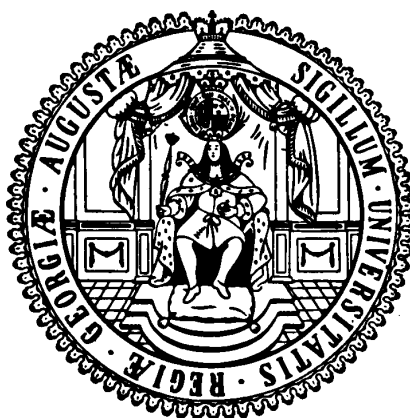# Courant Research Centre
'Poverty, Equity and Growth in Developing and Transition Countries: Statistical Methods and Empirical Analysis'

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Discussion Papers

Why we should all care about

social institutions related to gender inequality[*]

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Abstract. Institutions are a major factor explaining development outcomes. This study focuses on social institutions related to gender inequality understood as long-lasting norms, values and codes of conduct that shape gender roles, and presents evidence on why they matter for development. We derive hypotheses from existing theories and empirically test them at the cross-country level with linear regressions using the newly created Social Institutions and Gender Index (SIGI) and its subindices as measures for social institutions. We find that apart from geography, political system, religion, the level of economic development, one has to consider social institutions related to gender inequality to better account for differences in development. Our results show that social institutions that deprive women of their autonomy and bargaining power in the household, or that increase the private costs and reduce the private returns to investments into girls, are associated with lower female education, higher fertility rates and higher child mortality. Moreover, social institutions related to gender inequality are negatively associated with governance measured as rule of law and voice and accountability.

Keywords: Social institutions, SIGI, Gender inequality, Fertility, Child and infant mortality, Female education, Governance.

JEL **codes:** D63, I10, I20, H1, J16

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1 Introduction

Institutions are a major factor explaining development outcomes. They guide human behavior and shape human interaction (North, 1990). They are rooted in culture and history. They are humanly-devised to reduce uncertainty and transaction costs, and sometimes they are taken-for granted and become beliefs (Hall and Taylor, 1996; de Soysa and Jütting, 2007). Our study centers on a special type of institutions and their explanatory value for development outcomes: social institutions related to gender inequality.

It is a settled fact that gender inequalities come at a cost. Besides the consequences that the affected women experience as they are deprived of their basic freedoms (Sen, 1999), gender inequalities affect the whole society. They can lead to ill-health, low human capital, bad governance and lower economic growth (e.g. World Bank, 2001; Klasen, 2002). Gender inequalities can be observed in outcomes like education, health and economic and political participation, but they are rooted in gender roles that evolve from institutions that shape everyday life and form role models that people try to fulfil and satisfy. We refer to these long-lasting norms, values and codes of conduct as social institutions related to gender inequality.

We investigate the impact of these social institutions related to gender inequality on important development outcomes controlling for relevant determinants such as religion, political system, geography and the level of economic development. As development outcomes we choose indicators from the fields of education, demographics, health and governance. In particular, we use female secondary schooling, fertility rates, child mortality and governance in the form of rule of law and voice and accountability. We choose these indicators as they are related to economic development and allow us to find out whether social institutions related to gender inequality hinder progress in reaching the Millennium Development Goals.[1]

Most of the studies that have a similar research focus are conducted at the household level and proxy social institutions related to gender with measures of autonomy or status of women (e.g. Abadian, 1996; Hindin, 2000). At the cross-country level data are scarce and therefore only few studies are available that center on the development impact of gender-relevant social institutions (e.g. Morrison and Jütting, 2005; Jütting, Morrison, Dayton-Johnson, and Drechsler, 2008). In Branisa, Klasen, and Ziegler (2009) and Branisa, Klasen, Ziegler, Drechsler, and Jütting (2009) we propose several new composite indices that measure social institutions related to gender inequality at the country level,

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[1] In particular, goal 3 "Promote gender equality and empower women", goal 4 "Reduce child mortality" and goal 5 "Improve maternal health" are relevant here, although the other goals can be at least indirectly linked to our chosen indicators.

the Social Institutions and Gender Index (SIGI) and its five subindices Family Code, Civil liberties, Physical integrity, Son preference and Ownership rights. These measures use as input social institutions indicators from the OECD Gender, Institutions and Development database.[2] We are not aware of other measures that provide a similar encompassing way to capture the institutional basis of gender inequality at the cross-country level.

In this paper we use these newly proposed measures and check whether they are associated with the chosen development outcomes at the cross-country level. We proceed as follows. First, we look for relevant theories linking - at least implicitly - social institutions related to gender with development outcomes such as health, demographics, education and the governance of a society. We refer to bargaining household models (e.g. Manser and Brown, 1980; McElroy and Horney, 1981; Lundberg and Pollak, 1993) and models considering the costs and returns of children (e.g. Becker, 1981; King and Hill, 1993; Hill and King, 1995) as well as to contributions from several disciplines on governance and democracy. These contributions focus on differences in behavior between men and women, and on the role of women's movements countervailing power to personal rule and clientelism (e.g. Swamy, Knack, Lee, and Azfar, 2001; Tripp, 2001). Second, we run several linear regressions with the outcome indicators as dependent variables and the SIGI and its subindices as the main explanatory variables. Our results show that social institutions related to gender inequality matter; higher inequality in social institutions is associated with lower development outcomes.

In a related paper, Jütting, Luci, and Morrisson (2009) follow the same econometric procedure we use here and study the impact of the SIGI and its subindices on gender inequality on labor market outcomes.

This paper is organized as follows. Section 2 presents the concept and measurement of social institutions related to gender inequality. In section 3 we review existing theory on household decision-making and incorporate social institutions into the models, deriving hypotheses on their impact on fertility and child mortality. In section 4 we formulate hypotheses on the impact of social institutions on rule of law, and voice and accountability based on the literature on governance, democracy and gender. Data is described in section 5. The empirical estimation and the results are presented in section 6. Section 7 concludes.

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[2] The   data   are   available   at   the   web-pages   http://www.wikigender.org   and http://www.oecd.org/dev/gender/gid.

2 Social institutions related to gender inequality: Concept and measurement

There are several approaches to institutions. According to North (1990, p. 3 ff.) "institutions are the rules of the game in a society", they are "humanly devised constraints that shape human interaction". The approach to institutions from an economics perspective conceives them as the result of collective choices in a society to achieve gains from cooperation by reducing uncertainty, collective action dilemmas and transaction costs. A sociological or cultural perspective, that is complementary to the rational choice one, relates institutions closely to culture. Institutions in this sense frame meanings and beliefs. People try to satisfy norms rather than to act individually within the rules of the game, i.e. institutions do not canalize preferences of actors, they influence the preferences and shape the role models and identities of the actors themselves. Actors and institutions amalgamate so that actors are often not aware of the guiding principles of their behavior. Legitimacy and appropriateness drive institutional evolution more than efficiency considerations. Cultural authority, power in a society and community dynamics might be more relevant in shaping such institutions that become taken-for-granted without continuously being evaluated against efficiency considerations (Hall and Taylor, 1996, and references therein).

Social institutions related to gender inequality that build the focus of our study are more embedded in the cultural-sociological account although efficiency issues may also matter. We conceive these social institutions as long-lasting norms, values and codes of conduct that find expression in traditions, customs and cultural practices, informal and formal laws. They are at the bottom of gender roles and the distribution of power between men and women in the family, in the market and in social and political life. As social institutions related to gender inequality build an often taken-for-granted basis of people's behavior and interaction in all spheres of life, they shape the social and economic opportunities of men and women, their autonomy in taking decisions (Dyson and Moore, 1983; Abadian, 1996; Hindin, 2000; Bloom, Wypij, and Das Gupta, 2001) or the capabilities to live the life they value (Sen, 1999). That is why they might affect important development outcomes and contribute to outcome gender inequalities (de Soysa and Jütting, 2007).

As we are interested in the impact of social institutions related to gender inequality we make use of the recently proposed *Social Institutions and Gender Index (SIGI)* and its five subindices Family code, Civil liberties, Physical integrity, Son preference and Ownership rights (Branisa et al., 2009). These cross-country composite measures cover between 102 and 123 developing countries, and are built out of twelve variables of the OECD Gender,

Institutions and Development Database (Morrison and Jütting, 2005; Jütting et al., 2008).[3] These variables proxy social institutions through prevalence rates, legal indicators or indicators of social practices. As the subindices measure each one dimension of social institutions related to gender inequality the method of polychoric Principal Component Analysis (Kolenikov and Angeles, 2009) is chosen to extract the common information of the variables corresponding to a subindex.

The *Family code* subindex captures institutions that directly influence the decision-making power of women in the household. It is composed of four variables that measure whether women have the right to be the legal guardian of a child during marriage and whether women have custody rights over a child after divorce, whether there are formal inheritance rights of spouses, the percentage of girls between 15 and 19 years of age who are/were ever married, and the acceptance of polygamy in the population.[4] The *Civil liberties* subindex covers the freedom of social participation of women and combines two variables, freedom of movement of women and freedom of dress, i.e. whether there is an obligation for women to use a veil or burqa to cover parts of their body in the public. The *Physical integrity* dimension comprises two indicators on violence against women, the existence of laws against domestic and sexual violence and the percentage of women who have undergone female genital mutilation. The subindex *Son preference* measures the economic valuation of women and is based on a *missing women* variable that measures an extreme form of preferring boys over girls based on information of the female population that has died as a result of gender inequality. The last subindex *Ownership rights* covers the access of women to several types of property: land, credits and property other than land. The values of the SIGI and of all the subindices are between 0 and 1. The value 0 means no or very low inequality and the value 1 indicates high inequality.

The SIGI combines the five subindices into a multidimensional measure of deprivation of women in a country. It is inspired by the Foster-Greer-Thorbecke poverty measures (Foster, Greer, and Thorbecke, 1984) and aggregates gender inequality in several dimensions measured by the subindices. The underlying methodology of construction leads to penalization of high inequality in each dimension and allows only for partial compensation between dimensions.

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[3] The data are available at the web-pages http://www.wikigender.org and http://www.oecd.org/dev/gender/gid.

[4] Countries where this information is not available are assigned scores based on the legality of polygamy.

For the specific five subindices the value of the index SIGI is calculated as follows.

$$
\begin{aligned}
\text{SIGI} \quad = \quad & \frac{1}{5} \left(\text{Subindex Family Code} \right)^2 + \frac{1}{5} \left(\text{Subindex Civil Liberties} \right)^2 \\
+ \quad & \frac{1}{5} \left(\text{Subindex Physical Integrity} \right)^2 + \frac{1}{5} \left(\text{Subindex Son preference} \right)^2 \\
+ \quad & \frac{1}{5} \left(\text{Subindex Ownership Rights} \right)^2
\end{aligned}
\tag{1}
$$

The main shortcoming of these indices is that they cover only developing countries. This is due to the fact that the variables used as input do not measure relevant social institutions related to gender inequalities in OECD countries. Further research is required to develop appropriate measures for developed countries. Nevertheless, these social institutions indicators are innovative measures of the social, economic and political valuation of women and add information to other existing measures of gender inequality in well-being and empowerment such as the Gender-Related Development Index (GDI) and the Gender Empowerment Measure (GEM) (United Nations Development Programme, 1995), the Global Gender Gap Index from the World Economic Forum (Lopez-Claros and Zahidi, 2005), the Gender Equity Index developed by Social Watch (Social Watch, 2005), the African Gender Status Index proposed by the Economic Commission for Africa (Economic Commission for Africa, 2004). The SIGI and its subindices focus on the roots of gender inequality in a society and not on gender inequality in outcomes. The ranking of countries according to the SIGI and its subindices is presented in Table 1.

3 Social Institutions and Household Decisions

In this section we review the existing literature about the potentials effects of social institutions related to gender inequality on the outcomes female education, fertility and child mortality. It is not in the scope of this study to develop a formal model that incorporates social institutions as a main variable and specifies the exact functional relationships. Instead, we use existing theories that give hints on how social institutions operate. We focus on the microeconomic literature as we assume that the effect of social institutions related to gender inequality operates at the micro-level affecting decisions of households. This literature provides the necessary micro-foundation for our empirical analysis which as a consequence of our aggregated country data can only be conducted at the macro-level.

We use the non-unitary approach to the household and the method of Net Present Value to illustrate the effect of social institutions related to gender inequality on the outcomes female education, fertility and child mortality. Non-unitary household models show that

household decisions are the result of the distribution of bargaining power in the household. The essence is that outcomes are affected by who takes the decision. Common to the non-unitary models, that were initiated by Manser and Brown (1980) and McElroy and Horney (1981), is a game-theoretic approach to the household. Husband and wife have their own utility function, $U^h(c^h)$ for the husband and $U^w(c^w)$ for the wife, that depend each on the consumption of private goods c. They bargain over the allocation of resources to maximize their utility. In the case they do not reach agreement they receive a payoff which corresponds to an individual 'threat point', $P^h(\mathbf{S}, Z)$ and $P^w(\mathbf{S}, Z)$ which comprises the utilities associated with non-agreement.[5] $\mathbf{S}$ and Z are defined below.[6] The implication of non-unitary models is that household members do not simply pool resources and that inequality in power may cause inequality in outcomes (Kanbur, 2003; Pollak, 2003, 2007; Lundberg and Pollak, 2008). Empirical evidence shows that bargaining takes place and that who controls resources in the household significantly affects allocation decisions and that decisions by women differ from those taken by men (e.g. Thomas, 1990, 1997; Schultz, 1990; Lundberg, Pollak, and Wales, 1997; Haddad and Hoddinott, 1994; Rasul, 2008).

If husband and wife have to take decisions about their sons and daughters which will affect the future then the consideration of who takes the decision must be complemented with that of time. The method of the Net Present Value (NPV) allows to take into account not only present but also future costs and returns to investments in boys and girls (e.g. King and Hill, 1993, chapter 1). The NPV affects the decision of the household members. To simplify the illustration we ignore that bargaining takes place and name the decision-maker 'parents'. The maximization of utility in a multi-period model leads parents to consider the costs and returns of their investment in their children. This private calculation of parents at period $t = 1$ can then be represented with the NPV of the investment in a child, with $NPV = \sum_{t=1}^{T} \frac{R(\mathbf{S}, Z)_t - K(\mathbf{S}, Z)_t}{(1+r)^t}$ where T is the number of time periods considered, R represents the returns, K the costs of investments in a child, and r represents the discount rate. Like the threat point P in the non-unitary models, R and K are functions of $\mathbf{S}$ and Z that will be explained below. If the NPV is positive parents decide to invest in a child.

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[5] The threat point may be external to the marriage. In this case it corresponds to the individual's utility outside the family in case of divorce, as it is modeled in the divorce threat models of Manser and Brown (1980) and McElroy and Horney (1981). In the separate spheres bargaining models of Lundberg and Pollak (1993) the threat point is internal to the marriage and is the utility associated with a non-cooperative equilibrium within marriage given by traditional gender roles and social norms.

[6] Using Nash-Bargaining a solution to these non-unitary models can be found. Husband and wife maximize the Nash product function $N = [U^h(c^h - P^h(\mathbf{S}, Z)][U^w(c^w - P^w(\mathbf{S}, Z)]$, that is subject to a pooled budget constraint. The result is the demand function $c^i = f^i(p, y, \mathbf{S}, Z)$ with p for prices, y for total household income and $i = w, h$ (Lundberg and Pollak, 2008).

Gender inequality in the investments in boys and girls arises if the *NPV* of boys is larger then the one of girls.[7]

Finally, let us explain **S** and *Z*. **S** can be defined as 'extrahousehold environmental parameters' (McElroy, 1990) or 'gender-specific environmental parameters' (Folbre, 1997) that influence the threat point in the non-unitary household models and the *NPV* of a child. We consider that **S** can be best described as *social institutions related to gender inequality*. *Z* represents all other influential factors besides **S** that affect the threat point in the non-unitary model and the *NPV* of a child.

3.1 Social Institutions and Female Education

There are several ways how social institutions related to gender inequality might affect the costs and returns of educational investments.[8] Social institutions related to gender inequality influence the costs of education as they shape gender roles related to the division of labor and the opportunity costs of educating girls. Opportunity costs include income from child labor and are higher for girls when they are expected to do housework, to care for their younger siblings or to work in agriculture. Boys are in general less engaged in household production. Moreover, traditions like paying a dowry increase costs and negatively affect parents' decision to educate their daughters (Hill and King, 1995; Lahiri and Self, 2007).

Social institutions related to gender inequality also affect the returns to education. They are generally lower for girls than for boys because girls and women are discriminated on the labor market in the form of entry restrictions and wage gaps. Thus, boys are expected to be economically more productive. They become or are by tradition the building block of their parents' old-age security. Moreover, parents cannot expect or expect low returns from female education when the daughter marries and leaves the house implying that the family loses her labor force (Pasqua, 2005; Song, Appleton, and Knight, 2006). Another issue that may be considered by the parents' calculation is receiving a bride price that does not compensate the investments in the education of a girl (Hill and King, 1995).

In addition to these considerations, social institutions related to gender inequality can affect the supply of schooling which might reduce incentives to send girls to school.

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[7] See Pasqua (2005) who considers both perspectives, the non-unitary approach to the household and the cost and returns approach in the case of education of girls.

[8] It must be noted that the private *NPV* of investments in the education of children does not correspond to the social *NPV*. Social returns to education, especially female education, are often higher than the private ones. There is evidence that society benefits from female education as it contributes to overall development and drives economic growth (Hill and King, 1995; Klasen, 2002; Braunstein, 2007; Klasen and Lamanna, 2009). The resulting investment in female education will then often be sub-optimal.

School environments that are hostile to the needs of girls could influence parents' decision to send girls to school. Examples are that no latrines are provided, no female teachers are available, distances to school are too long or prices favor boys (Hill and King, 1995; Alderman, Behrman, Ross, and Sabot, 1996; Pasqua, 2005; Lahiri and Self, 2007).

The costs and returns perspective does not rule out that the distribution of decision-making power in the household matters, too. The non-unitary household approach is also useful to explain low female education (Pasqua, 2005). Several empirical studies show that when women dispose of more resources, investments in the education of girls are higher (e.g. Schultz, 2004; Emerson and Souza, 2007).

Hypothesis 1: Social institutions that deprive women of their autonomy and bargaining power in the household or that increase the private costs and reduce the private returns to investments into female education are associated with lower female education than can be expected in a more egalitarian environment.

3.2 Social Institutions and Fertility and Child Mortality Rates

Social institutions related to gender inequality that restrict female decision-making power in the household and reduce the NPV of the investment in girls in comparison to boys do not only lead to low female education but also to higher fertility levels and higher child mortality.

We first focus on fertility. Using a non-unitary household approach it can be argued that the utility of a woman associated with getting a child might be different from the utility of a man. The utility women derive from children is lower than the one of men as women bear most of the costs of having children. These costs are related to the discomfort of pregnancy, health risks related to pregnancy, and the income losses associated with time spent on child care. This might explain why women might want less children than men, but cannot achieve their objectives in the presence of social institutions that restrict their power in limiting the number of children born. Empirical studies support the hypothesis that reduced female bargaining power leads to shorter time spans between births, a lower use of contraceptives and higher fertility levels (Thomas, 1990; Abadian, 1996; Hindin, 2000; Saleem and Bobak, 2005; Seebens, 2008).

The perspective of the NPV gives a second explanation for higher fertility if there are social institutions that favor gender inequality. In the absence of well-functioning insurance markets and pension systems, parents in developing countries may need more children to feel secure. Depending on the costs of a child and the returns to the invest-

ment in a child parents will consider to get more children.[9] As it was explained in the previous subsection on female education, social institutions related to gender inequality affect the *NPV* of investments in children. If these social institutions lower income earning opportunities for girls, the *NPV* of investments in girls will be lower than the *NPV* of investments in boys so that sons often yield the promise of more economic security than daughters do. As long as parents cannot perfectly control the sex of their offspring, they will bear more children to increase the chance of having more sons (Cain, 1984; Abadian, 1996; Kazianga and Klonner, 2009).

Child mortality is our next development outcome of interest. To explain higher child mortality levels in the presence of social institutions that disadvantage women one has to consider that mothers are usually the primary caregivers of children in developing countries. In line with the non-unitary approach, if mothers have only limited power in the household and are not free to take decisions, they are constrained in the use of health care or in the access to food and other goods necessary for children and cannot take care of their children as they would without those restrictions. This might lead to worse child health and higher child mortality rates (Thomas, 1990, 1997; Bloom et al., 2001; Smith, Ramakrishnan, Ndiaye, Haddad, and Martorell, 2002; Maitra, 2004; Shroff, Griffiths, Adair, Suchindran, and Bentley, 2009).

From the *NPV* perspective it might be rational for parents to invest more in the health and nutrition of boys than in girls who as a consequence could suffer more heavily from health problems and experience higher mortality rates than boys. It is possible that this behavior increases overall child mortality rates. Moreover, the limited education and information that women typically experience in patriarchal societies as a result of past *NPV* calculations of their parents or as a result of lacking opportunities for information in the society might also lead to worse child health as measured e.g. by anthropometric indicators and to higher child mortality figures (Schultz, 2002; Shroff et al., 2009).

Hypothesis 2: Social institutions related to gender inequality that deprive women of their autonomy and bargaining power in the household or that increase the private costs and reduce the private returns of investments into girls are associated with higher fertility levels and higher child mortality than would be expected in an egalitarian environment.

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[9] Women might be even more dependent on their children than their husbands if they live in an environment of social institutions hostile to women where they lack access to resources, financial security and legal protection.

4 Social Institutions and the Society: Governance

Social institutions related to gender inequality do not only influence household behavior, they also determine the place women have in society. In societies where social institutions limit the rights of women, their access to resources and protection, and where women's place is restricted to the private sphere, they usually have only a limited say in the public and political domain. They have only few possibilities to organize themselves in women's associations as well as to enter the political arena. What is the impact of social institutions related to gender inequality on governance?

Various disciplines (economics, politics and sociology) consider the issue of governance at all levels and sectors of a society. Although there is a variety of definitions of the concept, common to the different approaches are issues like responsiveness, steering and governability, accountability and legitimacy. We rely on the general definition of Kaufmann, Kraay, and Mastruzzi (2008, p. 7) who developed several well-known governance indicators and defined governance "broadly as the traditions and institutions by which authority in a country is exercised. This includes the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them." The World Bank states that in general gender inequalities come at the cost of governance (World Bank 2001). Evidence and causal mechanisms are rather suggestive. There are at least two explanations of why social institutions consolidating gender roles hinder high quality governance.

First, there exist psychological and sociological explanations that center on arguments that women are less corrupt and less egoistic than men. They are more risk-averse and tend to follow the rules. Moreover, women's socialization is more community-oriented and hence, women often represent not only their needs but also the needs of other social groups (Dollar, Fisman, and Gatti, 2001; Swamy et al., 2001). Therefore, societies that give women economic and political power will have a political system that is more rule oriented, responsive and accountable compared to a society where women's participation is oppressed.

Second, women's movements have played and play a major role in increasing the quality of political systems (Waylen, 1993; Tripp, 2001). Tripp (2001) states for African countries (notably Eastern and Southern Africa) that women's movements represent one of the most important forces challenging neopatrimonial rule that finds expression in patronage, clientelism and personal rule. Political reforms at the beginning of the 1990s in form of free and competitive elections, freedom of expression and association, and

multi-party systems were not sufficient to end the praxis of neopatrimonialism. Nevertheless, these reforms strengthened social forces like the movement of women that started to demand the rule of law, transparency, responsiveness and accountability. In the beginning, governments and political parties affiliated women to the system as they wanted them to be part of it and to weaken their opposition. But women realized that they neither got access to formal political positions nor access to the benefits of clientelism. The denied access to power and participation in the political arena and in the economy that had existed for years drove women to develop a different relation to the state and to the execution of power than men. Especially, being part of an autonomous movement women could claim the rule of law, equality and transparency. Moreover, by cross-cutting cleavages like ethnicity or religion women's movements did not only gain members but also hindered clientelistic practices that go along those lines. Although there are no quantified and universal results about the real effects of the power of women's movements in increasing the quality of political systems, this argumentation might be suggestive about why countries with high gender inequality in social institutions might display a bad quality of governance. It might be because such social institutions hinder women in the first stage, namely to organize themselves and to express their interests.[10]

Hypothesis 3: Social institutions related to high gender inequality inhibit the building blocks of good governance. In societies with social institutions favoring gender inequality political systems will be less responsive and less open to the citizens, so that voice and accountability will be reduced.

Hypothesis 4: Social institutions related to high gender inequality inhibit the building blocks of good governance. In societies with social institutions favoring gender inequality there might be more personal rule in the political system as well as inequality in justice and legal systems, so that the rule of law will be weakened.

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[10] Another potential but controversial explanation is that in societies where social institutions favoring gender inequality prevail, there is also a lack of tolerance, and personal freedom and individual autonomy are restricted (Norris and Inglehart, 2002; Rizzo, Abdel-Latif, and Meyer, 2007). The missing of these democratic values as a major basis for a well-functioning political system negatively affects the governance of a society. Even if a democracy is installed, groups that favor gender inequality and use democratic procedures to get in power raise the danger to undermine democratic principles and will work against the building blocks of governance, i.e. against responsiveness and equality before the law.

5 Data

Our investigation uses macro-data at the country level. Table 2 gives an overview over the variables used for our estimations, the definitions and the data sources. Descriptive statistics of the variables used are presented in Table 3. As main regressors we use the SIGI and its five subindices Family code, Civil liberties, Physical integrity, Son Preference and Ownership rights in our estimations to check their explanatory value for the development outcomes female education, fertility, child mortality and governance.

First, we are interested in the impact of social institutions on female education, fertility and child mortality. As dependent variables we use *total fertility rates* from World Bank (2009) and *child mortality rates* from United Nations (2009). To measure education we choose *female gross secondary school enrollment rates* because this enables important functionings and empowers women. Furthermore we assume that parents take into account that basic education of both boys and girls is necessary for fulfilling tasks related to the household. Data for secondary school enrollment are from World Bank (2009).

Second, we want to estimate the association between governance and our social institutions measures. We use the Governance Indicators developed by Kaufmann et al. (2008) and choose two of them to capture equality before the law, justice, tolerance and security as well as responsiveness, political openness and accountability in the political system. The *rule of law* index measures the extent to which contracts are enforced and property rights are ensured and the extent to which people trust in the state and respect the rules of the society. The *voice and accountability* index proxies civil and political liberties like freedom of expression, freedom of association, free media and the extent of active and passive political participation of citizens.

In all regressions we control for the level of economic development, religion, region and the political system in a country. The specific variables we use are:

- the log of per capita GDP in constant prices to control for the level of economic development (US$, PPP, base year: 2005);

- a Muslim majority and a Christian majority dummy to control for the impact of religion, the left-out category being countries that have neither a majority of Muslim nor a majority of Christian population;

- region dummies to capture geography and other unexplained heterogeneity that might go together with region, the left-out category being Sub-Saharan Africa;

- two political institutions variables, the electoral democracy variable and the civil liberties index from Freedom House (2008) that together measure liberal democracy

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which is assumed to be related to responsiveness to the needs of the public, political openness and tolerance in a country.[11]

To reduce omitted variable bias, we use different additional control variables in each regression following suggestions in the literature. In the fertility and child mortality regressions, we additionally control for

- female literacy rates to measure the ability of women to control their reproductive behavior, to care for themselves and their children (e.g. Basu, 2002; Hatt and Waters, 2006);

- a dummy proxying for high HIV/AIDS prevalence rates to control for extreme health problems especially in Sub-Saharan Africa due to AIDS (e.g. Foster and Williamson, 2000).

The Governance regressions exclude as control variables the civil liberties index from Freedom House as this index is used to build the voice and accountability index that we choose as dependent variable. We keep the electoral democracy variable because it does not pose a problem. We additionally include as control variables

- ethnic fractionalization as it might disturb governance through identity politics, patronage and distribution conflicts (e.g. Collier, 2001; Tripp, 2001);

- a measure of trade openness as openness increases the incentives to build 'good' institutions to attract trading partners, to join trading agreements etc. (e.g. Al-Marhubi, 2005).

Social institutions, i.e. normative frameworks, only change slowly and incrementally. As the social institutions indicators are not expected to change much over time we have to decide which year or time span should be covered by the other variables. For our response variables we choose to take the average of the existing values over five or six years (2000-2005, 2001-2005). For the control variables we take the averages of the existing values over ten years (1996-2005).[12] These averages allow us to take into account a delay of five years between dependent and independent variables that first assures to reduce possible endogeneity problems and second to capture time delays until possible effects can be observed. Nevertheless, the choice of the time span is rather arbitrary.

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[11] We multiply the civil liberties index by -1 to facilitate interpretation.

[12] The ethnic fractionalization variable is constant over time as changes in the ethnic composition of a country at least over 20 and 30 years are rare.

6 Empirical estimation and Results

6.1 Empirical estimation

We empirically test with linear regressions whether the composite measures reflecting social institutions related to gender inequality s_i are associated with several response variables y_i, representing the chosen development outcomes. As was discussed previously, we consider that social institutions related to gender inequality are relatively stable and long-lasting. Therefore, we assume that they do not depend on the response variable for the period considered.

We run regressions as

$$y_i = \gamma + \beta s_i + \text{control variables}_i + \varepsilon_i \tag{2}$$

and use information at the country level. We are mainly interested in testing the null hypothesis that the coefficient β is zero at a statistical significance level of $\alpha = 5\%$. If the null hypothesis is rejected, it is reasonable to infer that the measure proxying for social institutions related to gender inequality does matter for the given response variable, as predicted in the hypothesis from sections 3 and 4.

The general procedure used for each of the response variables consists of two steps. First, we start examining the effect of SIGI. We begin our estimation with a simple linear regression with SIGI as the only regressor s_i. We then run a multiple linear regression adding the main group of control variables that consists of the level of economic development, region dummies, religion dummies and the political system variables. If SIGI is significant in this regression, we continue and, if applicable, estimate the complete model with all identified control variables to confirm whether SIGI remains significant.

As SIGI is a rather broad measure to rank and compare countries and policy implications are difficult to derive from it, in a second step we focus on the subindices to get a more precise idea about what kind of social institutions might be related to the chosen development outcomes. We estimate the same multiple linear regression(s) described above using the five subindices as s_i one at a time instead of SIGI to explore which dimension of social institutions related to gender inequality seems to be the most relevant. In the corresponding regression tables we only report the specification with the subindex that is statistically significant. In the case that more than one subindex is significant, we run an additional regression including simultaneously all the subindices that are significant when included one by one. In all cases only one of them remains statistically significant. This is the one which is reported in the regression table. It must be noted that we keep and show

even those control variables that are not statistically significant in the regression, as we want to stress that our social institutions indicators are associated with the development outcomes even if we include these control variables.

All regressions are estimated with Ordinary Least Squares (OLS). Regression diagnostics not reported here suggest that heteroscedasticity is a possible issue in our data and that there are influential observations that could drive our results. Concerning the first issue, it is known that if the model is well specified, the OLS estimator of the regression parameters remains unbiased in the presence of heteroscedasticity, but the estimator of the covariance matrix of the parameter estimates can be biased and inconsistent making inference about the estimated regression parameters problematic. Violations of homoscedasticity can lead to hypothesis tests that are not valid and confidence intervals that are either too narrow or too wide. To deal with heteroscedasticity, we use 'heteroscedasticity-consistent' (HC) standard errors. This means that while the parameters are still estimated with OLS, alternative methods of estimating the standard errors that do not assume homoscedasticity are applied. As the samples we use contain less than 150 observations, we use HC3 robust standard errors proposed by Davidson and MacKinnon (1993), which are better in the case of small samples. These are the standard errors that are presented in the regression Tables 4-8. Simulation studies by Long and Ervin (2000) have shown that HC standard error estimates tend to maintain test size closer to the nominal alpha level in the presence of heteroscedasticity than OLS standard error estimates that assume homoscedasticity. These authors recommend the use of HC3 robust standard errors, especially for sample sizes less than 250, as they can keep the test size at the nominal level regardless of the presence or absence of heteroscedasticity, with only a minor loss of power associated when the errors are indeed homoscedastic.[13]

In addition to this, we also use bootstrap with 1000 replications to compute a Bias-corrected and accelerated (Bca) 95% confidence interval of the regression coefficients computed with OLS (Efron and Tibshirani, 1993). One of the main advantages of bootstrapping methods is that no assumptions about the sampling distribution or about the statistic are needed. The results are not reported here, but are available upon request, and confirm that all the coefficients that are significant at the 5% level in Tables 4-8 remain significant when using Bias-corrected and accelerated (Bca) 95% confidence intervals around them.

To deal with the second issue and check whether influential observations drive the

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[13] Certainly, heteroscedasticity-consistent standard errors are not a panacea for inferential problems under heteroscedasticity. As pointed out by some authors, there are limitations and trade-offs in these estimators (e.g. Kauermann and Carroll, 2001; Wilcox, 2001).

results, we use estimates of a regression obtained with OLS with standard variance estimator to detect the observations with unusual influence or leverage using Cook's distance. Cook's distance is a commonly used estimate of the influence of a data point when doing least squares regression. We exclude countries from the sample if the value of Cook's distance is larger than $4/n$, with n being the number of observations, and re-estimate each regression on the restricted sample with HC3 robust standard errors. In all the cases we confirm that even after we exclude influential observations, the results remain basically unchanged.[14] The regressions are not reported here, but are available upon request.

6.2 Results

Results using *female secondary education* as dependent variable are presented in Table 4. Regression (1) with SIGI as the only regressor yields a negative and statistically significant association. Higher levels of inequality are associated with lower levels of female secondary education. The association vanishes in regression (2) if one includes the level of economic development, religion, region and the political system as control variables. Using the subindex Family code instead of SIGI as the main regressor in regression (3) shows a different picture. The subindex is statistically significant even if the control variables are included. The adjusted coefficient of determination R^2 is 0.78. Hence, we find no evidence against Hypothesis 1 that states that social institutions related to high gender inequality have a negative impact on female education.

Results obtained using *total fertility rate* and *child mortality* as response variables are shown in Tables 5 and 6. In both cases, the simple linear regression (1) using SIGI as the only regressor shows a positive and significant statistical association between SIGI and the response variable. Higher levels of inequality are associated with higher levels of fertility and with higher levels of child mortality. However, once control variables related to the level of economic development, religion, region and the political system in a country are included in regression (2), SIGI is not longer statistically significant. This is not the case when we use the Subindex Family code as the main regressor, as it is significant in regression (3) which uses the same control variables, and even in regression (4) which adds two additional regressors: the share of literate adult female population and a dummy reflecting high adult HIV/AIDS prevalence. In regression (4) the obtained adjusted R^2 is

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[14] An alternative to this procedure would have been the use of robust regression, for example using iteratively reweighted least squares as described in Hamilton (1992). In this approach, a regression is run with ordinary least squares, then case weights based on absolute residuals are calculated, and a new regression is performed using these weights. The iterations continue as long as the maximum change in weights remains above a specified value.

0.84 for fertility and 0.82 for child mortality. Hence, we cannot reject Hypothesis 2, suggesting that social institutions related to high gender inequality are associated with higher fertility levels and higher child mortality.[15] As the subindex Family code is the relevant social institutions measure in our empirical estimations it seems that social institutions that deprive women of their autonomy and bargaining power in the family and that might restrict women's possibilities outside the family do matter for female education, fertility and child mortality.

Table 7 shows the results obtained for the dependent variable *voice and accountability*. Regression (1) with SIGI as the only regressor shows a negative and statistically significant association: higher levels of gender inequality are associated with lower levels of voice and accountability. This association remains significant in regression (2) where we add the level of economic development, religion, region and the political system[16] as control variables, and in the complete specification shown in regression (3) where we additionally include the proportion of seats held by women in national parliaments, the literacy rate of the population, a measure of openness of the economy, and a measure of ethnic fractionalization. In regression (3), we obtain an adjusted R^2 of 0.69. Although SIGI is significant in the complete model we explore which dimension of social institutions related to gender inequality is behind this result and find that it is the subindex Civil liberties. The specifications with the subindex Civil liberties in regressions (4) and (5) show that this subindex is negatively associated with voice and accountability and that this association is statistically significant even with the control variables. In regression (5) the adjusted R^2 is 0.69. Hypothesis 3 cannot be rejected with this evidence suggesting that social institutions related to gender inequality inhibit the building blocks of good governance in the form of voice and accountability. The subindex Civil liberties is the relevant social institutions measure in our empirical estimations. The freedom of women to participate in public life seems to increase the quality of governance of a society. Relating back to theory, this could be due to the behavior of women as they tend to be more socially oriented than men and are a group that cross-cuts cleavages in general.

Results for the other component of governance, *rule of law*, are shown in Table 8, providing evidence for Hypothesis 4. Regression (1) shows a negative and statistically significant association between SIGI and rule of law: higher levels of inequality are associated with lower levels of rule of law. This association remains significant in regression

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[15] Regressions not shown here, but available upon request, confirm that the results concerning mortality rates hold when using infant mortality rate instead of child mortality rate as the dependent variable.

[16] Recall that in the governance regressions we only include the electoral democracy variable of Freedom House (2008) as the civil liberties index is included in the chosen governance indicators which are now the response variables.

(2) where we add the level of economic development, religion, region and the political system as control variables, and in the complete specification (regression (3)) where we additionally include the proportion of seats held by women in national parliaments, the literacy rate of the population, a measure of openness of the economy, and a measure of ethnic fractionalization. In this last regression, we obtain an adjusted R^2 of 0.51. Again we are interested in exploring which dimension of social institutions related to gender inequality is the relevant one for rule of law. We find that it is the subindex Ownership rights. The specification with this subindex yields similar results and is presented in regressions (4) and (5). In the last regression the adjusted R^2 is 0.56. As postulated in Hypothesis 4, social institutions related to gender inequality seem to matter for governance inhibiting the rule of law, e.g. through personal rule and inequality in justice. Women's access to property might increase their opportunities to gain power in economic and political life. Assuming that their attitudes are different than those of men and that they countervail clientelism and injustice, their increased power contributes to improve rule of law.

7 Conclusion

This study presents several answers to the question why we should care about social institutions related to gender inequality beyond the intrinsic value of gender equality. We derive hypotheses from existing theories and empirically test them with linear regression at the cross-country level using the newly created Social Institutions and Gender Index (SIGI) and its subindices. Our results show that social institutions related to gender inequality are associated with lower female secondary education, higher fertility rates, higher child mortality and lower levels of governance measured as voice and accountability and rule of law. We find that apart from geography, political system, religion and the level of economic development, one has to consider social institutions related to gender inequality to better account for differences in important development outcomes.

The empirical estimation follows a two-step procedure for each outcome measure. First, the focus is to examine the explanatory value of the SIGI. In the specifications including all control variables, the SIGI is significant in the regressions for the governance measures voice and accountability and rule of law. If one interprets the SIGI as a summary measure of lack of power of women in all spheres of the society then it seems that when women have more power governance is better.[17] In the case of female secondary schooling, fertility rate and child mortality the SIGI turns out to be insignificant in the

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[17] The association between two composite measures like the SIGI and the governance indicators has to be interpreted carefully.

complete specifications.

Second, as the SIGI is a broad measure of social institutions related to gender inequality, we investigate which particular dimension of social institutions is significantly related to the chosen development outcomes using the complete specifications. The subindex Family code is negatively associated with female education, fertility and child mortality. These results suggest that social institutions that deprive women of their autonomy and bargaining power in the family do matter for female education, fertility and child mortality. The subindex Civil liberties is the dimension of social institutions that is significantly related to the governance component voice and accountability. The freedom of women to participate in public life seems to increase the quality of governance of a society as women tend to be more socially oriented than men and are a group that cross-cuts cleavages in general. The rule of law component of governance is negatively related to the subindex Ownership rights. This could indicate that women's access to property helps them to increase their economic and political power. Assuming women are different then men with regard to rule-orientation, their increased power contributes to improve rule of law.

Although the subindices Family code, Ownership rights and Civil liberties are the more important dimensions of social institutions related to gender inequality for the response variables considered in this study, this does not mean that the other two subindices Son preference and Physical integrity are not important intrinsically.

Case studies investigating the mechanisms between social institutions and the outcome variables are necessary. Our study has the limitations of any cross-sectional regression analysis as we cannot rule out omitted variable bias. Causality can never be derived from regression analysis with cross-sectional data unless at least valid instruments are found. Concerning the results of the subindices, these should be considered exploratory and need to be confirmed with further research which should also include the elaboration of appropriate theories linking social institutions related to gender inequality with each of the development outcomes used in this study.

Social institutions are long-lasting and deep-seated in people's minds. Changing them is a difficult task and requires approaches tailored to the particular needs and the socio-economic context (Jütting and Morrisson, 2005). The state certainly can help attenuate the effects of social institutions through specific policies. It may set incentives to counteract social institutions, e.g. in the form of laws to fight against discriminatory practices or through the implementation of programs favoring girls and women. Micro-credit programs or subsidies targeted at mothers are good examples here. Nevertheless, changing social institutions needs more than that. It needs a thorough understanding of the power

relations in a country and people that are willing to become reform drivers and initiate learning processes that should be complemented by deliberation and public discussion at all levels of society. Be it through internal or external forces, women need help to empower themselves. That is what Sen calls 'agency of women' (Sen, 1999).

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Appendix

Rankings of Countries according to the SIGI and its Subindices

Table 1: Rankings of Countries according to the SIGI and its Subindices

Country	SIGI		Family code		Civil liberties		Physical integrity		Son preference		Ownership rights	
	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value
Paraguay	1	0.0024832	19	0.0689011	1	0	3	0.0875702	1	0	1	0
Croatia	2	0.0033300	3	0.0081060	1	0	9	0.1287797	1	0	1	0
Kazakhstan	3	0.0034778	5	0.0283710	1	0	9	0.1287797	1	0	1	0
Argentina	4	0.0037899	13	0.0486361	1	0	9	0.1287797	1	0	1	0
Costa Rica	5	0.0070934	23	0.0810601	1	0	15	0.1699892	1	0	1	0
Russian Federation	6	0.0072524	35	0.1402772	1	0	9	0.1287797	1	0	1	0
Philippines	7	0.0078831	8	0.0405301	1	0	3	0.0875702	1	0	53	0.1735059
El Salvador	8	0.0082581	17	0.0648481	1	0	3	0.0875702	1	0	43	0.1715123
Ecuador	9	0.0091447	24	0.0891661	1	0	3	0.0875702	1	0	53	0.1735059
Ukraine	10	0.0096900	8	0.0405301	1	0	23	0.2163499	1	0	1	0
Mauritius	11	0.0097590	11	0.0445831	1	0	23	0.2163499	1	0	1	0
Moldova	12	0.0098035	12	0.0470149	1	0	23	0.2163499	1	0	1	0
Bolivia	13	0.0098346	13	0.0486361	1	0	23	0.2163499	1	0	1	0
Uruguay	14	0.0099167	15	0.0526891	1	0	23	0.2163499	1	0	1	0
Venezuela, RB	15	0.0104259	21	0.0729541	1	0	23	0.2163499	1	0	1	0
Thailand	16	0.0106770	41	0.1564892	1	0	15	0.1699892	1	0	1	0
Peru	17	0.0121323	15	0.0526891	1	0	33	0.2405940	1	0	1	0
Colombia	18	0.0127270	21	0.0729541	1	0	15	0.1699892	1	0	43	0.1715123
Belarus	19	0.0133856	4	0.0243180	1	0	34	0.2575594	1	0	1	0
Hong Kong, China	20	0.0146549	26	0.1038001	1	0	1	0	89	0.25	1	0
Singapore	21	0.0152573	25	0.0997471	1	0	34	0.2575594	1	0	1	0
Cuba	22	0.0160304	28	0.1175371	1	0	34	0.2575594	1	0	1	0
Macedonia, FYR	23	0.0178696	39	0.1516949	1	0	34	0.2575594	1	0	1	0
Brazil	24	0.0188021	19	0.0689011	1	0	48	0.2987690	1	0	1	0
Tunisia	25	0.0190618	32	0.1273769	1	0	9	0.1287797	89	0.25	1	0

Table 1 – continued from previous page

Country	SIGI		Family code		Civil liberties		Physical integrity		Son preference		Ownership rights	
	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value
Chile	26	0.0195128	34	0.1390898	1	0	23	0.2163499	1	0	56	0.1772301
Cambodia	27	0.0220188	38	0.1443302	1	0	48	0.2987690	1	0	1	0
Nicaragua	28	0.0225149	33	0.1296962	1	0	34	0.2575594	1	0	43	0.1715123
Trinidad & Tobago	29	0.0228815	39	0.1516949	1	0	15	0.1699892	89	0.25	1	0
Kyrgyz Rep.	30	0.0292419	42	0.1598009	1	0	48	0.2987690	1	0	56	0.1772301
Viet Nam	31	0.0300619	6	0.0324240	1	0	60	0.3863392	1	0	1	0
Armenia	32	0.0301177	7	0.0364770	1	0	60	0.3863392	1	0	1	0
Georgia	33	0.0306926	17	0.0648481	1	0	60	0.3863392	1	0	1	0
Guatemala	34	0.0319271	27	0.1053781	1	0	54	0.3451297	1	0	43	0.1715123
Tajikistan	35	0.0326237	47	0.2595481	1	0	34	0.2575594	1	0	43	0.1715123
Honduras	36	0.0331625	44	0.2160969	1	0	54	0.3451297	1	0	1	0
Azerbaijan	37	0.0339496	37	0.1431428	1	0	60	0.3863392	1	0	1	0
Lao PDR	38	0.0357687	51	0.3203431	1	0	23	0.2163499	1	0	43	0.1715123
Mongolia	39	0.0391165	30	0.1200122	1	0	48	0.2987690	89	0.25	43	0.1715123
Dominican Rep.	40	0.0398379	28	0.1175371	1	0	34	0.2575594	1	0	58	0.3450181
Myanmar	41	0.0462871	35	0.1402772	1	0	60	0.3863392	89	0.25	1	0
Jamaica	42	0.0484293	1	0.0040530	1	0	54	0.3451297	1	0	76	0.3507359
Morocco	43	0.0534361	48	0.2627905	1	0	9	0.1287797	89	0.25	58	0.3450181
Fiji	44	0.0545044	8	0.0405301	1	0	60	0.3863392	1	0	66	0.3487424
Sri Lanka	45	0.0591410	46	0.2340427	98	0.3006851	15	0.1699892	1	0	66	0.3487424
Madagascar	46	0.0695815	70	0.4113796	1	0	60	0.3863392	1	0	43	0.1715123
Namibia	47	0.0750237	58	0.3530730	1	0	34	0.2575594	89	0.25	66	0.3487424
Botswana	48	0.0810172	53	0.3216308	1	0	15	0.1699892	1	0	79	0.5222482
South Africa	49	0.0867689	73	0.4232618	84	0.2980757	23	0.2163499	1	0	58	0.3450181
Burundi	50	0.1069056	57	0.3354503	1	0	60	0.3863392	1	0	79	0.5222482
Albania	51	0.1071956	31	0.1228778	1	0	60	0.3863392	101	0.5	66	0.3487424
Senegal	52	0.1104056	99	0.6024997	1	0	45	0.2645464	1	0	58	0.3450181
Tanzania	53	0.1124419	81	0.4988582	1	0	22	0.2015119	1	0	79	0.5222482
Ghana	54	0.1126940	61	0.3662139	1	0	80	0.3957452	1	0	79	0.5222482
Indonesia	55	0.1277609	59	0.3540548	103	0.5987608	79	0.3936178	1	0	1	0
Eritrea	56	0.1364469	76	0.4553800	1	0	106	0.6891036	1	0	1	0
Kenya	57	0.1370416	63	0.3702669	1	0	46	0.2815227	1	0	111	0.6847302

Table 1 – continued from previous page

Country	SIGI		Family code		Civil liberties		Physical integrity		Son preference		Ownership rights	
	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value
Cote d'Ivoire	58	0.1371181	79	0.4901204	1	0	85	0.4345464	1	0	77	0.5064994
Syrian Arab Rep.	59	0.1381059	68	0.4026909	98	0.3006851	34	0.2575594	101	0.5	66	0.3487424
Malawi	60	0.1432271	60	0.3608732	84	0.2980757	88	0.4736178	1	0	79	0.5222482
Mauritania	61	0.1497032	71	0.4205634	98	0.3006851	103	0.6018251	1	0	58	0.3450181
Swaziland	62	0.1565499	86	0.5214396	84	0.2980757	60	0.3863392	1	0	79	0.5222482
Burkina Faso	63	0.1616069	88	0.5393882	1	0	104	0.6309179	1	0	58	0.3450181
Bhutan	64	0.1625080	43	0.2051253	84	0.2980757	54	0.3451297	118	0.75	1	0
Nepal	65	0.1672252	62	0.3677918	84	0.2980757	48	0.2987690	101	0.5	79	0.5222482
Rwanda	66	0.1685859	56	0.3297368	1	0	91	0.5151189	1	0	111	0.6847302
Niger	67	0.1755873	104	0.6488194	1	0	99	0.5248165	89	0.25	58	0.3450181
Equatorial Guinea	68	0.1759719	82	0.5029112	84	0.2980757	91	0.5151189	1	0	79	0.5222482
Gambia, The	69	0.1782978	103	0.6430297	1	0	102	0.5969762	1	0	66	0.3487424
Central African Rep.	70	0.1843973	92	0.5590215	1	0	101	0.5802916	1	0	79	0.5222482
Kuwait	71	0.1860213	83	0.5052276	103	0.5987608	34	0.2575594	101	0.5	1	0
Zimbabwe	72	0.1869958	80	0.4907522	84	0.2980757	59	0.3693737	1	0	111	0.6847302
Uganda	73	0.1871794	102	0.6369662	84	0.2980757	81	0.4105832	1	0	79	0.5222482
Benin	74	0.1889945	84	0.5063324	1	0	87	0.4687690	1	0	111	0.6847302
Algeria	75	0.1902440	69	0.4050073	103	0.5987608	60	0.3863392	101	0.5	43	0.1715123
Bahrain	76	0.1965476	52	0.3214722	103	0.5987608	60	0.3863392	101	0.5	66	0.3487424
Mozambique	77	0.1995442	109	0.6977612	84	0.2980757	60	0.3863392	1	0	79	0.5222482
Togo	78	0.2025180	96	0.5883301	1	0	86	0.4445249	1	0	111	0.6847302
Congo, Dem. Rep.	79	0.2044817	66	0.3903762	1	0	81	0.4105832	1	0	119	0.8375180
Papua New Guinea	80	0.2093579	50	0.2769745	1	0	60	0.3863392	118	0.75	78	0.5082487
Cameroon	81	0.2165121	89	0.5434412	84	0.2980757	90	0.4833154	1	0	109	0.6817546
Egypt, Arab Rep.	82	0.2176608	49	0.2664667	98	0.3006851	111	0.8227322	101	0.5	1	0
China	83	0.2178559	1	0.0040530	1	0	48	0.2987690	122	1	1	0
Gabon	84	0.2189224	107	0.6838656	84	0.2980757	91	0.5151189	1	0	79	0.5222482
Zambia	85	0.2193876	108	0.6919716	1	0	60	0.3863392	1	0	111	0.6847302
Nigeria	86	0.2199123	71	0.4205634	103	0.5987608	89	0.4784666	89	0.25	79	0.5222482
Liberia	87	0.2265095	87	0.5347034	1	0	107	0.7575595	1	0	79	0.5222482
Guinea	88	0.2280293	105	0.6714008	1	0	105	0.6454643	1	0	79	0.5222482
Ethiopia	89	0.2332508	55	0.3272618	1	0	109	0.7742441	1	0	108	0.6780117

Table 1 – continued from previous page

Country	SIGI		Family code		Civil liberties		Physical integrity		Son preference		Ownership rights	
	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value
Bangladesh	90	0.2446482	95	0.5833395	103	0.5987608	2	0.0412095	101	0.5	79	0.5222482
Libya	91	0.2601870	67	0.3928483	103	0.5987608	91	0.5151189	101	0.5	79	0.5222482
Unit. Arab Emirates	92	0.2657521	93	0.5619696	103	0.5987608	100	0.5318035	101	0.5	66	0.3487424
Iraq	93	0.2752427	77	0.4739084	103	0.5987608	98	0.5199677	101	0.5	79	0.5222482
Pakistan	94	0.2832434	64	0.3782142	103	0.5987608	47	0.2818035	118	0.75	79	0.5222482
Iran, Islamic Rep.	95	0.3043608	91	0.5579166	119	0.7809880	91	0.5151189	89	0.25	79	0.5222482
India	96	0.3181120	100	0.6065527	103	0.5987608	15	0.1699892	118	0.75	79	0.5222482
Chad	97	0.3225771	111	0.7932968	98	0.3006851	84	0.4321167	1	0	120	0.8404936
Yemen	98	0.3270495	97	0.5943937	119	0.7809880	60	0.3863392	101	0.5	79	0.5222482
Mali	99	0.3394930	112	0.7973498	1	0	114	0.9709072	1	0	58	0.3450181
Sierra Leone	100	0.3424468	98	0.6015940	1	0	110	0.7984881	1	0	121	0.8442366
Afghanistan	101	0.5823044	110	0.7159838	121	0.8177727	91	0.5151189	122	1	109	0.6817546
Sudan	102	0.6778067	106	0.6798126	122	1	111	0.8227322	101	0.5	122	1
Angola		NA	89	0.5434412	1	0		NA	89	0.25	79	0.5222482
Bosnia & Herzegovina		NA		NA	1	0	34	0.2575594	1	0	1	0
Chinese Taipei		NA		NA	1	0	3	0.0875702	101	0.5	1	0
Congo, Rep.		NA	101	0.6245013	1	0		NA	1	0	79	0.5222482
Guinea-Bissau		NA		NA		NA	107	0.7575595	1	0	111	0.6847302
Haiti		NA	65	0.3783729	1	0	54	0.3451297	1	0		NA
Israel		NA	45	0.2271240	1	0		NA	1	0	1	0
Jordan		NA	85	0.5173866	103	0.5987608		NA	101	0.5	79	0.5222482
Korea, Dem. Rep.		NA		NA	84	0.2980757	91	0.5151189	1	0	1	0
Lebanon		NA		NA	103	0.5987608	60	0.3863392	1	0	53	0.1735059
Lesotho		NA	94	0.5714864	84	0.2980757		NA	1	0	79	0.5222482
Malaysia		NA	53	0.3216308	103	0.5987608		NA	1	0	1	0
Occup. Palest. Terr.		NA	78	0.4860674	103	0.5987608		NA	1	0	66	0.3487424
Oman		NA	74	0.4536434	84	0.2980757		NA	101	0.5	66	0.3487424
Panama		NA		NA	1	0	8	0.1118143	1	0	1	0
Puerto Rico		NA		NA	1	0	23	0.2163499	1	0		NA
Saudi Arabia		NA	74	0.4536434	122	1		NA	101	0.5	79	0.5222482
Serbia & Montenegro		NA		NA	1	0		NA		NA	43	0.1715123
Somalia		NA		NA	103	0.5987608	113	0.8421274	1	0	111	0.6847302

Table 1 – continued from previous page

Country	SIGI		Family code		Civil liberties		Physical integrity		Son preference		Ownership rights	
	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value
Timor-Leste		NA		NA	1	0	83	0.4275487	89	0.25	79	0.5222482
Turkmenistan		NA		NA	1	0	60	0.3863392	1	0	79	0.5222482
Uzbekistan		NA		NA	1	0	60	0.3863392	1	0	1	0

7.1 Codebook

Table 2: Description and Sources of Variables

Variables	Definition	Source
Response Variables		
Fertility	Total fertility rate (births per woman)	World Bank (2009)
	(average of existing values over the last five years)	
Child mortality	Children under five mortality rate per 1,000 live births (year 2005)	United Nations (2009)
Female secondary school	School enrollment, secondary, female (% gross)	World Bank (2009)
	(average of existing values over the last five years)	
Voice and accountability	Index that combines several data sources based	Kaufmann et al. (2008)
	on expert perceptions of "the extent to which a country's citizens are	
	able to participate in selecting their government, as well as freedom	
	of expression, freedom of association, and a free media"	
	(Kaufmann et al., 2008);	
	(average of existing values over the last five years)	
Rule of law	Index that combines several data sources based on expert	Kaufmann et al. (2008)
	perceptions of "the extent to which agents have confidence in and	
	abide by the rules of society, and in particular the quality of contract	
	enforcement, property rights, the police, and the courts, as well as	
	the likelihood of crime and violence"	
	(Kaufmann et al., 2008);	
	(average of existing values over the last five years)	
Regressors		
SIGI	Social Institutions and Gender Index	Branisa et al. (2009)
Subindex family code	Subindex Family code	Branisa et al. (2009)
Subindex civil liberties	Subindex Civil liberties	Branisa et al. (2009)
Subindex physical integrity	Subindex Physical integrity	Branisa et al. (2009)
Subindex son preference	Subindex Son preference	Branisa et al. (2009)
Subindex ownership rights	Subindex Ownership rights	Branisa et al. (2009)
Literacy female	Share of literate adult female population (15+) (%) year 2000	World Bank (2009)
<td colspan="3" align="center">Continued on next page</td>		

Table 2 – continued from previous page

Variables	Definition	Source
	(average of the existing values over the last 10 years)	
Literacy population	Share of literate population (whole)	Human Development Report (HDR) stats office
	(average of the existing values over the last 10 years)	
GDP	Log of GDP per capita, PPP (constant 2005 international $)	World Bank (2008)
	(average over the last 10 years)	
FH civil liberties	-1 * Index that measures the extent to which countries ensure	Freedom House (2008)
	civil liberties including freedom of expression, assembly, association,	
	education, and religion as well as personal autonomy. It covers	
	whether there is an established and generally equitable system	
	of rule of law, free economic activity and equality of opportunity.	
	(scale -1 (best) to -7 (worst))	
	(average of the existing values over the last 10 years)	
Electoral democracy	Index that qualifies countries as electoral democracy when there	Freedom House (2008)
	exist competitive, universal and free and secret elections and a	
	multiparty system that can access the media for political	
	campaigning; (average of the existing values over the last 10 years)	
Parliament	Proportion of seats held by women in national parliaments (%)	World Bank (2009)
	(average of the existing values over the last 10 years)	
Aids	Adult (15-49) HIV prevalence percent by country, 1990-2007;	UNAIDS/WHO (2008)
	Countries were coded 1 if Adult (15-49) HIV prevalence rate	
	exceeds 5 per cent, otherwise 0.	
Ethnic	The ethnic fractionalization measure gives the probability that two	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
	individuals selected at random from a population are members of	
	different groups. It is calculated with data on language and origin	
	using the following formula $FRAC_j = 1 - \sum_{i=1}^{N} s_{ij}^2$,	
	where s_{ij} is the proportion of group $i = 1, \ldots,$	
	N in country j going from complete homogeneity (an index of 0)	
	to complete heterogeneity (an index of 1).	
Openness	Share of imports of goods and services of total GDP	World Bank (2008)
Muslim	Countries get a 1 if at least 50 % of the population are muslim,	Central Intelligence Agency (2009)
	0 otherwise.	
Christian	Countries get a 1 if at least 50 % of the population are christian,	Central Intelligence Agency (2009)
	0 otherwise.	

Table 2 – continued from previous page

Variables	Definition	Source
SA	Countries get a 1 if located in region South Asia, 0 otherwise.	
ECA	Countries get a 1 if located in region Europe and Central Asia, 0 otherwise.	
LAC	Countries get a 1 if located in region Latin America and the Caribbean, 0 otherwise.	
MENA	Countries get a 1 if located in region Middle East and North Africa 0 otherwise.	
EAP	Countries get a 1 if located in region East Asia and Pacific 0 otherwise.	

7.2 Descriptive Statistics

Table 3: Variables used

Variable	Observations	Mean	Std. Dev.	Min	Max
SIGI	102	0.126	0.122	0.002	0.678
Subindex Family Code	112	0.326	0.223	0.004	0.797
Subindex Civil Liberties	123	0.160	0.259	0	1
Subindex Physical integrity	114	0.358	0.191	0	0.971
Subindex Son preference	123	0.134	0.240	0	1
Subindex Ownership rights	122	0.298	0.266	0	1
Fertility	121	3.562	1.702	0.933	7.678
Child mortality	119	80.005	67.777	3.758	273.8
Female secondary school	108	59.210	30.484	6.037	113.275
Rule of law	123	-0.563	0.718	-2.142	1.658
Voice and accountability	123	-0.583	0.752	-2.102	1.088
SA	124	0.056	0.232	0	1
ECA	124	0.137	0.345	0	1
LAC	124	0.177	0.384	0	1
MENA	124	0.145	0.354	0	1
EAP	124	0.137	0.345	0	1
Muslim	124	0.331	0.472	0	1
Christian	124	0.435	0.498	0	1
GDP	115	7.988	1.121	5.609	10.553
Literacy population	121	0.741	0.218	0.173	1
Literacy female	106	0.705	0.251	0.128	0.998
Electoral democracy	120	0.455	0.459	0	1
FH civil liberties	121	-4.366	1.434	-7	-1.4
Parliament	118	10.630	6.925	0	29.556
Aids	116	0.138	0.346	0	1
Openness	119	0.452	0.261	0.013	1.914
Ethnic	120	0.517	0.237	0.039	0.930

7.3 Regression Analysis

Table 4: Linear regressions with dependent variable female secondary school

Specification with SIGI	(1) b/se	(2) b/se	Specification with Subindex	(3) b/se
SIGI	**-141.77*** **	**-10.91**	**Subindex family code**	**-39.10** **
	(37.31)	(36.37)		(11.64)
GDP		12.69***	GDP	11.46***
		(3.39)		(2.61)
Muslim		-2.21	Muslim	3.43
		(5.47)		(4.84)
Christian		5.31	Christian	4.18
		(5.48)		(4.33)
SA		16.05	SA	12.3
		(8.75)		(8.44)
ECA		40.26***	ECA	28.25***
		(8.98)		(6.95)
LAC		18.33*	LAC	8.64
		(9.07)		(7.41)
MENA		33.86**	MENA	29.67**
		(12.50)		(9.69)
EAP		24.73**	EAP	14.36*
		(8.26)		(6.53)
Electoral democracy		8.11	Electoral democracy	6.19
		(7.67)		(6.84)
FH civil liberties		1.95	FH civil liberties	2.72
		(3.56)		(2.89)
constant	74.75***	-56.71	constant	-27.87
	(4.12)	(37.27)		(30.56)
Number of obs.	94	91	Number of obs.	99
Adj. R-Square	0.28	0.75	Adj. R-Square	0.78
Prob>F	0.0003	0.0000	Prob>F	0.0000

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
HC3 robust standard error in brackets.
Regression (2) and (3) with controls for economic development, geography, religion and political system. In this case, this specification corresponds to the complete specification.

Table 5: Linear regressions with dependent variable fertility

Specification with SIGI	(1) b/se	(2) b/se	Specification with Subindex	(3) b/se	(4) b/se
SIGI	**8.25***	**1.73**	**Subindex family code**	**1.89**	**2.03**
	(2.31)	(2.61)		(0.70)	(0.70)
GDP		-0.71***	GDP	-0.60***	-0.43***
		(0.16)		(0.12)	(0.12)
Muslim		0.52	Muslim	0.34	0.18
		(0.27)		(0.27)	(0.27)
Christian		0.25	Christian	0.24	0.46
		(0.26)		(0.25)	(0.26)
SA		-1.89***	SA	-1.73***	-1.88***
		(0.37)		(0.41)	(0.38)
ECA		-2.44***	ECA	-2.08***	-1.59***
		(0.48)		(0.38)	(0.43)
LAC		-0.96*	LAC	-0.68	-0.57
		(0.47)		(0.36)	(0.40)
MENA		-1.42*	MENA	-1.07*	-1.23*
		(0.63)		(0.50)	(0.48)
EAP		-1.74***	EAP	-1.37***	-1.20**
		(0.42)		(0.39)	(0.38)
Electoral democracy		-0.2	Electoral democracy	0.02	-0.03
		(0.31)		(0.29)	(0.30)
FH civil liberties		-0.02	FH civil liberties	-0.11	-0.14
		(0.17)		(0.13)	(0.13)
			Literacy female		-1.62**
					(0.60)
			Aids		-0.51
					(0.30)
constant	2.55***	9.76***	constant	7.89***	7.47***
	(0.25)	(1.82)		(1.30)	(1.29)
Number of obs.	100	97	Number of obs.	106	99
Adj. R-Square	0.31	0.82	Adj. R-Square	0.80	0.84
Prob>F	0.0006	0.0000	Prob>F	0.0000	0.0000

$* \ p < 0.05, ** \ p < 0.01, *** \ p < 0.001$
HC3 robust standard error in brackets.
Regression (2) and (3) with minimum of controls for economic development, geography, religion and political system. Regression (4) with complete specification for fertility.

Table 6: Linear regressions with dependent variable child mortality

Specification with SIGI	(1) b/se	(2) b/se	Specification with Subindex	(3) b/se	(4) b/se
SIGI	**318.56****	**50.42**	**Subindex family code**	**80.14****	**77.23***
	(108.81)	(150.58)		(25.85)	(31.50)
GDP		-22.55**	GDP	-20.24***	-13.82**
		(7.35)		(5.34)	(5.09)
Muslim		26.61	Muslim	14.23	5.74
		(14.13)		(13.13)	(14.50)
Christian		7.49	Christian	9.47	14.27
		(11.72)		(10.31)	(10.81)
SA		-68.33***	SA	-61.30***	-71.03***
		(18.87)		(17.05)	(16.33)
ECA		-85.65***	ECA	-66.13***	-53.16*
		(23.82)		(16.75)	(20.65)
LAC		-66.65**	LAC	-50.69***	-50.23**
		(23.84)		(14.88)	(18.89)
MENA		-97.73***	MENA	-86.25***	-93.71***
		(26.90)		(21.71)	(23.48)
EAP		-73.44***	EAP	-59.37***	-55.65**
		(17.23)		(15.02)	(17.85)
Electoral democracy		-0.79	Electoral democracy	7.05	1.75
		(15.86)		(15.96)	(14.80)
FH civil liberties		-4.54	FH civil liberties	-8.33	-8.32
		(7.86)		(6.65)	(6.44)
			Literacy female		-62.77**
					(21.39)
			Aids		-19.02
					(14.56)
constant	43.38***	272.39**	constant	209.47**	209.34**
	(10.80)	(93.09)		(66.26)	(63.27)
Number of obs.	99	97	Number of obs.	106	99
Adj. R-Square	0.28	0.79	Adj. R-Square	0.79	0.82
Prob>F	0.0043	0.0000	Prob>F	0.0000	0.0000

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
HC3 robust standard error in brackets.
Regression (2) and (3) with controls for economic development, geography, religion and
political system. Regression (4) with complete specification for child mortality.

Table 7: Linear regressions with dependent variable voice and accountability

Specification with SIGI	(1) b/se	(2) b/se	(3) b/se	Specification with Subindex	(4) b/se	(5) b/se
SIGI	-2.60***	-1.42**	-1.59**	**Subindex civil liberties**	-0.61**	-0.65**
	(0.50)	(0.48)	(0.54)		(0.23)	(0.23)
GDP		0.27***	0.30***	GDP	0.31***	0.27***
		(0.06)	(0.06)		(0.05)	(0.06)
Muslim		0.18	0.15	Muslim	0.16	0.21
		(0.13)	(0.14)		(0.13)	(0.14)
Christian		-0.03	-0.04	Christian	-0.05	-0.08
		(0.12)	(0.13)		(0.12)	(0.12)
SA		-0.27	-0.28	SA	-0.12	-0.04
		(0.20)	(0.21)		(0.18)	(0.20)
ECA		-0.64***	-0.56*	ECA	-0.52***	-0.57**
		(0.14)	(0.22)		(0.13)	(0.22)
LAC		-0.40*	-0.41*	LAC	-0.32*	-0.31
		(0.17)	(0.18)		(0.15)	(0.16)
MENA		-0.45	-0.47	MENA	-0.27	-0.23
		(0.23)	(0.25)		(0.19)	(0.24)
EAP		-0.30*	-0.21	EAP	-0.14	-0.21
		(0.14)	(0.21)		(0.13)	(0.18)
Electoral democracy		1.10**	1.07***	Electoral democracy	1.13**	1.14***
		(0.12)	(0.11)		(0.10)	(0.10)
Parliament			0.01	Parliament		0.01
			(0.01)			(0.01)
Literacy population			-0.31	Literacy population		0.24
			(0.42)			(0.37)
Openness			-0.07	Openness		0.23
			(0.36)			(0.22)
Ethnic			-0.07	Ethnic		0.01
			(0.25)			(0.23)
constant	-0.23*	-2.80***	-2.77***	constant	-3.28***	-3.37***
	(0.10)	(0.45)	(0.47)		(0.41)	(0.39)
Number of obs.	102	97	95	Number of obs.	112	108
Adj. R-Square	0.18	0.69	0.69	Adj. R-Square	0.68	0.69
Prob>F	0.0000	0.0000	0.0000	Prob>F	0.0000	0.0000

$* \ p < 0.05$, $** \ p < 0.01$, $*** \ p < 0.001$
HC3 robust standard error in brackets.
Regression (2) and (4) with controls for economic development, geography, religion and political system.
Regressions (3) and (5) with complete specification for governance/voice and accountability.

Table 8: Linear regressions with dependent variable rule of law

Specification with SIGI	(1) b/se	(2) b/se	(3) b/se	Specification with Subindex	(4) b/se	(5) b/se
SIGI	**-1.73***	**-1.88***	**-1.33***	**Subindex ownership rights**	**-0.89***	**-0.71***
	(0.49)	(0.53)	(0.60)		(0.20)	(0.23)
GDP		0.41***	0.36***	GDP	0.37***	0.30***
		(0.08)	(0.07)		(0.08)	(0.07)
Muslim		0	-0.04	Muslim	-0.03	-0.02
		(0.16)	(0.16)		(0.13)	(0.14)
Christian		-0.18	-0.18	Christian	-0.11	-0.14
		(0.15)	(0.14)		(0.14)	(0.13)
SA		0.18	0.26	SA	0.11	0.21
		(0.22)	(0.24)		(0.17)	(0.20)
ECA		-0.84***	-0.67*	ECA	-0.93***	-0.83***
		(0.18)	(0.27)		(0.16)	(0.22)
LAC		-0.74***	-0.54*	LAC	-0.78***	-0.61**
		(0.19)	(0.21)		(0.19)	(0.19)
MENA		-0.14	0.17	MENA	-0.09	0.18
		(0.29)	(0.32)		(0.25)	(0.29)
EAP		-0.31	-0.28	EAP	-0.35*	-0.36
		(0.16)	(0.23)		(0.15)	(0.20)
Electoral democracy		0.33*	0.40**	Electoral democracy	0.38**	0.44***
		(0.14)	(0.13)		(0.11)	(0.11)
Parliament			0.01	Parliament		0.01
			(0.01)			(0.01)
Literacy population			-0.29	Literacy population		-0.03
			(0.42)			(0.38)
Openness			0.69*	Openness		0.71**
			(0.33)			(0.27)
Ethnic			-0.07	Ethnic		-0.12
			(0.32)			(0.28)
constant	-0.35***	-3.37***	-3.32***	constant	-3.06***	-2.94***
	(0.10)	(0.58)	(0.52)		(0.56)	(0.53)
Number of obs.	102	97	95	Number of obs.	112	108
Adj. R-Square	0.09	0.49	0.51	Adj. R-Square	0.53	0.56
Prob>F	0.0006	0.0000	0.0000	Prob>F	0.0000	0.0000

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
HC3 robust standard error in brackets.
Regression (2) and (4) with controls for economic development, geography, religion and political system.
Regressions (3) and (5) with complete specification for governance/rule of law.