Trust, Governance, and Growth: Exploring the Interplay

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"The interplay of institutions and individuals is more complex than is often recognized."
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ABSTRACT

Thin trust and efficacious governance are well-established contributors to economic progress but the interplay between these factors and their joint impact on human flourishing is unclear. We extend previous analyses by expanding the cross-sectional data set to over 100 countries and by employing simultaneous models to capture the interplay between trust, governance and economic growth. We find that in this interdependent system framework that (1) the effect of trust on growth is greater than shown in earlier analyses, (2) trust and governance are complementary components that under adverse circumstances can lead to a low-growth trust trap for some societies, (3) income inequality and fractionalization play important, intermediary roles in explaining levels of trust, governance, and ultimately, economic welfare, and (4) the colonization legacy of each country captures an important component of the current variation across countries in regard to their levels of trust, governance, and economic growth.

Key Words: Trust, Social Capital, Governance, Institutions, Economic Growth, Interdependencies

JEL Classifications: O15, O17, O43

1. INTRODUCTION

The wide discrepancy in economic growth trajectories across nations has been a

fertile research field for development scholars and practitioners for nearly two decades.

Proponents of geography (Gallup and Sachs 1998), institutions and governance (Acemoglu,

Johnson and Robinson 2002), culture, including social capital (Guiso, Sapienza and Zingales

2006) and productivity, both human and technological (Barro 1991) all claim a

predominant if not a preeminent explanatory role in the divergence in countries' economic

fortunes historically and in recent years.[1] However, the difficult, and often complex

interplay or interdependencies between all these factors clouds our understanding of the

key determinants of economic growth. Particularly troubling has been the uncertain direction of the causal relationship between levels of social capital and the efficacy of formal institutions. We empirically reveal in this paper that interpersonal trust, as a key component of a country's social capital endowment, emerges in a key interdependent role with formal institutions to simultaneously serve as an important explanation for economic growth.

The evolution of our understanding of the interplay between trust, governance and economic performance can be traced back to numerous conceptual origins (Macaulay 1963; Arrow 1974; Granovetter 1985) but we begin in the development context with Platteau (1994a, 1994b).[2] Platteau associates trust or trustworthiness with the internalization of moral norms in a society. Norms that promote generalized morality, not limited-group morality, are of the greatest concern. Primary (e.g. family) and secondary (e.g. schools, religious communities, peer groups) socialization interact to reinforce moral norms, like trustworthiness. According to Platteau, trustworthiness is sustainable 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) go beyond Platteau's moral norms, positing that levels of societal trust are highly dependent on ethnic homogeneity and civil association membership. Ethnic homogeneity is positively associated with trust levels because similar agents are more likely to feel shame or ostracize one another if one person abuses the trust of another, people believe others are inherently trustworthy, agents agree on moral norms,

and individuals demonstrate altruistic behavior. The authors, adding support to the work of Putnam (1993), argue that group association is a determinant of trust because voluntary associations reinforce habits of cooperation, civic-mindedness, and solidarity through common interests, high value of ostracism as punishment for deviating behavior, and the confidence that other members are inherently trustworthy.

With this background, Zak and Knack (2001), in their analysis of the determinants of trust, found that social distance measures (i.e. Gini income and land inequality) were the most dominant explanatory variables in their models, exhibiting a negative relationship with trust levels. Although not included together in their models with social distance measures, institutional variables (corruption index, contract enforcement, investor rights) on their own also were highly significant. Surprisingly, income and educational attainment variables, when considered with social distance or institutional variables, produced inconsistent and insignificant results. Bjornskov (2006) expanded on the work of Zak and Knack by nearly doubling the number of countries and added monarchies, communism, the age structure of a society, and population size as possible determinants of trust. Utilizing a series of OLS and 2SLS (in response to possible endogeneity) specifications, Bjornskov found that the most important determinants of trust were religion (negative influence in Roman Catholic and Muslim countries), the existence of a monarchy in the past (positive influence), a post-communist country (a negative influence), and income inequality (a negative influence). In contrast to Zak and Knack, Bjornskov's institutional variables (Gastil Index, Rule of Law) showed no association with trust.[3]

Efforts to associate trust with economic growth are limited, with the major contributors being the now familiar contributors, Knack and Keefer (1997) and Zak and

Knack (2001). In Knack and Keefer's sample of 29 countries, trust was positively related to economic growth and statistically significant. Given their concern about possible endogeneity, the authors utilized 2SLS regression with law students as a proportion of graduate students and their ethnic heterogeneity variable as instruments for trust.[4] Their estimated trust coefficient 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 yielded a statistically significant negative coefficient supporting the hypothesis 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. This finding would imply that cross-country convergence of economic growth rates is accelerated in the presence of higher levels of trust.

Zak and Knack utilized standard economic control variables (i.e. initial GDP, schooling attainment, prices of investment goods) in their growth model specifications, in addition to trust. Of special relevance to our current analysis are the results from the set of the authors' regressions that added various formal governance variables (i.e. proxies for property rights, corruption, contract enforcement) both separately and contemporaneously with trust, testing the hypothesis that trust would augment the influence of these governance variables on economic growth. Without trust in the specifications, these governance variables were highly significant with large coefficients. Trust was highly significant when included in the estimates but the corruption and contract enforcement variables became insignificant. The authors point out that this result suggests that formal institutions increase growth, in part, through their stimulation of increased

levels of societal trust. Throughout their analysis, Zak and Knack found that trust was positively related to economic growth and statistically significant, while its inclusion decreased both the significance and magnitude of the coefficients of the formal institutional variables. One possible interpretation of this result is that societal trust and governance, particularly formal institutions pertaining to contract enforcement and penalties for engaging in corruption, are substitutes for one another. Given that the trust variable retained its significance in all the models, it is possible that societal trust and governance are mutually dependent with trust being the dominant factor related to economic growth. Zak and Knack also discovered that poor countries with low levels of trust are caught in a trust trap that constrains economic growth.[5]

This paper is organized as follows. In Section 2 we present a conceptual model for the interplay between trust, governance and economic growth. We hypothesize that income inequality and fractionalization (social diversity), via their influence on trust levels, have a dominant effect on economic growth. Section 3 describes the empirical modeling and explains the data sources. We improve upon past trust studies by extending the cross-country analysis to over 100 countries, making our analysis more representative of the world at large.[6] In Section 4 we discuss the empirical results. We find that trust and governance, through their interdependent relationship or interplay, have a positive and significant effect on economic growth.

2. THE INTERPLAY

Recent empirical studies confirming that trust plays a role in economic growth operate under the assumption that formal institutions are responsible for generating trust, not vice-versa. Knack and Zak (2003) and Harrison (2006) even go so far as to suggest that

formal institutions (i.e. public policies) are necessary and responsible for generating the informal norms, like trust, that are necessary for economic progress. Fukuyama (1995) counters this position by arguing that social capital arises out of religion, culture and historical experience outside the control of government institutions and therefore government policy is not an effective tool for building social capital and trust. Governments even are capable of destroying social capital when their policies crowd out social norms with the explicit or implicit intention that citizens develop dependency on the state.

Generally, economists relegate social capital (culture, values, trust, informal institutions) to the "residual" of their empirical models, while for most of the discipline's early history social capital variables were considered to be principal determinants of economic development (Smith 1759, Marshall 1890). The contemporary failure to model the role of trust may overstate the influence of formal institutions in empirical models and confuse the direction of causality in the relationship between trust and formal governance. Informal norms, like trust, often generate internal rules and enforcement mechanisms at the community or organizational level that prove to be more effective and efficient (e.g. lower transaction costs) than external punishment and incentives imposed by formal, government-generated institutions.

We hypothesize that there exists an endogenous component of trust, unrelated to formal institutions or external governance, directly related to economic growth. Concurrently, we recognize that trust and formal institutions are undoubtedly complementary in their interdependent roles, and in this interplay, influence economic growth. Therefore, an analytical framework is needed to capture these complexities and

answer the questions (1) In which direction does the flow of causality between trust and formal institutions appear to be stronger? (2) Do inadequate institutions have a stronger negative effect on trust, and consequently, on economic development, than the economic benefits derived from superior governance? and (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?

Drawing upon the earlier work of Platteau (1994a,b), North (1994) and Grief (2005), and the previously reviewed empirical literature, we capture the interplay between trust, formal institutions and growth in a conceptual model (Figure 1) and then extend this understanding to our econometric analysis. In this conceptual illustration the social capital or trust endowment is formed from a society's prevailing social structure and the informal norms that regulate social behavior.[7] 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 create a foundation that can transmit both beneficial and harmful norms. Following Greif (2005), "good" social capital is an endowment that fosters cooperation while "bad" social capital leads to less cooperation, or worse, conflict. "Good" social capital is contract enforcing and coercion constraining; "bad" is contrary to "good". 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 stimulates the establishment of formal institutions that support and reinforce both the markets and in turn, the stock of social capital.

The impact of market development on formal institutions is assumed to be strong, while the reinforcement effect that formal institutions exert on social capital depends on whether a country is on a high-growth or low-growth path.[8] Following Fukuyama (1995), the creation of "good" social capital is notoriously resistant to incentives provided by formal institutional change. With that being the case, on the high-growth path in Figure 1, formal institutions exert a weak (i.e. dotted line) reinforcement effect on social capital. Poorly designed formal institutions have a strong destructive effect on social capital; this implies that government action can both crowd-out, and in the worse case, discourage private-order cooperative norms.

The interplay model implies that for countries blessed with a high-trust endowment, *ceteris paribus*, 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 vulnerable 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 these two scenarios is when externally imposed formal institutions, antagonistic to healthy markets, disrupt the institutions-market system. Poorly designed formal institutions exert a dominant effect on market behavior. 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 colonial extractive institutions and enterprises are examples of governance structures that place countries on a low-growth path.

3. DATA AND EMPIRICAL STRATEGY

Given our objective to extend this line of research to a higher proportion of low- and middle-income nations than the earlier work of Zak and Knack (2001) and Bjornkov (2006), we developed a larger cross-country dataset that is more representative of the income distribution of the community of nations. Secondly, we explore the relative influences that trust and formal institutions have on one another as outlined in the conceptual model. Finally, trust, governance, and economic growth are modeled simultaneously to capture the real world interplay between these contributors to human flourishing.

(a) Empirical strategy

(i) Trust Equation

The determinants of trust are tested using the expanded dataset of 116 countries. A base specification with trust as the independent variable utilizes the Zak and Knack (2001) and Bjornskov (2006) specifications as a guide. The trust equation is as follows:

$$y_{1i} = \alpha_0 + \alpha_1 x_{1i} + \alpha_2 x_{2i} + \alpha_3 x_{3i} + \alpha_4 x_{4i} + \alpha_5 z_{1i} + \alpha_6 z_{1i}^2 + \alpha_7 z_{2i} + \alpha_8 y_{2i} + \varepsilon_1 \quad (1)$$

where 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; z_2 = a vector of religious composition variables (% Catholic, % Muslim, % Orthodox, %Protestant) ; y_2 = a vector of formal institutional variables (political rights, civil liberties, rule of law, voice and accountability, etc.).

As noted earlier, 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. Our 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, we include income inequality 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.

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).[9] 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. These variables may pick up historical and cultural components that have been embedded in the religious identification but are independent of actually practicing a given faith.

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.

(ii) Formal Institutions Equation

A separate specification is modeled using different measures of formal institutions as the independent variable. In the first step we found characteristics related to governance that are unrelated to trust. Then the predicted values from the separately modeled formal institution equation are used in the structural trust equation (2SLS), providing more consistent estimates if formal institutions and trust are indeed endogenous to one another. The reverse is also tested with 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 we have hypothesized, that trust and formal institutions are found to be interdependent, a fully specified formal institution equation can be included in a simultaneous equation model together with trust.

The formal institution equation is as follows:

$$y_{2i} = b_0 + b_1 x_{5i} + b_2 x_{6i} + b_3 x_{5i} x_{6i} + b_4 z_{1i} + b_5 z_{1i}^2 + b_6 z_{3i} + b_7 y_{1i} + \varepsilon_2 \qquad (2)$$

where 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; z_3 = a vector of

legal origin dummies (English, French, German, Scandinavian, Communist) and $y_1 =$

interpersonal trust (percentage responding affirmatively).

Given the interdependent nature of formal institutions and trust, 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, is performed and 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 are correlated, violating the conditions necessary to

consistently estimate with OLS or 2SLS. The simultaneous equation specification is as

follows:

$$y_{1i} = \alpha_0 + \alpha_1 x_{1i} + \alpha_2 x_{2i} + \alpha_3 x_{3i} + \alpha_4 x_{4i} + \alpha_5 z_{1i} + \alpha_6 z_{1i}^2 + \alpha_7 z_{2i} + \alpha_8 y_{2i} + \varepsilon_1 \ (3)$$

$$y_{2i} = b_0 + b_1 x_{5i} + b_2 x_{6i} + b_3 x_{5i} x_{6i} + b_4 z_{1i} + b_5 z_{1i}^2 + b_6 z_{3i} + b_7 y_{1i} + \varepsilon_2$$

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.

(iii) 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. The growth equation is as follows:

$$y_{3i} = c_0 + c_1 x_{1i} + c_2 x_{7i} + c_3 x_{8i} + c_4 y_{1i} + c_5 y_{2i} + \varepsilon_3 \qquad (4)$$

where 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:

$$y_{1i} = \alpha_0 + \alpha_1 x_{1i} + \alpha_2 x_{2i} + \alpha_3 x_{3i} + \alpha_4 x_{4i} + \alpha_5 z_{1i} + \alpha_6 z_{1i}^2 + \alpha_7 z_{2i} + \alpha_8 y_{2i} + \varepsilon_1 \ (5)$$

$$y_{2i} = b_0 + b_1 x_{5i} + b_2 x_{6i} + b_3 x_{5i} x_{6i} + b_4 z_{1i} + b_5 z_{1i}^2 + b_6 z_{3i} + b_7 y_{1i} + \varepsilon_2$$

$$y_{3i} = c_0 + c_1 x_{1i} + c_2 x_{7i} + c_3 x_{8i} + c_4 y_{1i} + c_5 y_{2i} + \varepsilon_3$$

As hypothesized in our conceptual model, trust and governance are assumed to be positively associated with one another and, in turn, drive higher rates of economic growth.

4. RESULTS AND DISCUSSION

(a) Determinants of Trust

Table 1 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 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 1 compare the base specification used by Zak and Knack (2001) in their trust determinants regression. Consistent with Zak and Knack and Bjornskov, the latest trust observation collected for a respective country in the World Values Survey was used as the dependent variable. Conversely, when trust was included as an independent variable in regressions later in this analysis, the earliest available values were utilized. The variable of interest, income inequality, was highly significant in both estimates, 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 in our model, 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, we argue that this is likely a symptom of the endogenous relationship between income and trust.

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, linguistic and religious fractionalization, compiled by Alesina, et al. (2003) were also tested but are not reported in Table 1. In no instance were linguistic or religious fractionalization significantly related to trust, linearly or non-linearly.[10]

Equations 3a, 3b, and 3c 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 this most complete specification with the larger sample. As noted earlier, 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.

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. 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 and positive 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 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%). A total of 14 countries were identified based on the above criteria.

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, but statistically insignificant, sign. Overall, the results are robust to the exclusion of the high-CV, low-radius countries.

Another more rigorous way to test and correct for outliers is Least Trimmed Squares (LTS).[11] 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 also is positively, rather than negatively, related to trust at a 10% level of significance.

<center>(b) Trust and Colonization</center>

Given the potential significance of colonization as a determinant of trust, through its effect on formal institutions, it is worth exploring this relationship at this time. Colonization refers specifically to European colonization that occurred principally between the 16th and 20th centuries. Equations 1 and 2 in Table 2 report the results of 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. It is noteworthy that income inequality and linguistic

fractionalization are both statistically significant for those countries that were colonized

while both of these variables are insignificant for those countries that were not colonized.

Equations 3 and 4 in Table 2 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 utilizing religious fractionalization as an

explanatory variable is that the religious measure is significantly and positively related to

trust for countries that were not colonized and significant and negatively related in

colonized countries. Religious diversity appears to be associated with social division, i.e.

lower trust, in only those countries that were colonized. The act of colonization,

independent of the effect of colonization on formal institutional quality, appears to have

altered the relative ability of society to constructively 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 2). 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 some

nations 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

groups, take advantage of weak institutions to abuse government power for their own

benefit this situation more likely leads 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. In the case of French, Portuguese,

and Spanish colonization, institutions initially developed for the purpose of consolidating

power under the conquering, or ruling class, that often was an ethnically homogeneous

minority. Later, those countries adopted legal systems based on civil law that tended to

consolidate legal authority under government control. Equation 9 in Table 2 demonstrates

how French legal origin, a proxy for both civil legal system and

Spanish/Portuguese/French colonization, is negatively related to formal institution

quality.[12] 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.[13]

The above results raise 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. These results suggest colonization left a

distinct and lasting imprint on informal institutions independent of formal governance.

(c) 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 3 shows OLS results for formal institutions, proxied by

the World Bank (WB) governance index from 2005 and the Gastil Index, regressed on

beginning levels of trust and controls. The coefficient for trust is not significantly different

from zero in either model, implying that there is not an influence 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 earlier

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 was employed.

Equation 3 (Table 3) uses percent Protestant and Gini income as instruments for

trust in the estimation. The results change dramatically, with trust becoming highly

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 the Gastil Index for 2009

from Freedom House 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 the 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.

(d) 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 are a strong determinant

of trust. 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 in Figure 1 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 individuals, groups, and organizations as they interact with one another. There are also notable cases like colonization, military conquest, or internal revolution when formal institutions are imposed on societies. Given the different avenues through which (1) formal institutions are created and maintained (e.g. colonization, direct democracy), (2) the differing degrees of rigidity influencing the rates that formal institutions evolve (e.g. totalitarian, democratic rule), and (3) 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 4 begins the empirical analysis that aims to formally explore this question of interdependency. 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 (WB 1996) was used as the formal institutions variable. Using an IV/2SLS approach, the instruments are 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 applied in combination with other relevant control variables in regressions aimed at explaining trust as the dependent variable.

The first estimated equation in Table 4 is a modified estimate of the final trust equation from Table 1 (3b) where we regressed income inequality and fractionalization on trust while controlling with the religious composition variables. This base equation was included for comparison purposes so that the coefficient estimates 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, ethnic fractionalization lost significance in this base specification so we substituted linguistic polarization as a proxy for social diversity. A statistically significant linguistic fractionalization is strongly related to ethnic fractionalization (Pearson's correlation coefficient=.68). Depending on the mix of countries, one or the other often is significantly related to trust.

Again, income inequality and a form of fractionalization (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

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leveling off, and then a decline in trust as linguistic fractionalization continues to increase.

Table 5 reports 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 and increase from values of 1 to 10 for linguistic fractionalization. Elasticities level off at the relatively low level of 15, turning negative close to 30. Between values of 30 and 100, the elasticity decreases at an increasing rate. Linguistic fractionalization appears to have its largest effect on trust at higher levels of fractionalization. The effect is relatively muted below levels of 50, but 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 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, thereby changing the relative mix of groups in countries both losing and receiving refugees.

Equation 1 in Table 4 includes the predicted values of World Bank governance that used the colonization dummy, log population density in 1500, and the interaction between colonization and density as instruments in the first stage. The World Bank governance index is highly significant with a relatively large coefficient when used to explain trust in

the second stage estimate. A one-standard deviation improvement in governance equates to a 7.5% absolute percentage increase in the level of societal trust.

This finding 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, the reader 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, implying that the effect of linguistic diversity and income inequality on trust is transmitted through the effects that formal institutions have on trust.[14] 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 4 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 the quality of formal institutions. In other words, when linguistic differences

(serving as a proxy for ethnic or social diversity) are used to extract rents for respective

linguistic groups through channels of governance, governance quality is lower, and through

this mechanism, linguistic diversity is reflected in lower levels of 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 4), 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 (Equations 5-7). The benefit of using the Gastil

Index is the available long time-series of data, going back to 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 was the Gastil Index significant when the index was used as the measure of formal institutions.[15]

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 result may 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 (Equation 1). Further, the effects of income inequality and social diversity on trust appear to be transmitted through the quality of governance.

(e) Non-Recursive System Model of Trust and Formal Institutions

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. Table 6 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 while the

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same WB 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 because given its non-recursive nature the correlation of the equation errors is a foregone conclusion. The results of the three estimators should approximate one another when using the same instruments under the conditions of conditional homoscedasticity and the non-clustering of errors (no serial autocorrelation). 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 estimates 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 provide more consistent and unbiased results. But given the additional condition of normality for the FIML estimator, 3SLS and GMM are the favored tools. However, when using SAS, the FIML estimation has the added benefit of decomposing the marginal effects into direct, indirect, and total effects. Effect decomposition from the FIML estimation is reported with all our 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 consistent covariance matrix. 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 6, parameter coefficients and standard errors are remarkably similar across all three estimators. The limited variation in coefficient magnitudes across the estimators produces greater 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. 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 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 (not reported here).

Table 7 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).

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 and supports our conceptual model where there is a strong causal impact from trust to institutions with a mixed magnitude and significance of impact from institutions to trust (see Figure 1).

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 thereby confirming results attained earlier in this analysis.

Overall, these magnitudes are quite large and imply a powerful impact that societal trust has on institutional quality. More importantly, where decreases in trust or institutional quality amplify the changes in the other variable, this result 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.

Finally, in further confirmation of our 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.

(f) GDP Growth and Trust

The preceding material has laid the necessary foundation to establish a model that relates trust to long-term GDP growth (% annual, per capita, PPP, constant 2005 prices) as a proxy for economic development. Based on the conceptual model in Figure 1, it is hypothesized that trust and governance have an interdependent relationship so a more effective way to model the relationship between trust and growth is by using a simultaneous equation model. Trust and governance are included on both the left-hand side and right-hand side of their respective equations, consistent with the feedback effect, or interplay, 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. In Table 8 three different estimators are tested for comparison purposes: FIML, 3SLS, and GMM.

Parameter estimates in Table 8 vary 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 also bias estimates differently depending on the method of estimation. In any case, the principal source responsible for the variation

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in parameter estimates across estimation methods is unknown. Fortunately, the effects for variables of interest are remarkably similar across methods so our following discussion will take into consideration when these estimated parameters vary.

Consistent with results attained to this point, results in Table 8 indicate that 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 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 9. The decomposition is based on the FIML estimates. 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 this 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 a "bad" equilibrium.

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 (Table 8). 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—that 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 (Table 8). 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 -0.30 and -0.42. This implies that a one-standard deviation increase in income inequality in a country (std. deviation = 10) lowers trust 3.0 – 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. Direct, indirect, and total effects 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 that there 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 increase 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 10 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%. Growth in countries that were colonized is 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 (b), namely that income inequality affects countries differently depending on their colonial history.

Returning back to Table 9, the effect of linguistic fractionalization appears to have a role when introducing economic growth into the system of equations.[16] 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 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. The trust coefficients attained in Table 8, Equation 1 are clearly much higher than those attained by Zak and Knack. A one-standard deviation increase in trust 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. So 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 estimated 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.

5. CONCLUDING REMARKS

Our conceptual and empirical models 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 interplay of trust and governance are novel and further our understanding of how trust, as a proxy for cooperation within civil society, reinforces formal institutional quality. Likewise, our understanding of how income inequality and social diversity impact development, through civil society (i.e. trust), governance, and economic growth has been enhanced. 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 magnitude of the effect of trust on growth is even greater than that attained in previous studies. According to our results, 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. Finally, the study was expanded to include a larger set of countries compared to previous studies, providing more representative results for 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 the existing trust literature. Where previous studies assumed governance as the principal driver of trust, our empirical results indicate that there is a positive, interdependent relationship between trust and governance. The nature of the relationship, where 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 that 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 plays an important role in determining trust, governance, and economic growth. The legacy of European colonization established a path for some colonized countries that resulted in higher-quality institutions, higher levels of trust, and robust levels of economic growth, or conversely in other colonized countries, lower 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 levels of institutional quality were then reflected in lower trust

levels. Additionally, societal trust in those countries that were colonized is negatively affected and more vulnerable to linguistic diversity, religious diversity, and income inequality. Lower societal trust lowers the quality of governance and the rate of economic growth.

NOTES

1. Formal institutions (formal rules, laws and norms, and their enforcement) and governance are used synonymously throughout this paper while informal institutions (moral, religious and civil society norms) are closely associated with culture.

2. We define trust as the confidence by Party A that Party B will not act opportunistically when Party A is vulnerable. Putnam (2000) distinguishes between "thick" trust, shared among family and friends, and "thin" trust with those individuals less proximate and based on reputations, norms, and signals. "Thin" trust or generalized trust is most conducive to economic growth. Empirically, the most cited and used measure of trust is taken from the World Values Survey (WVS). The WVS has been conducted in various waves spanning the 1981-2009 timeframe. 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?" 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.

3. The Gastil Index is a measure of civil liberties and political rights published annually by Freedom House while the Rule of Law measure is published annually by the World Bank (Kaufmann, Kraay, and Mastruzzi 2009).

4. The legal system as a formal institution is viewed as a substitute for trust.

5. Zak and Knack included the interaction term, GDP (per capita, PPP, constant price), with trust 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 this difference. They reported that the marginal effect of convergence for countries in their sample with trust values under 25% was uniformly positive, large and significant, implying that low levels of trust are creating a trap that acts as a barrier to growth.

6. Knack and Keefer (1997) report results for 29 countries, Zak and Knack (2001) 32-41 countries depending on the specification, and Bjornskov (2006) 76 countries. We were able to expand both the number of countries and the analysis of previous studies by using the following sources: Afrobarometer (2011), Arabbarometer (2011), Asiabarometer (2011), Barrett, Durian and Johnson (1982), Barro and Lee (2013), East Asia Barometer (2011), European Values Study (2011), Freedom House (multiple years), Heston, Summers and Aten (2009), La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny (1999), and Latinobarometro (2011).

7. Social capital and trust will be used synonymously throughout this section of the paper.

8. Dotted lines in Figure 1 represent where an effect is assumed to be "weak" while solid lines represent "strong" effects.

9. See Bower and Wilson (2015) for a detailed analysis of the measurements of fractionalization and polarization, as well as, their theoretical relationship with trust.

10. This specification was also tested using the disaggregated World Bank institution measures and the Gastil Index from Freedom House 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 was tested as well, with analogous results.

11. This technique, to test the robustness between trust and growth, was used by Bergrren, Elinder, and Jordahl (2008). 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.

12. In this case, the WB governance index is from 2005.

13. 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.

14. First stage results show that income inequality and linguistic polarization are significantly related to governance as well.

15. 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 4 pass the Sargan test of overidentification restrictions.

16. Granted, linguistic fractionalization is only statistically significant using the FIML estimator. However, if the reliability of the FIML estimates is to be trusted, linguistic fractionalization has a negative, significant total effect on trust, roughly 33% greater than the direct effect alone.

REFERENCES

Acemoglu, Daron, Simon Johnson and James A. Robinson. "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution," *The Quarterly Journal of Economics,* Vol. 117, No.4 (November,2002) pp. 1231-1292.

Afrobarometer, Online Data Analysis, (1999-2009), Downloaded 2011, http://afrobarometer-online-analysis.com/aj/AJBrowserAB.jsp.

Arabbarometer, (2006-2008), Downloaded 2011, http://www.arabbarometer.org/?q=content/arabbarometer-i-spss-data-file.

Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg. "Fractionalization," *Journal of Economic Growth,* Vol. 8 (June, 2003), pp. 155–94.

Arrow, Kenneth. "Limited Knowledge and Economic Analysis," *American Economic Review*, Vol. 64, No.1 (1974), pp. 1-10.

AsiaBarometer Survey Data 2003-2007. AsiaBarometer Project (http://www.asiabarometer.org/) , Downloaded 2011.

Barrett, David B., George Thomas Kurian, and Todd M. Johnson. *World Christian Encyclopedia* (Oxford: Oxford University Press, 1982).

Barro, Robert. "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics*, (1991), pp. 407-443.

--------and Jong Wha Lee. "A New Data Set of Educational Attainment in the World, 1950-2010," *Journal of Development Economics*, Vol. 104 (September, 2013), pp. 184-198.

Berggren, Niclas, Mikael Elinder and Henrik Jordahl. "Trust and Growth: A Shaky Relationship," *Empirical Economics,* Vol. 35 (2008), pp. 251-274.

Bjornskov, Christian. "Determinants of Generalized Trust: A Cross Country Comparison," *Public Choice,* Vol. 130 (2006), pp. 1-21.

Bower, Thomas R. and Paul N. Wilson. "Fractionalization and Trust: A Research Note," Working Paper 2015-02, Department of Agricultural and Resource Economics, University of Arizona, (Tucson, 2015).

Delhey, Jan, Kenneth Newton and Christian Welzel. "How General is Trust in 'Most People'? Solving the Radius of Trust Problem," *American Sociological Review,* Vol. 76, No. 5 (2011), pp. 786-807.

East Asia Barometer, Online Data Analysis, (2001-2003, 2005-2008), Downloaded 2011, http://www.jdsurvey.net/eab/Analize.jsp.

EVS (2011). European Values Study 1981-2008, Longitudinal Data File. GESIS Data Archive, Cologne, Germany, ZA4804 Data File Version 2.0.0 (2011-12-30) DOI:10.4232/1.11005.

Freedom House. *Freedom in the World: The Annual Survey of Political Rights and Civil Liberties* (New York: Freedom House, 1979, 1981, 1991, 1996).

Fukuyama, Francis. *Trust, The Social Virtues and Creation of Prosperity* (New York: The Free Press, 1995).

Gallup, J.L. and Jeffrey D. Sachs. "Geography and Economic Development". National Bureau of Economic Research Working Paper 6849, (Harvard University, Cambridge, Massachusetts, 1998).

Granovetter, Mark, "Economic Action and Social Structure: The Problem of Embeddedness," *The American Journal of Sociology,* Vol.91, No.3 (November, 1985), pp. 481-510.

Greif, Avner, "Commitment, Coercion, and Markets: The Nature and Dynamics of Institutions Supporting Market Exchange," in *Handbook of New Institutional Economics*, Claude Ménard and Mary M. Shirley (eds.), (Berlin:Springer, 2005), pp. 727-786.

Guiso, Luigi, Paulo Sapienza and Luigi Zingales. "Does Culture Effect Economic Outcomes?," *Journal of Economic Perspectives,* Vol.20, No.2 (Spring 2006), pp. 23-48.

Harrison, Larry E. *The Central Liberal Truth: How Politics Can Change a Culture and Save It From Itself.* (New York: Oxford University Press, 2006).

Heston, Alan, Robert Summers and Bettina Aten. Penn World Table Version 6.3, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, August 2009.

Kaufmann, Daniel, Aart Kraay and Massimo Mastruzzi. "Governance Matters VIII: Aggregate and Individual Governance Indicators, 1996-2008." *World Bank Policy Research Working Paper* 4978 (Washington, D.C.: World Bank, 2009).

Knack, Stephen and Philip Keefer. "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures," *Economics and Politics,* Vol.7, No.3 (November, 1995), pp. 207-227.

-----. "Does Social Capital Have an Economic Payoff?," *The Quarterly Journal of Economics,* Vol.112, No.4 (November, 1997), pp. 1251-1288.

----- and Paul J. Zak. "Building Trust: Public Policy, Interpersonal Trust and   Economic Development," *Supreme Court Economic Review*, Vol. 10 (2003), pp. 91-   107.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny. "The Quality of Government.," *The Journal of Law, Economics, and Organization,* Vol. 15, No.1 (1999), pp. 222-279.

Latinobarometro, Online Data Analysis, (1995-2010), Downloaded 2011, http://www.latinobarometro.org/latino/LATAnalizeSample.jsp.

Macaulay, Stewart. "Non-Contractual Relations in Business: A Preliminary Study," *American Sociological Review*, Vol. 28, No.1 (1963), pp. 55-67.

Marshall, Alfred. *Principles of Economics*, (1890), 8th Edition, (London: Macmillan, 1938).

Montalvo, Jose G. and Marta Reynal-Querol. "Ethnic Diversity and Economic Development," *Journal of Development Economics,* Vol.76 (2005), pp. 293-323.

North, Douglass, "Economic Performance Through Time," *The American Economic Review*, Vol. 84, No.3 (June 1994), pp. 359-68.

Platteau, Jean-Philippe. "Behind the Market Stage Where Real Societies Exist," *Journal of Development Studies*, Vol. 30, No. 3 (1994a), pp. 533–577.

-----. "Behind the Market Stage Where Real Societies Exist – Part II: The Role of Moral Norms," *Journal of Development Studies*, Vol. 30, No. 4 (1994b), pp. 753-817.

Putnam, Robert. *Making Democracy Work: Civic Traditions in Modern Italy*, (Princeton University Press, 1993).

-----. *Bowling Alone: The Collapse and Revival of American Community,* (New York: Simon and Schuster, 2000).

Smith, Adam, *The Theory of Moral Sentiments* (London: A. Millar, 1759).

World Bank Group. *World Development Indicators*, (Washington, D.C., Various Years).

-----. *World Development Report 2015 : Mind, Society, and Behavior*, (Washington, DC: World Bank, 2015), https://openknowledge.worldbank.org/handle/10986/20597 License: CC BY 3.0   IGO."

WVS (2009). World Value Survey 1981-2008 official aggregate v.20090902, 2009. World Values Survey Association (www.worldvaluessurvey.org). Aggregate File Producer: ASEP/JDS Data Archive, Madrid, Spain.

Zak, Paul and Stephen Knack. "Trust and Growth," *The Economic Journal*, Vol. 111, No.470 (April, 2001), pp. 295-321.
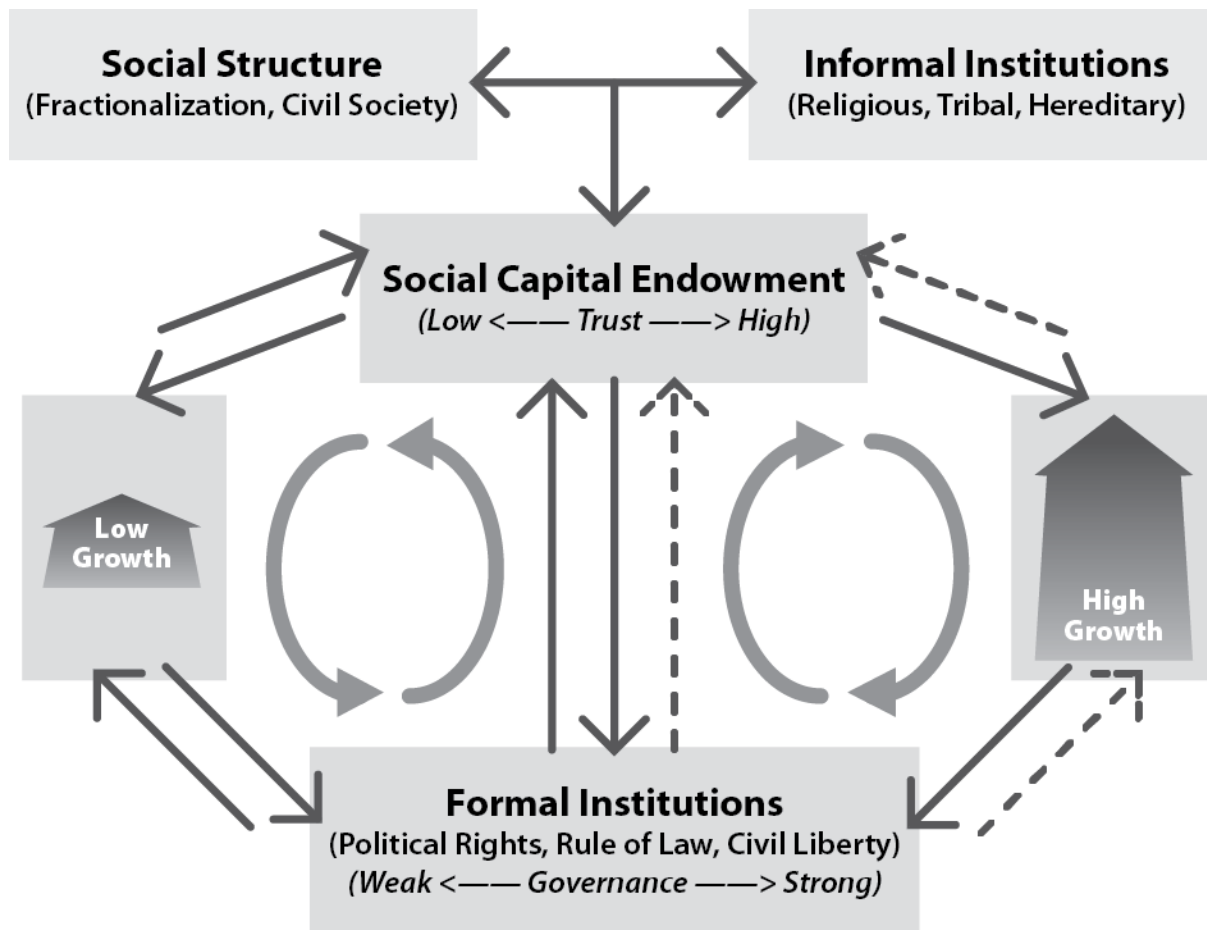
Figure 1: The Conceptual Interplay of Trust, Governance, and Economic Growth

Table 1, Trust Results (OLS)

Equation	1a	1b	2a	2b	3a	3b	3c	4a	4b
Source (other than authors):		Zak and Knack		Zak and Knack			Bjornskov		
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.

Table 2: Trust and Colonization Results (OLS)

Equation	1	2	3	4	5	6	7	8	9	10
	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.

Table 3: Trust and Formal Institutions Results (OLS and IV)

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

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

Table 4: Formal Institutions and Trust Results (IV/2SLS, D.V.=Trust)

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.

Table 5: 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

Table 6: Non-Recursive Simultaneous Model Results for Trust and Institutions

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.

Table 7: 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)	

Table 8: 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		

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

Table 9: 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.

Table 10: Elasticity of Gini Income on Growth, by Colony and Legal Origin

		French/Spanish Legal Origin		English Legal Origin	
colony = 0		colony = 1		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