.6	39%
Portugal	16.9	6.6	39%
Singapore	23.3	9.0	39%
Uganda	13.6	5.2	39%
Nicaragua	19.3	7.2	37%
Vietnam	41.8	15.0	36%
Cambodia	6.2	2.1	34%
Guatemala	23.2	7.7	33%
Venezuela	18.8	6.2	33%
Thailand	33.2	10.8	33%
Malta	18.7	6.1	33%
Mexico	26.8	8.4	31%
Colombia	17.9	5.6	31%
Peru	13.9	4.2	30%

4.3 High-CV/Low-Trust Radius Countries

> 2.5 sd CV	> 2.5 sd min-max	Trust Radius < .5
Iran	Indonesia	China
Lesotho	Iran	Vietnam
Malawi	Malawi	Korea, South
Myanmar	Vietnam	South Africa
		Jordan
		Morocco
		Thailand
		Romania
		Ghana
		Burkina Faso

4.4 LTS outliers, Table 9

Country	Observed	Estimated	Residual	Studentized Residual
China	61.3	14.38	46.92	5.41
Vietnam	52.1	16.33	35.77	4.13
Belarus	44.8	20.54	24.26	2.80
Azerbaijan	44.9	21.19	23.71	2.74
Thailand	41.6	17.90	23.70	2.73
Trinidad and Tobago	3.8	27.23	-23.43	-2.70
Rwanda	4.9	27.40	-22.50	-2.60

4.5 LTS outliers, Table 14

Country	Observed	Estimated	Residual	ABS(St. Residual)
China	61.3	18.17	43.13	4.71
Vietnam	52.1	19.85	32.25	3.52
Iraq	40.8	15.76	25.04	2.74
Azerbaijan	44.9	19.89	25.01	2.73
Belarus	44.8	19.87	24.93	2.72

4.6 LTS outliers, Table 21 (D.V.=Trust)

Country	Observed	Estimated	Residual	ABS(St. Residual)
Indonesia	51.60	35.01	16.59	3.74
Vietnam	41.10	25.15	15.95	3.60
Iran	65.30	49.50	15.80	3.57
China	60.30	44.69	15.61	3.52
Greece	23.70	38.80	-15.10	3.41
Egypt	37.90	24.61	13.29	3.00
India	35.40	22.39	13.01	2.94
Malta	10.00	22.15	-12.15	2.74
Brazil	6.70	18.55	-11.85	2.67
Romania	16.10	27.36	-11.26	2.54

4.7 LTS outliers, Table 21 (D.V.=World Bank Governance Index)

Country	Observed	Estimated	Residual	ABS(St. Residual)
Iraq	-1.81	-0.21	-1.59	5.48
Sweden	1.73	3.22	-1.49	5.14
Finland	1.76	3.23	-1.47	5.05
Iceland	1.48	2.91	-1.43	4.92
Denmark	1.79	3.20	-1.41	4.86
Norway	1.79	3.14	-1.35	4.64
Azerbaijan	-1.07	-0.24	-0.83	2.85
Algeria	-1.10	-0.29	-0.81	2.80

4.8 LTS outliers, Table 29

Country	Observed	Estimated	Residual	ABS(St.Residual)
China	7.69	1.27	6.42	7.35
Zimbabwe	-2.19	3.04	-5.23	5.99
Botswana	5.44	1.53	3.90	4.47
Korea, South	5.57	1.98	3.59	4.11
Singapore	5.10	1.51	3.59	4.11
Vietnam	4.24	1.32	2.91	3.34
Indonesia	4.07	1.21	2.87	3.28
Thailand	4.18	1.38	2.81	3.22
Nicaragua	-1.31	1.46	-2.77	3.18
Laos	3.72	1.12	2.60	2.98
Egypt	3.42	0.91	2.52	2.88
Malaysia	4.41	2.21	2.20	2.52

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