EFFICIENCY OF INSTITUTIONS, POLITICAL STABILITY AND INCOME DYNAMICS

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Abstract

In a simple theoretical framework, the quality of institutions affects individual's investment decisions, and hence income levels and distribution. When institutions deteriorates and inequalities increase, the incumbent undertakes redistributive taxation to maintain political support. The quality of institutions and the extent of redistribution depend on the degree of government responsiveness to citizens and on the credibility of the political opposition to the incumbent. The econometric analysis is based on both single equation models and systems of equations. Good institutions are found to reduce the Gini coefficient and to increase average income, growth, and income of the poor. However, some non-linearites are detected in the institutions-Gini relationship.

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1. Introduction

This paper investigates the link between the quality of institutions and income (its distribution and dynamics), and the feedback that such a link has on political stability. Institutional quality is broadly defined to include different dimensions of governance, such as enforcement of property rights, efficiency of the bureaucracy, reliability of the judicial system, quality of the legal system, rule of law, effectiveness of government. The basic argument is as follows. The quality (or efficiency, which will be used as a synonymous of quality) of institutions affects the rate of return that individuals earn on investment projects. More inefficient institutions entail a larger number of individuals who do not undertake investment and hence end up earning a mere subsistence wage. Institutional inefficiency therefore lowers average per-capita income and increases poverty and inequality. However, growing poverty and inequality lessen political support to the incumbent government. When support is sufficiently reduced, the incumbent will be forced to take some action to prevent being replaced in office. A first possibility is to reform institutions, so to restore a minimum level of efficiency. An alternative route is to redistribute income. Redistribution would then imply some non-linearities in the relationship between institutional quality and income inequality.

The research on the economic implications of the quality of institutions has considerably expanded over the past decade. Most papers have focused on the adverse effect that weak institutions have on growth, investment and productivity. Distributional issues have instead received relatively less attention[1]. Yet some interesting results have emerged. On the empirical side, Gupta et al. (1998) find that more pervasive corruption, which is a specific form of institutional inefficiency, increases the Gini coefficient and reduces the average income of the poor in a cross-section of about 40 countries. In a broader sample, Dollar and Kraay (2002) document a positive association between rule of law and average income of the bottom quintile of the population. On the theoretical side, Angeletos and Kollinztas (2000) show that corruption and rent-seeking activities increase income inequality in a neo-classical growth model. Li et al. (2000) instead consider a two-sector economy with rent-seekers and predict maximum inequality at intermediate levels of corruption. They also find some econometric evidence consistent with this theoretical prediction. Ahlin (2001) also develops a multi-sectoral model where corruption non-linearly affects income distribution.

Even with the recent progress of the research, this paper can add value to the literature in several ways. For what concerns the theoretical analysis, the paper's distinctive feature is the presence of a feedback effect from inefficiency and income inequality to political stability. This feedback, which is consistent with a stylized fact recently detected in the political science literature (Anderson and Tverdova, 2003), generates two innovative insights. One concerns the forces that drive redistribution in

[1] On the correlation between institutions and growth, investment or productivity see, inter alia, Mauro (1995), Keefer and Knack (1995), Tanzi and Davoodi (1997), Hall and Jones (1999), Henisz (2000), Kaufmann and Kraay (2002), Lamsdorff (2003). The level of democracy, but not the quality of institutions and governance, is occasionally used as explanatory variable in income inequality regressions; see for instance Li et al. (1998), Gradstein et al (2000), Barro (2002), Lundberg and Squire (2003).

the society. Most political-economy models rely on either the median-voter theorem or direct lobbying to explain the extent of redistribution[2]. Here instead redistribution is linked to the fluctuations of political consensus and hence to the degree of government responsiveness to citizens and to the political quality of the opposition. The other insight relates to the form of the relationship between institutions and income inequality. In the literature, this is generally posited to be linear. In this paper, instead, there is a potential non-linearity stemming from the incentive of the government to redistribute when institutions are highly inefficient. Since the exact level of inefficiency that triggers redistribution depends on a number of country-specific factors, it is possible that highly unequal countries redistribute less than more equal ones. The origin of non-linearities is therefore different from Li et al (1998) and Ahlin (2001). Moreover, these non-linearities will not necessarily take a U (or inverted U) shape.

For what concerns the econometric analysis, the main contribution of the paper is to generalize and extend previous findings. First of all, most paper focus on a single specific aspect of institutional quality (typically, corruption) and this in turn constrains the choice of indicators for the empirical test. The broad notion of institutions adopted in this paper makes it possible to adopt various measures. This is interesting since different measures are likely to quantify different dimensions (of the same phenomenon), some of which might be more significant than others. Furthermore, the standard approach in the literature is to estimate only single equation models. However, the theoretical framework of this paper indicates that income dynamics and distribution are the joint outcome of institutional efficiency. Hence, a system of equations will be estimated along with single equations. Finally, specific attention is given to possible non-linearities in the relationships. This is done not just by squaring institutional variables on the r.h.s. of the econometric model, but also estimating step-wise linear regressions to detect how coefficients change at different initial levels of the regressors.

The rest of the paper is organized as follows. Section 2 outlines the theoretical framework. First the basic setting is introduced. Then the formation of consensus and political stability is studied. Finally, the use of redistribution as a way to compensate institutional inefficiencies is discussed. Section 3 proposes an empirical test of some of the predictions from Section 2. Results from a cross-section model are presented first. These are followed by panel estimates and then by the system of equations. Section 4 concludes and sets the line for future research.

2. Institutional quality, income dynamics and distribution in theory.

2.1 *Basic set-up: distributive implications of institutional quality*

Consider an economy where each individual in the population has access to a specific investment project. The generic project accessible by agent i is identified by the pair (R_i, C_i), where R_i denotes the expected rate of return and C_i is the degree of

[2] See Harms and Zink (2003) for a survey of contributions on the political economy of redistribution.

interaction with institutions that the project involves.[3] R_i and C_i are randomly drawn from two continuous independent distributions $F(R)$ and $F(C)$ with compact supports $[0, R_{max}]$ and $[0, C_{max}]$ respectively, and with joint *pdf* $f(R, C) = f(R)f(C)$.

Interacting with institutions is costly. Denote this cost by L_i. L_i will be clearly larger the more intense interaction is, and hence the higher is C_i. However, a more efficient bureaucracy, a more reliable legal system, more secure property rights, stronger enforcement of contracts, lower incidence of corruption practices, rule of law and good governance are all factors that will reduce L_i for any given C_i. Hence, L_i will be decreasing in the overall degree of institutional quality. For the sake of simplicity, the functional form is assumed to be $L_i = \alpha C_i$, where α denotes the inverse of institutional quality; that is, α is a measure of institutional inefficiency. The basic argument would however hold for any functional form of the type $L_i = g(\alpha, C)$, where $g'(\bullet)>0$.

Agent i decides whether to undertake the investment project or not. In case he does not, then he will earn a zero income, which can be easily reinterpreted as a mere subsistence wage. The decision is made by comparing his utility in the two cases. Without loss of generality it is assumed that utility is linear in the net income level; that is, $U_i = u(R_i - L_i) = R_i - \alpha C$. Again, the key implications of the model would be the same if more general utility functions of the form $u'(\bullet) > 0$ and $u''(\bullet) <0$ were used.

The condition for agent i to undertake the project (participation condition) is thus:

$$(1) \quad R_i - \alpha C_i \geq 0$$

This in turn implies that the population share P of individuals undertaking the project and earning a positive income can be written as:

$$(2) \quad P = \int_0^{\overline{C}} \int_{\alpha C}^{R_{max}} f(R,C)\,dR\,dC$$

where $\overline{C} = \frac{R_{max}}{\alpha}$ if $\alpha \geq \frac{R_{max}}{C_{max}}$ and $\overline{C} = C_{max}$ otherwise.

The implications of equation (2) can be illustrated through a simple diagram (Figure 1). The participation condition is summarized by the cut-off line $R = C/\alpha$. Below the line are individuals that earn a positive income ("the rich"), above the line are those who do not undertake the project ("the poor"). As institutions become more inefficient, the cut-off line gets flatter and more people will become poor. Formally, this can be seen from (2), where $\partial P/\partial\alpha < 0$.

[3] For instance C_i can be the number of patents that agent i needs to obtain from the bureaucracy, or the volume of business done with the public administration, or the number of times that it will be necessary to recur to the legal system to have contracts enforced and economic rights secured.

Lower quality institutions are therefore associated with a more unequal distribution of income. The effect shows up both as an increase in the economy's Gini coefficient and as a lower average income of the poor. Average per-capita income and aggregate output also decrease as institutions become more inefficient. This is because the number of those who earn a zero income increases and the net income of those who earn a positive income decreases.

Some additional observations are in order. If institutions were fully efficient, that is, if $\alpha = 0$, then all individuals would participate and earn a positive income. However, inequality would not be removed[4]. The income earned by different agents would still differ because of the intrinsic differences in investment opportunities, as summarized by the distribution of *R*. Therefore, institutional inefficiency is not the only source of income inequality in the economy. All the factors that contribute to determining the distribution of *R* will also affect inequality. In fact, whilst the distribution of *R* is assumed to be stochastic, one could link it to other variables. An obvious candidate would be investment in human capital. This feature of the model provides the theoretical justification for including various controls, in addition to indicators of institutional efficiency, in the econometric analysis of the determinants of income inequality.

Finally, in this set-up, income dynamics result from the disincentive effect that bad institutions have on private investment. The mechanism is thus different from the predatory effects that often characterize the theoretical literature on rent-seeking.[5] However, it is consistent with the idea that institutions affect growth and development prospects by reducing the stock of capital available for future production.

2.2 *The formation of consensus and political stability*

To survive in office governments need a minimum level of popular consensus. In a democracy, the electoral competition requires consensus to be gained at the time of elections and maintained afterwards to avoid re-calls, anticipated elections, and early terminations. But some popular consensus is also necessary in non-democratic regimes: when dissatisfaction with the government grows large, riots and coups can lead to a change in regime. Clearly, the level of consensus required to stay in office will vary across countries and over time depending on various factors that determine the degree of government responsiveness to citizens. Such factors will include, among others, the type of regime (i.e. democratic versus non-democratic, presidential vs. parliamentary), the set of constitutional and legal norms regulating the political process, the fragmentation and polarization of the political arena.

To formalize the issue, let δ be the minimum consensus to remain in office. Thus, δ can be interpreted as an indicator of government responsiveness to people. The incumbent is associated with an observable level of institutional inefficiency α_{inc}. If consensus falls below δ, the opposition will come into power, forming a government with an expected level of institutional inefficiency α_{opp}. Agent *i* in the economy

[4] This is different form Li et al. (2000), where the absence of corruption implies a Gini coefficient equal to zero.

[5] Gradstein (2004) and Neeman et al. (2003) are two recent examples of this literature.

supports the incumbent only if his utility is higher under the incumbent than under the opposition. In case the two utilities are identical, the individual will toss a coin. This representation of the political process is admittedly highly simplified. A number of extensions will be discussed later. However, it does capture an important stylized fact documented by Anderson and Stverdova (2003): the attitude of citizens towards the government depends on the quality of institutions.

To study the formation of consensus, income under the two possible alternative regimes (incumbent government and opposition) must be compared. Agent *i*'s income under the incumbent is:

$$(3)\quad \begin{aligned} I_{i,inc} &= R_i - \alpha_{inc} C_i \quad \text{if} \quad R_i \geq \alpha_{inc} C_i \\ I_{i,inc} &= 0 \qquad\qquad\quad \text{otherwise} \end{aligned}$$

and under the opposition is:

$$(4)\quad \begin{aligned} I_{i,opp} &= R_i - \alpha_{opp} C_i \quad \text{if} \quad R_i \geq \alpha_{opp} C_i \\ I_{i,opp} &= 0 \qquad\qquad\quad \text{otherwise} \end{aligned}$$

Comparison of equations (3) and (4) suggests that each agent in the economy will fall in one of four possible groups. ***Group 1*** includes individuals whose investment opportunities are such that $R_i \geq \alpha_{inc} C_i$ and $R_i \geq \alpha_{opp} C_i$. Those individuals earn a positive income under both regimes and hence support the incumbent only if $\alpha_{inc} < \alpha_{opp}$; for $\alpha_{inc} > \alpha_{opp}$ they will support the opposition, and for $\alpha_{inc} = \alpha_{opp}$ they will toss a coin. ***Group 2*** consists of individuals whose investment opportunities are such that the participation condition is met only under the incumbent. Clearly, these individuals will always support the incumbent. At the other extreme, ***Group 3*** consists of individuals for whom the participation condition is met only under the opposition. Therefore, they will never support the incumbent. Finally, ***Group 4*** includes individuals whose investment opportunities entail that $R_i < \alpha_{inc} C_i$ and $R_i < \alpha_{opp} C_i$. They will thus always toss a coin. Inspection of equations (3) and (4) also reveals that group 2 is empty for $\alpha_{inc} > \alpha_{opp}$, group 3 is empty for $\alpha_{inc} < \alpha_{opp}$, and both are empty for $\alpha_{inc} = \alpha_{alt}$. Figure 2 exemplifies the case of $\alpha_{inc} < \alpha_{opp}$

Political preferences of individuals therefore are not fixed ex-ante, but result from the stochastic distribution of investment opportunities and the quality of the institutions delivered by the incumbent. Group 1 configures as "opportunistic", supporting whichever regime is more efficient. Group 2 is pro-incumbent, whilst Group 3 is pro-opposition. These two are the counterpart of ideologically biased voters in models of partisan business cycle and form two polarized constituencies in the political arena. Group 4 is instead politically neutral since on average its support will always be equally split between the two contenders. The distribution of support in the population for different values of α_{inc} and α_{opp} can be therefore summarized as in Table 1.

From the information in Table 1 it is possible to compute the maximum level of institutional inefficiency that allows the incumbent to remain in office. This will be

equal to that value of inefficiency α^* such that actual consensus is just above the threshold δ. Start by assuming that δ is equal to the simple majority threshold. This working assumption is consistent with a two-party competition in a democratic regime.[6] With $\delta = ½$ the necessary and sufficient condition for the incumbent to survive in office is that its share of support be larger than the share of support received by the opposition. This will be true if $\alpha_{inc} < \alpha_{alt}$. In this case, in fact, the support for the incumbent amounts to the whole of group 1 and group 2 plus ½ of group 4, whilst support for the opposition only includes ½ of group 4. For $\alpha_{inc} = \alpha_{alt}$, a tie-breaking rule is required, since support for the two regimes is exactly the same (all non-empty groups split). Thus, the maximum level of institutional inefficiency that can be delivered (or tolerated) by the incumbent is

$$(5) \quad \alpha^* = \alpha_{opp} - \varepsilon$$

where ε is a small positive constant.

The above result has an interesting interpretation. To remain in office, the incumbent government cannot deliver institutions that are more inefficient than those expected to be delivered by the opposition. In other words, a good quality opposition, or an opposition which is perceived to be of good quality, will force the incumbent to maintain good quality institutions. In this sense, weak governance is the result of lack of a good and credible political opposition.

The result can be generalized. For values of δ larger than ½, α^* will be significantly smaller than α_{opp}, thus reinforcing the positive effect that the existence of a good opposition has on institutional quality. For values of δ smaller than ½, the quality of the opposition will represent less of a constraint for the incumbent. Yet, α^* will still be a function of α_{opp}. Since δ is a positive function of government responsiveness to the citizens, one can conclude that the combination of a responsive government and a good political opposition is what is required to ensure that the efficiency of institutions will never fall too low.

2.3 *Extensions of the framework*

Two extensions that might be worth considering in future work concern endogenous political participation and the possibility that a change in regime will reshuffle the distribution of *C*s across projects.

In its simplest form, endogenous political participation is unlikely to generate major changes to the basic setting. With only a fraction of the poor actively expressing their support or discontent towards the government, condition (5) would not change. This is because the poor are either members of group 4 or of group 3. In the case of the politically neutral group 4, endogeneity of political participation affects symmetrically support for the incumbent and support for the opposition. In the case of group 3, endogenous participation makes a difference if that group is non-empty and this only happens when $\alpha_{opp} < \alpha_{inc}$. But with $\alpha_{opp} < \alpha_{inc}$ support for the incumbent

[6] In fact, two-party models under democracy are the common working hypothesis of much of the political economy literature (see for instance Persson and Tabellini, 2002).

only comes from ½ of group 4 and hence the opposition wins even if some group 3 members do not get involved into politics. More sophisticated forms of endogenous participation in politics might however provide more interesting insights.

The second possible extension draws on the idea that government turnover (from incumbent to opposition) could alter the value of *C* associated with each project. On the one hand, changes in the distribution of *C* can increase ex-ante individual's uncertainty about the effect of political turnover. This would in turn be likely to induce some status-quo bias. On the other hand, if changes in the distribution are associated with a decrease in the average value of *C* (eventually linked to the fact that the opposition is expected to improve the overall quality of institutions), a pro-change bias could emerge. Future research should aim at formalizing these two channels and at identifying conditions under which one prevails over the other.

2.4 *Redistribution as a strategy to survive in office.*

Suppose that the level of inefficiency of institutions grows above α^*. Then an office-motivated incumbent will have to take some action to avoid losing office. A first possible option is to initiate institutional reform to bring inefficiency below α^*. An alternative strategy is to make use of redistributive fiscal policy. Indeed, the reason why consensus falls when institutional inefficiency increases is that income distribution becomes more unequal. Through redistribution the incumbent can thus compensate the adverse political effects of income inequality and hence stay in office eve if α_{inc} is above α^*.

The details of the redistributive programs that the government can implement are worked out in a companion paper (Carmignani, 2003b). To start with, consider that when actual institutional inefficiency α_{inc} is above α^*, then all individuals who earn a positive income are in group 1. Group 1 therefore provides the tax-base to finance redistribution. Two factors affect this tax-base. One is actual institutional inefficiency: higher values of α_{inc} reduce the size of group 1 and hence reduce the tax base. The other factor concerns the effect that taxation has on individual's participation condition: a higher tax-rate lowers the net return from investments and hence drives some individuals out of group 1. The total volume of resources available for redistribution is therefore limited by actual institutional inefficiency and by a standard Laffer-type argument.

The question is then how much inefficiency above α^* can be compensated by redistributing the resources available from group 1. This is equivalent to ask what level of inefficiency $\tilde{\alpha}$ will trigger a change in government once the incumbent is allowed to redistribute from group 1 to other groups. Again, computational details and some simulations are available from the companion paper (Carmignani 2003b). Some general observations can be drawn. The fact that resources available for redistribution are limited implies that for non-zero government responsiveness (that is, for $\delta > 0$) $\tilde{\alpha}$ is finite. Moreover, to keep consensus at δ when $\alpha_{inc} > \alpha^*$, the incumbent needs the support of more individuals in group 4 and/or some individuals in group 3 . Because group 4 consists of individuals who earn a zero income also under the opposition, the transfer that the incumbent has to pay to gain their support is on average smaller than the transfer to be paid to gain the support of group 3 members. In other words, for the

incumbent it is easier (cheaper) to attract extra-support from group 4 than from group 3 [7]. Thus, the larger group 4 is, the higher $\tilde{\alpha}$ will be. Because the size of group 4 shrinks as α_{opp} grows, then one can argue that redistribution can buy more political survival for the incumbent the lower the expected quality of institutions under the opposition. Finally $\tilde{\alpha}$ will increase the lower δ is, since lower δs imply that a smaller consensus has to be maintained, everything else being equal.

The quality of the opposition and the responsiveness of government to citizens therefore affect the scope for using redistribution as a political instrument. That is, in addition to the size of group 1 (namely, the tax-base) and the factors that determine it, redistribution is limited by the quality of the opposition and by government responsiveness. A better opposition and a more responsive government reduce the amount of inefficiency that can be compensated through redistribution and hence limit the incentive to redistribute for any given amount of resources available from group 1.

The use of redistribution to compensate the loss of political support bears an important implication for the form of the relationship between institutional quality and income distribution. In the basic set-up, less efficient institutions determine more unequal income distributions. But as inefficiency rises, incumbent's survival is threatened and redistribution used to re-gain consensus. This might generate an inverse correlation between inefficiency and inequality at high levels of inefficiency. Two factors can however complicate this correlation. First, when institutional inefficiency is very high, redistribution is limited by the small size of group 1. Second, the threshold beyond which more inefficiency triggers redistribution is a function of two parameters δ and α_{opp} which are likely to be country-specific. Hence, it can be difficult to characterize empirically the non-linearity in cross-sectional samples of heterogeneous countries.

3. Some empirical evidence

This section provides an empirical test of some implications of the theoretical framework discussed in Section 2. The focus will be on the correlation between institutional quality, the dynamics of income, and its distribution. The theory predicts that more inefficient institutions will reduce income (and growth) and increase inequalities. However, the political stability effect of institutional inefficiency complicates the relationship between institutions and inequality and makes it non-linear. The theory also identifies institutional inefficiency as a common determinant of both income level (and growth) and inequality. Accordingly, the empirical test is first conducted within the framework of single-equation models and then extended to a system of equations.

3.1 *Econometric framework*

The single equation framework is written as:

$$(7) \quad y_{i,t} = \beta_0 + \beta_1 z_{it} + \mathbf{X_{it}}\boldsymbol{\beta_2} + v$$

[7] Note that attracting support from group 3 amounts to filling group 2 with individuals that before redistribution are in group 3.

where z is an index of institutional quality (to be discussed later), **X** is a set of controls, i indicates a generic country in the sample, t denotes time, βs are parameters to be estimated and υ is the error term. Four different dependent variables will be used: average per-capita income, its growth rate, the Gini coefficient, the average income level of the bottom quintile of the population. The first two serve to study income dynamics, the other two are for the analysis of income distribution and poverty.

Different methodologies have been suggested in the literature for the estimation of (7). One way to proceed is to estimate a parsimonious specification where no controls are added to the institutional variable z on the r.h.s. The underlying hypothesis is that whilst the quality of institutions is determined by a broad set of factors, those factors affect the dependent variable only through institutional quality. Instrumental variables (IV) can be then applied to obtain consistent estimates [8]. If instead one believes that institutional quality is not the only determinant of income dynamics and distribution, then a richer specification of the r.h.s. is required. This in turn rises the problem of selecting the appropriate controls and to test the sensitivity of results to changes in the composition of **X**. The problem is particularly well-documented for income and growth regressions [9]. Moreover, Caselli et al. (1996) point out specific deficiencies of standard least squares estimators for income and growth regressions that include a lagged dependent variable. They therefore propose to estimate (7) in first differences, using appropriate lags of the right-hand side variables as instruments. The pragmatic strategy pursued in this paper is to make use of all the different methodologies and compare results to check their robustness.

The system of equations consists instead of the pair:

$$\text{(8a)} \quad Income_{it} = \omega_0 + \omega_1 z_{it} + \mathbf{W_{it}}\boldsymbol{\omega}_{\mathbf{2}} + u_{it}$$

$$\text{(8b)} \quad Gini_{it} = \psi_0 + \psi_1 z_{it} + \mathbf{S_{it}}\boldsymbol{\psi}_{\mathbf{2}} + e_{it}$$

where *Income* is average income (or growth), *Gini* is the Gini coefficient, z is an indicator of institutional quality, **W** and **S** are set of controls, ψs and ωs are parameters to be estimated, u and e are disturbances such that $E[e] = E[u] = 0$ and $E[eu] = \Sigma$. The two set of controls **W** and **S** can have some of the variables in common. Estimation of the system (8a)-(8b) is by GLS and IV (3SLS). 3SLS also allows to account for the joint endogeneity that occurs when **W** includes *Gini* and/or **S** includes *income*.

A final issue concerns the possible non-linearity in the relationship between institutional quality and income distribution. The common approach in this case is to include z^2 in addition to z on the r.h.s. of the Gini regressions (Li et al. 2000). However, as previously discussed, the non-linearity predicted by the theory does not necessarily take a U shape. For this reason, in addition to the inclusion of the square term, step-wise linear regressions will be estimated. In this case, the sample will be

[8] See Hall and Jones (1999), Kaufmann et al. (1999), Neeman et al. (2003).

[9] See for instance Levine and Renelt (1992) and Sala-i-Martin (1997).

partitioned in sub-samples on the basis of values of z (high, intermediate, low) and linear regressions will be estimated for each sub-sample. Then, the estimated coefficients on z will be compared to see how the relationship changes across sub-samples.

3.2. *Sample and data*

The full sample includes 136 countries observed over the period 1960-2000. Five-year averages are taken for each variable, so that for each country the panel has a maximum of eight observations (1960-64, 1965-69,…, 1995-2000). Sources and variables description are reported in the Appendix. The parsimonious version of equation (7) is estimated on a pure cross-section of observations for the sub-period 1995-2000 (1990-94 for a very few countries). All the other specifications, including the system of equations (8a)-(8b) are estimated on a panel that only includes countries for which at least two observations are available.

To carry out the analysis, empirical measures of institutional quality are needed. A number of indicators are now available. Kaufmann et al. (2003) collect bi-annual observations over the period 1996-2002 for six indicators of governance: effectiveness of government, rule of law, control of corruption, regulatory burden, political instability and violence, voice and accountability (i.e. civil liberties). The first four of them appear to be particularly close to the general definition of institutional efficiency maintained in Section 2. The main weakness of this data-set is its limited time-coverage, which implies that the indicators cannot be used in a panel analysis.

A longer time-dimension is available for the index of Economic Freedom of the World (EFW), published at five-year intervals since 1970. EFW measures the consistency of policies and institutions with economic freedom. The aggregate EFW index is obtained from the aggregation of indicators that are grouped into five clusters. These are: size of government and the public sector, quality of the legal structure and security of property rights, access to sound money, freedom to exchange with foreigners, quality of regulation of credit, labour and business. The index therefore constitutes a good proxy of the theoretical notion of institutional quality. Particularly relevant seems to be the cluster on the quality of the legal structure and security of property rights, which will be singled out in the analysis below. Henisz (2000) also provides an index of institutional quality that dates back to 1960. This index measures the degree of constraints on policy change in a country. The underlying theoretical argument is that constraints can work as a device to enforce government's commitments, especially for what concerns the enforcement of property rights. Moreover, checks and balances in the legislative process (a specific type of constraints) allow the voters to hold the elected officials more accountable and therefore helps minimize rent-seeking incentives in the political process.

All of the above mentioned indices are *subjective* measures of institutional quality. Merits and limits of subjective indicators have been discussed in the political economy literature[10]. It is therefore desirable to make also use of more *objective*

[10] See Carmignani (2003a) and references therein.

proxies. Clague et al. (1999) propose to use contract intensive money as proportion of total M2. Contract intensive money is defined as the part of M2 that is not currency in circulation outside banks. Hence, the index of institutional quality is computed as the ratio of M2 minus currency in circulation to M2. The underlying intuition is that if institutions are of a poor quality, then individuals will mostly engage in transactions that are self-enforceable. Typically, those transactions are carried out through currency. Hence a higher proportion of currency in circulation (that is, a smaller proportion of contract intensive money) will denote a lower institutional quality. Clague et al. (1999) report for this index sufficiently high correlations with other subjective indicators. Moreover, it can be easily computed for many countries on annual basis for long periods of time. Its main disadvantage is that it significantly correlates with indicators of financial development, which are in turn often included as control variables in both income and Gini regressions.

Table 2 reports the pair-wise correlations between the various indicators of institutional quality[11]. *Governance* is the simple average of the four relavant indicators in the Kaufmann et al.'s dataset; *polcon* is the indicator proposed by Henisz (2000); *efw* is the index of economic freedom and *legal* is its component that explicitely refers to the quality of the legal system and the security of property rights; *cim* is the contract-intensive money indicator of Clague et al. (1999). Correlations are reported for two different samples: the cross-section including only the latest observation for each country and the panel including all observations for all countries. Of course, given the lack of time-dimension in the Kaufmann's data-set, correlations with *governance* are only computed for the cross-section sample. As expected, correlations are generally high and positive, but almost always significantly smaller than 1. This means that different indicators capture different dimensions of the same broad phenomenon.

3.2 *Evidence from cross-section regressions*

The first piece of evidence comes from the estimation of a parsimonious version of (7) on the cross-sectional sample. Each of the four dependent variables is thus regressed on a constant and on each of the indicators of institutional quality. Following Hall and Jones (1999) and Kaufmann et al (1999), estimation is by instrumental variables. Instruments include variables that in the literature have been found to determine directly the quality of governance, but not the dependent variables. These are: country's latitude, legal origin dummies, ethnic fractionalization, the share of protestants in the population.[12].

Results of cross-section regressions are displayed in Table 3. The first four columns show that higher quality institutions significantly reduce income inequality and increase average income, income of the poor, and average income growth. Note

[11] Throughout the rest of this section, higher values of the institutional variables denote better institutions.¨

[12] The search for appropriate instruments is another highly debated issue in the literature. Latitude, legal origins and various measures of ethnic, religious and linguistic fractionalization are however the most widely used. The tests of over-identifying restrictions (not reported, but available upon request) broadly support this choice of instruments.

that the different size of coefficients across institutional indicators reflect the different scale over which such indicators are measured. It is however interesting to note that for each institutional variable, the estimated coefficients in the average income and in the income of the poor regressions are very close. This implies that improving institutions yields the same payoff to both the average citizen and the average poor.[13]

The last three columns of the table account for possible non-linearities. Results are reported for *governance*, but they are very similar to those obtained for other institutional variables. When including a squared term (column 5), the pattern of coefficients is consistent with an inverted U-shape relationship between Gini and *governance*. Estimated coefficients are however less precisely estimated. The step-wise linear regressions (column 6) confirms that the relationship changes sign at low levels of efficiency. When institutions are of a poor quality, a further deterioration will lead to lower (rather than higher) Gini. Similarly, at initial low values of efficiency, the income of the poor increases when institutional quality worsens. The theory of Section 2 explains this finding through the feedback that institutions have on political stability and hence on the incentive of the incumbent to redistribute.

3.3 *Panel regressions of income inequality and poverty*

The next piece of evidence comes from the estimation of a richer specification of (7) on a panel sample using instrumental variables. Instruments now include latitude, dummies for legal origins, and lagged values of regressors. Of the institutional variables, *governance* cannot be used because it only has the cross-sectional dimension. Moreover, since the aggregate index *efw* turns out to include sub-components that are highly correlated with some of the economic controls, only its sub-component *legal* is used.

The specification of the r.h.s. of the model builds on some key results in the income inequality literature[14]. *Schooling* measures educational achievements, *government* is government consumption, *M2* proxies the depth of the financial system, and *initial income* accounts for the interaction between economic development and income distribution. Gradstein et al. (2000) reports some significant inequality effects associated with country's dominant religion, which in turn is a proxy for ideology. The three dummies *buddhist, confucian,* and *muslim* capture these incremental effect over Judeo-Christian societies. Similarly, *communist* is a dummy that isolates the impact of the communist ideology. A dummy variable (*income dummy*) is used to take into account the difference between Gini data based on income and expenditures. When the institutional quality is measured by *cim*, *M2* and *initial income* have to be dropped from the set of controls to avoid multi-collinearity problems.

Results are reported in Table 4. The first-three columns broadly confirm the evidence from the cross-section regression: higher institutional quality reduces the Gini coefficient. This result holds when the set of controls is further expanded. In

[13] In fact, because the coefficients in the average income regression are slightly smaller for four out five indicators, one could argue that the payoff from improving institutions is actually slightly higher for the average poor.

[14] See Li et al. (1998) and Lindberg and Squire (2003)

columns 4 to 6 inflation, trade openness and a square term on initial income (to account for the Kuznets hypothesis) are added to the r.h.s of the Gini regressions. The coefficient on *legal* remains negative and statically significant. Results for *polcon* are qualitatively the same, whilst the coefficient on *cim* looses significance in the regression with squared income. The last column measures the correlation between institutional quality and the income of the poor. The specification of the r.h.s. includes average income, as suggested by Dollar and Kraay (2002). The positive coefficient on *legal* confirms that the income of the poor increases the better the institutional environment (again, results for *polcon* and *cim* are qualitatively very similar to those obtained for *legal*).

A few findings concerning the other economic controls are worth a mention. There is quite a systematic evidence of an ideology effect, particularly for what concerns Muslim and communist countries. This is broadly consistent with Gradstein et al. (2000). Less systematic is the evidence on *schooling, government* and *M2*: their estimated coefficients do not seem to be particularly robust to changes in the specification of the regression model. Yet, one might infer an inequality-reducing effect of educational achievements and depth of the financial system, whilst larger governments tend to be associated with more inequalities. This latter finding certainly deserves further investigation[15]. Finally, the correlation between contemporaneous average income and income of the poor is positive, but largely smaller than one. This stands in contrast with the results reported by Dollar and Kraay (2002) of a one-to-one proportionality between the two. In fact, this one-to-one proportionality shows up if income of the poor is regressed only on a constant and on average income. But when *legal* is added, whatever set of other controls is used, the estimated coefficient on average income drops to 0.49. [16]

Non-linearities in the relationship are tested in Table 5. The first two-columns present the regressions with squared terms on *legal* and *polcon* (results for *cim* are similar). The pattern of coefficients is consistent with an inverted U shaped relationship between the Gini coefficient and institutional quality. This non-linear shape however finds only mild support from the regressions of the income of the poor (columns 3 and 4). The sign of the coefficients suggest that worse institutions reduce the income of the poor at higher levels of institutional efficiency and increase it at lower levels of efficiency. But the estimated coefficients hardly pass a zero restriction test.

The step-wise linear regressions also provide a mixed picture. First of all, the partition of the sample into sub-samples based on values of the institutional variable

[15] Since *government* is instrumented by its lagged values, it is unlikely that the estimated coefficient reflects a reverse-causation effect from Gini to *government*.

[16] A regression of income of the poor (*yp*) on average income (*y*) and *legal* yields the following result :

$$yp = 1.018 + 0.4906y + 0.3895\ legal$$

with all coefficients being significant at 1% level of confidence. Interestingly, Dollar and Kraay (2002) do control for a measure of institutional quality. However, they use a time-invariant measure even though the sample period spans over a few decades. Thus, differences in the measurement of institutional quality might be the source of the discrepancy in the results between this paper and theirs.

presents some inconveniences: within each sub-sample economic variables highly correlates and religious dummies show practically no variation. Therefore, more parsimonious specifications drawn from Li et al (1998) are estimated. These include, in addition to the institutional variable, *schooling* and *M2* [17]. But even with this approach, coefficients are estimated quite imprecisely, as shown by large standard errors. The coefficients on *legal* do not seem to change sign across sub-samples. However, it appears that the strength of the inverse correlation between institutional quality and Gini vanishes at low values of *legal*. That is, worsening institutional quality is less likely to result in a more unequal income distribution if institutions are already highly inefficient.

3.4 *Panel regressions of income and growth*

Table 6 reports the evidence obtained from income and growth regressions. Different methodologies have been used in the literature to estimate equation (7) when income (or growth) is the dependent variable. A first basic approach is to estimate the income regression in levels using lagged values as instruments for the controls. This is done in the first three columns of the table. The set of controls include educational attainments (*schooling*), government consumption to GDP ratio (*government*), the depth of financial intermediation (*M2*), lagged average income, an indicator of openness to trade (*openness*) and an indicator of the degree of urbanization of the society (*urbanization*). The positive estimated coefficients on *legal, polcon* and *cim* substantiate a positive income-effect of good institutions. The inclusion of the Gini coefficient among the set of controls does not alter the key result on institutions (column 4 for *legal*; results for *polcon* and *cim* available upon request).

Next, following the criticisms of Caselli et al (1996), a first difference transformation of the basic regression in levels is estimated. This is equivalent to regressing the growth rate of income between sub-periods on lagged growth and changes in control variables between the same sub-periods. Lagged values of regressors are used as instruments. Results are displayed in column 5 for the variable *legal*. The estimated coefficient remains positive and statistically significant at the 10% level of confidence. The finding for *polcon* is analogous, with the coefficient being significant at slightly more than 5% confidence. The coefficient on *cim* instead is just below significance (p-value is 0.1103).

Column 6 reports the results from estimating a standard Barro-type growth regression. The dependent variable is the average annual growth rate of income in each sub-period and the regressors are instrumented by their lagged values Again, the effect of good quality institutions is positive and statistically different from zero. In column 7, the dependent variable is the investment to GDP ratio, rather than income growth. The importance of estimating an investment regression stems directly from the theoretical analysis in Section 2. Institutions affect income and growth through their effect on individual's incentive to invest. Therefore, better quality institutions should be associated with higher investment to GDP ratios. The positive estimated coefficient on *legal* in column 7 substantiates this hypothesis.

[17] To try to limit the size of an already big table, the estimated coefficients on *schooling* and *M2* in the step-wise linear regressions are not reported, but they are available upon request.

For what concerns the other control variables, it is worth noting that the estimated coefficient on lagged income is smaller than one in all specifications. This implies conditional convergence. The positive effect of education and financial development also appears to be quite robust. Particularly strong is the marginal impact of the depth of the financial system on the investment to GDP ratio. Government consumption to GDP is instead found to hamper growth and reduce investment. Finally, there is little evidence of any additional impact of openness to trade and urbanization.

Finally, the theoretical analysis does not provide univocal predictions on non-linearities in the relationship between institutional quality and income level (or growth). When, at low levels of efficiency a further deterioration of institutions leads the government to redistribute, the net effect on average income can be positive or negative. On the one hand, redistribution might be harmful for growth, since it implies higher taxation and hence lower return on investments. On the other hand, if the poor can use the transfers they receive to undertake investment, then redistribution might contribute to growth, in addition to reducing inequality. In column 8 the income regression is re-estimated including *legal* squared in addition to the linear term. The coefficient on the squared term is however largely insignificant, thus suggesting that the non-linear specification might not be appropriate.

3.5 *The system of equations*

The final piece of evidence stems from the estimation of the system of equations (8a)-(8b). The two dependet variables are the Gini coefficient and average income. The specification of each equation is the same as in the single-equation framework. The estimation methods are SURE and 3SLS. Only results for 3SLS are reported, those obtained from SURE are not qualitatively different[18]. Instruments include latitude, legal origins, and lagged values of the regressors. Results are displayed in Table 7.

In the first three columns, a non-simultaneous system is estimated. Institutional quality has a clear inequality-reducing effect. The income-effect instead significantly shows up only when quality is measured by *legal*. Columns (5), (6), and (7) incorporate a non-linear effect in the Gini equation, but not in the income equation. In fact, the previous evidence from the single-equation framework suggests to impose a zero restriction on the coefficient of the squared institutional variable in the income equation. For *legal* and *polcon*, the evidence of an inverted U-shaped interaction in the Gini equation is quite strong. At the same time, the coefficients on the linear institutional variables in the income equation do not change substantially[19]. The last two columns estimate the system of simultaneous equations, with income among the set of controls in the Gini equation and Gini among the controls in the income equation. The estimated coefficients on the institutional variables remain quite similar to those obtained from the non-simultaneous system.

[18] SURE is not used when the system is simultaneous.

[19] The Wald test never rejects the zero restriction on the squared term. Allowing for non-linearities in the income equation does not change results in the Gini equation and the squared institutional variable in the income equation always has a largely insignificant coefficient.

The estimation of a system of equations also confirm the important role of several other controls. More schooling and more developed financial markets both work in the sense of reducing inequality and increasing average income. There it thus a potentially large payoffs for governments in promoting policies to facilitate access to education at all levels and to deepen financial intermediation. Expanding government consumption in percent of GDP has instead perverse effects. A larger government consumption share is in fact associated with a higher Gini coefficient and with lower growth. Of the variables that are not included in both models, some of the religious/ideology dummies continue to display significant coefficients in the Gini equations. Openess to trade and urbanization instead appear to have no relevant impact on income. Finally, income is a determinant of Gini, whilst Gini does not seem to significantly affect income.

4. Conclusions and directions of future research

In the theoretical model, inefficient institutions alter individual's investment decisions. This has effects on both income distribution and income dynamics. Lower quality institutions increase the degree of income inequality and reduce average income in the economy. However, at high level of institutional inefficiency, income inequality is such that the survival in office of the incumbent is threatened. This implies that either institutional reforms are introduced to restore efficiency or redistribution is used to compensate the poor. The use of redistribution then creates the possibility for non-linearities: at lower levels of institutional efficiency, a further deterioration of institutions reduces (instead of increasing) inequalities.

Some of the key theoretical predictions are supported by the econometric analysis. The quality of institutions inversely correlates with the Gini coefficient and positively correlates with income (and growth). The effect is particularly evident when empirical measures of governance and effectiveness of the legal system are used to proxy the efficiency of institutions. The basic econometric findings are robust to changes in the specification of the empirical models and to the estimation of a system of equations. There is also evidence that at higher levels of inefficiency, the sign of the relationship between institutions and Gini might be reversed or, at least, that it becomes statistically insignificant. Whether the non-linear specification is preferable to the linear one is however quite difficult to establish. A specification test (Ramsey, 1969) applied to both the cross-sectional sample and the panel generally indicates the superiority of the linear specification. Yet, as well-known from the econometric literature, this test might not necessarily be conclusive. Furhter work on this issue has to be done[20].

In addition to what already mentioned in the text, two main lines for future research are left open. On the theoretical side, there is need to formalize incumbent's choice between reform and redistribution when consensus falls below the survival threshold. This in turn requires the definition of a model of timing and depth of institutional reforms and a more careful specification of redistributive programs[21].

[20] The results of the Ramsey test are not reported in Section 3 to save space. However they are available upon request.

[21] Some steps in this direction are already proposed in Carmignani (2003b).

Such an extension would therefore make institutions endogenous to the economic process, along the lines discussed in Besley and Case (2004). For what concerns the empirical part, not all of the implications of the theoretical model have been brought to the data. In fact, Section 3 focuses on the correlations between institutions, income distribution and income dynamics. There are at least two other correlations that can be tested. One is the impact of institutional quality/income inequality on government stability. The other is the effect of institutional quality on the extent of redistribution.

Appendix

Variables description and sources

Variable	Description and source
Governance	Index of quality of governance, obtained as simple average of four clusters: Government effectiveness, Control of corruption, Rule of law, Regulatory burden. Source: Kaufmann et al. (2003).
Polcon	Index of political constraints on policy change. Source: Henisz (2000)
Legal	Index of legal structure and security of property rights (judicial independence, impartiality of courts, protection of intellectual property, military interference in rule of law and the political process, integrity of the legal system). It is one of the five components of *Efw*. Sources: Economic Freedom of the World, International Country Risk Guide.
Efw	Index of Economic Freedom of the World. Includes the following components: size of government, legal structure and property rights, access to sound money, freedom to exchange with foreigners, regulation of credit, labour and business. Source: Economic Freedom of the World.
Cim	Contract intensive money. It is defined as the ratio of M2 minus currency in circulation outside banks to total M2. The original definition is from Clague et al. (1999). Source: computed from raw data in International Financial Statistics.
Gini	Gini coefficient. Sources: UN-WIDER dataset, UNECE Economic Survey of Europe 2004, Dollar and Kraay (2002), Deininger and Squire (1996).
Income	Average per-capita GDP in real terms. Sources: Penn World Tables.
Income of the poor	Average per-capita income of the bottom quintile of the population. It is computed from *Gini* and income shares data as the share of the bottom quintile times average per-capita income

	divided by 0.2. Sources: same as *Gini*.
Growth	Average per-capita growth rate of *income*. Source: same as *income*
Income dummy	Dummy variable taking value 1 if *Gini* data refers to income (as opposed to expenditure). Source: same as *Gini*
Muslim	Dummy variable taking value 1 if Islam is the dominant religion in the country. Source: Gradstein et al. (2000)
Buddhist	Dummy variable taking value 1 if Buddhism is the dominant religion in the country. Source: Gradstein et al. (2000)
Confucian	Dummy variable taking value 1 if Confucianism is the dominant religion in the country. Source: Gradstein et al. (2000)
Communist	Dummy variable taking value 1 if country is communist. Source: Gradstein et al. (2000).
Schooling	Average number of years of schooling in total adult population. Source: Barro and Lee (2000).
Government	Government consumption in percent of total GDP. Source: Penn World Tables
M2	Index of financial depth. It is computed as the ratio of M2 to GDP. Source: International Financial Statistics.
Inflation	Average annual change in consumer price index. Sources: International Financial Statistics and Penn World Tables.
Trade openness	Total international trade (exports plus imports) in percent of GDP. Source: Penn World Tables.
Urbanization	Rate of urban population on total population. Source: World Development Indicators.
Latitude	Distance of a country from the equator. Source: La Porta et al. (1999).
Legal oroigins	Dummy variable taking value 1 if country has British, or German, or Scandinavian legal origins. Source: La Porta et al. (1999).
Ethinc fract.	Index of ethnic fractionalization of the population. Source: Alesina et al. (2003).
Protestant share	Share of protestants in total population. Sources: La Porta et al. (1999) and Alesina et al. (2003).

Tables and Figures

Table 1: Groups of consensus in the population

$\alpha_{inc} < \alpha_{alt}$		$\alpha_{inc} > \alpha_{alt}$		$\alpha_{inc} = \alpha_{alt}$	
Incumbent supported by	**Opposition supported by**	**Incumbent supported by**	**Opposition supported by**	**Incumbent supported by**	**Opposition supported by**
Group 1	½ Group 4	½ Group 4	Group 1	½ of Group 1	½ Group 1
Group 2	*Group 3 empty*	*Group 2 empty*	Group 3	½ of Group 4	½ Group 4
½ Group 4			½ Group 4	*Group 2 empty*	*Group 3 empty*

Table 2: Pair-wise correlations between indicators of institutional quality

	Governance	*Polcon*	*Legal*	*Efw*	*Cim*
Governance		0.7019	0.9372	0.8559	0.5925
Polcon	0.7019		0.6412 **0.6597**	0.6003 **0.5700**	0.5791 **0.6059**
Legal	0.9372	0.6412 **0.6597**		0.7807 **0.7539**	0.4971 **0.5209**
Efw	0.8559	0.6003 **0.5700**	0.7807 **0.7539**		0.6258 **0.5028**
Cim	0.5925	0.5791 **0.6059**	0.4971 **0.5209**	0.6258 **0.5028**	

Notes: The table reports simple bilateral correlation coefficients. Correlation coefficients in the cross-section sample are reported in normal black. Correlation coefficients in the panel sample are reported in **bold**. Governance is not included in the panel sample and hence no correlation coefficients are computed.

Table 3. The impact of institutional inefficiency in a cross-sectional model

	Gini (1)	Income of the poor (2)	Income (3)	Growth (4)	Gini (5)	Gini (6)	Income of the poor (7)
governance	-0.138***	1.404***	1.211***	0.01***	0.255		
	(111)	(95)	(129)	(122)	(111)		
polcon	-0.505***	4.721***	4.077***	0.033***			
	(106)	(92)	(120)	(116)			
Legal	-0.096***	0.561***	0.512***	0.004***			
	(87)	(81)	(102)	(101)			
Efw	-0.175***	1.261***	1.287***	0.012***			
	(87)	(81)	(102)	(101)			
Cim	-0.409	7.761***	7.319***	0.056**			
	(104)	(90)	(121)	(116)			
Govern. sq					-0.347*		
Govern. high						-0.176	1.018***
						(check)	(check)
Govern. med						-0.136	4.042***
						(check)	(check)
Govern. low						1.335***	-6.323
						(check)	(check)

Notes. The first four columns reports estimated coefficients from the parsimonious specification of equation (7). Each regression includes only one institutional variable at the time. However, estimated coefficients obtained from regressions with the same dependent variable are all reported in the same column. The number in parenthesis are the number of observations for each regression. The fifth column reports the results from the estimation of the parsimonious specification with the addition of a squared term on *governance*. The last two columns report the results of the step-wise linear regressions. * ** *** denotes statistically significant coefficients at respectively 10%, 5%, 1% level of confidence. Estimation is by 2SLS. Instruments include: index of ethnic fractionalization, legal origins dummy, latitude, share of protestants in the population. Estimated constant terms are not reported.

Table 4. Panel regressions of income inequality and income of the poor

	Gini (1)	Gini (2)	Gini (3)	Gini (4)	Gini (5)	Gini (6)	Income of the poor (7)
Income dummy	0.223***	0.228***	0.370**	0.229***	0.224***	0.188***	
Muslim	-0.178***	-0.107*	-0.024	-0.141**	-0.184***	-0.160***	
Buddhist	-0.027	-0.1**	-0.264	-0.039	-0.029	-0.084	
Confucian	0.038	-0188**	-0.085	0.011	0.006	-0.005	
Communist	-0.112	-0.427***	-0.948**	-0.159	-0.095	-0185**	
Schooling	-0.107*	-0.067	0.884*	-0.089	-01.08*	-0.124***	0.107
Government	0.437	0.884***	-0.082	0.210	0.37	0.498**	-0.214
M2	-0.04	-0.283***		0.003	-0.072	-0.11	0.441*
Initial income	0.135*	0.134*		0.078	0.134*	0.952***	
Leg	-0.168***			-0.145***	-0.167***	-0.082**	0.286***
Polcon		-0.693**					
Cim			-10.812**				
Inflation				0.013			-0.022
Trade openness					0.072**		-0.119
Intial income sq.						-0.043***	
Income							0.484***
N. OBS.	242	235	282	225	235	235	202

Notes: Estimation is by 2SLS. Instruments include lagged values of regressors, latitude and dummy for legal origins. * ** *** denotes statistically significant coefficients at respectively 10%, 5%, 1% level of confidence Estimated constant terms are not reported

Table 5. Panel regressions with non-linearities

	Gini (1)	Gini (2)	Income of the poor (3)	Income of the poor (4)	Gini (5)	Income of the poor (6)
Income dummy	0.213***	0.189***				
Muslim	-0.079*	-0.078*				
Buddhist	-0.078	-0.222***				
Confucian	-0.016	-0.044				
Communist	-0.177**	-0.304***				
Schooling	-0.076*	-0.108***	0.019	0.169**		
Government	0.554**	0.951***	-0.798	-1.192***		
M2	-0.164*	-0.234***	0.592***	0.853***		
Initial income	0.05	0.064*				
Inflation			-0.024	-0.017		
Trade openness			-0.135	-0.162*		
Legal	0.201**		-0.361			
Legal sq.	-0.026***		0.049**			
Polcon		0.965***		-0.531		
Polcon sq.		-1.478***		0.737		
Legal high					-0.355** (69)	1.339 (58)
Legal med.					-2.149 (67)	4.961 (64)
Legal low					-0.049 (62)	0.976*** (56)
Income			0.601***	0.723***		
Lagged income						
N.OBS	198	242	202	241		

Notes. In Columns 5 and 6 the coefficients from piece-wise linear regressions are reported only for the institutional variables (the other control variables include *income dummy, schooling* and *M2*). The number in parenthesis indicate the number of observations used for each piece-wise linear regression.
* ** *** denotes statistically significant coefficients at respectively 10%, 5%, 1% level of confidence.
Estimation is by 2SLS. Instruments include lagged values of the explanatory variables, latitude and legal origins. Estimated constant terms are not reported

Table 6: Panel regressions of per-capita income

	Income (1)	Income (2)	Income (3)	Income (4)	Income (5)	Growth (6)	Invest (7)	Income
Schooling	0.047***	0.034***	-0.021	0.048*	-0.229*	0.012**	0.016**	0.052***
Government	-0.43***	-0.428***	-0.37***	-0.654***	-0.093	-0.084***	-0.139***	-0.48***
M2	0.053	0.119***		0.122***	0.109	0.014*	0.032***	0.064*
Lagged income	0.923***	0.893***	0.95***	0.895***	0.974***	-0.016***	-0.03***	0.952***
Trade openness	0.014	0.005	0.008	0.02	-0.081	0.005	0.001	0.023
Urbanization	0.023	0.106	0.081	-0.04	0.275	0.002	0.013	
Legal	0.03**			0.038***	0.072*	0.005**	0.008**	0.061*
Polcon		0.183**						
Cim			0.703*					
Gini				-0.002			-0.004	
Legal sq.								-0.004
N.Obs	365	417	506	198	276	293	198	293

Notes: The first four columns report estimates from a standard regression in levels. Estimation is by 2SLS using lagged values of explanatory variables, latitude, and legal origins as instruments. Column (5) reports estimates obtained from a first difference version of the basic growth regression, following Caselli et al. (1996). Lagged values of explanatory variables are used as instruments. Column (6) reports estimates from a regression of average annual growth rate on explanatory variables. Estimation is by 2SLS with lagged values, latitude and legal origins as instruments. Same instruments are used for the investment regression in column (7).

Estimated constant terms not reported. * ** *** denotes statistically significant coefficients at respectively 10%, 5%, 1% level of confidence. Estimated constant terms are not reported

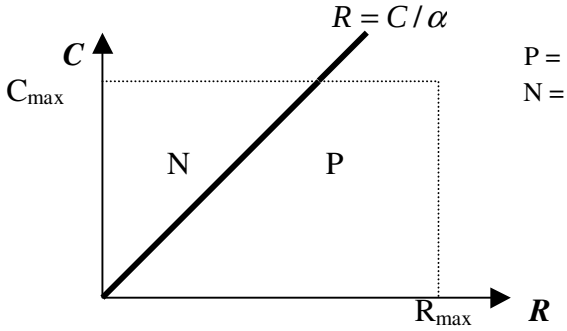
Table 7: System of equations

Gini equation								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Income dummy	0.226***	0.192***	0.135***	0.222***	0.202***	0.134***	0.228***	0.182***
Muslim	-0.056	-0.086**	-0.089**	-0.043	-0.088**	-0.096**	-0.078*	-0.090**
Buddhist	-0.032	-0.136***	-0.098**	-0.039	-0.21***	-0.105**	-0.092	-0.135***
Confucian	0.043	-0.060	-0.011	0.025	-0.068	-0.014	-0.002	-0.07
Communist	-0.098	-0.365***	-0.128	-0.139	-0.37***	-0.139*	-0.176*	-0.353***
Schooling	-0.095***	-0.078***	-0.175***	-0.085**	-0.073***	-0.169***	-0.057	-0.087***
Government	0.653***	0.677***	0.705***	0.532***	0.694***	0.704***	0.479**	0.697***
M2	-0.222***	-0.238***		-0.204***	-0.16***		-0.150**	-0.253***
Initial income							-0.063*	0.016
Legal	-0.036***			0.098**			-0.028***	
Legal sq.				-0.012***				
Polcon		-0.193***			0.572***			-0.206***
Polcon sq.					-0.97***			
Cim			.0.232			1.36		
Cim sq.						-0.767		

Income equation								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Schooling	0.050***	0.048***	0.047***	0.051***	0.047***	0.047***	0.047**	0.047***
Government	-0.506***	-0.592***	-0.507***	-0.041	-0.529***	-0.527***	-0.488***	-0.588***
M2	0.144***	0.174***		0.143***	0.174***		0.138***	0.174***
Trade open.	0.020	0.018	0.044***	0.022	0.016	0.043***	0.017	0.016
Urbanization	-0.039	0.044	-0.051	-0.041	0.046	-0.053	-0.038	0.048
Lag. Income	0.927***	0.921***	0.961***	0.927***	0.921***	0.962***	0.93***	0.920***
Gini							-0.02	-0.008
Legal	0.017***			0.017***			0.016***	
Polcon		-0.002			-0.004			-0.003
CIM			0.128			0.126		
N.Obs	198	242	260	198	242	260	198	242

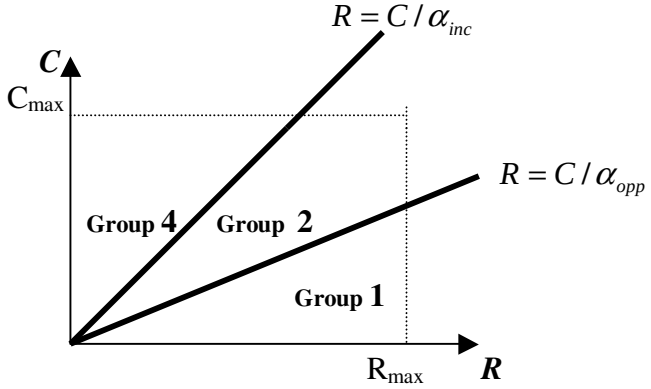
Notes: Estimation is by 3SLS. Instruments include lagged values of explanaotory variables, latitude., legal origin dummies. * ** *** denotes statistically significant coefficients at respectively 10%, 5%, 1% level of confidence. Estimated constant terms are not reported

Figure 1.



P = participants (participation condition met)
N = non-participants (participation condition not met)

Figure 2



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