Identifying the effect of institutions on economic growth

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Abstract. This chapter describes how institutional quality can be measured, quantifies the correlation between institutional and economic developments, and reviews and discusses the literature on the causal impact of institutions on growth. Identifying a causal effect of institutions on development, and understanding the technology of the transmission of institutional quality to growth are challenging issues. This is due to the difficulty (i) of disentangling the causal and reversing the causal effects, (ii) of accounting for unobserved shocks affecting both institutions and growth, and (iii) of capturing the lag structure of the relationship. To address these problems, existing cross-country studies have instrumented institutional quality using variables reflecting the settlement decisions of colonizers and imperial powers between the 16th and the 19th century. While fully recognizing the merits and the methodological rigor of this literature, I show that the type of institution implemented by imperial powers was statistically linked to unobserved factors affecting long-run economic performance. Hence, the quantitative predictions of these studies must be used with caution. Alternatively, collecting long-run data on institutional and economic changes, and searching for quasi-natural experiments (comparing the dynamics of countries which were initially similar and experienced different, unexpected institutional shocks) are promising research avenues.

1. Introduction

An undeniably stylized fact of the last century is that, with a few exceptions, the poorest countries of the world did not catch up with industrialized nations in any meaningful way. Although a considerable amount of research has been devoted to the understanding of development disparities across countries, economists have not yet found out how to make poor countries rich. Still, in comparative growth studies, the quality of institutions has been seen by many renowned economists as a major explanation of cross-country inequality. Standard growth theories have shown that development depends on the accumulation of human capital, physical capital, access to modern technologies. Accumulation of these factors is likely to be affected by institutional characteristics such as the organization and functioning

of the productive sector, the distribution of political and civil rights, the quality of the legal system, government effectiveness, etc. However identifying a causal effect of institutions on development, quantifying its size, and understanding the technology of transmission of institutional quality to growth are challenging issues. This paper reviews the major insights of the literature, adds a few caveats, and provides a few suggestions for further research.

Let me first clarify how the concept of "institutions" has been defined in the literature. Following North (1990), "Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction". Acemoglu et al. (2005) dismantled the engine and defined institutions as a combination of three interrelated concepts:

- *Economic institutions* - They include factors governing the structure of incentives in society (i.e. incentives of economic actors to invest, accumulate factors, make transactions, etc.) and the distribution of resources. For example, the structure of property rights, entry barriers, set of contract types for business offered in contract law; redistributive tax-transfer schemes are affecting economic performance and growth.
- *Political power* - Economic institutions are themselves the outcome of collective choices of the society. A society is made of different groups with conflicting interests. The relative political power of these groups governs their capacity to decide the administration of resources and implement policies. The distribution of political power determines the design and the quality of economic institutions. It results from *de facto* political power (i.e. political power emerging from economic outcomes) and *de jure* political power.
- *Political institutions* - They include institutions allocating *de jure* political power across groups. They are linked to the characteristics of the government and the design of the constitution. This raises numerous questions which include among others: Who elects the empowered? How power distribution is structured? Where decision-making power is held?

The interactions between these three notions govern institutions growth and development, but also the reverse causal effects of the economy on institutions. As emphasized by Acemoglu et al. (2005), political institutions and the distribution of political power in society are determined by the distribution of resources. They govern the design of economic institutions, which in turn determine the level of development and the dynamics of the distribution of resources. For example, in a very unequal society, prejudiced groups can engage in activities (exit, protest, revolt, military coup) that will change political and economic institutions. Hence, when assessing the impact of institutions on growth, a first difficulty is to disentangle the causal and reverse causal relationships between these two variables. A second problem is that many unobserved variables can simultaneously affect institutions and growth, leading to spurious correlations. A third major issue stems from the fact that the system exhibits persistence: political institutions are durable and changes in institutions translate into economic performance with a certain lag.

In the remainder of this chapter, I first explain how the three components of institutions described above have been measured in the literature (Section 2). I then illustrate the strong correlation that exists between institutional and economic development (Section 3). Finally, I review the literature on the causal impact of institutions on growth and discuss this impact's limits (Section 4).

2. Measurements of institutional quality

Several databases have been developed to characterize the quality of institutions. I list below the main databases used to describe political power, and political and economic institutions.

On political institutions, the *Polity* project records the authority characteristics of many states in the world.[1] The latest version, *Polity IV*, covers all major, independent states in the global system (i.e., states with total population of 500,000 or more in the most recent year; currently 164 countries) over the period 1800-2010. The *Polity IV* data set provides an index of democracy. This index combines two eleven-point scales (0-10) of democracy and autocracy. The democracy index is a variable aggregating three characteristics of institutions: first is the presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders; second is the existence of institutionalized constraints on the exercise of power by the executive; third is the guarantee of civil liberties to all citizens in their daily lives and in acts of political participation. The autocracy index is derived from codings of the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive. Other country-specific variables are provided in the *Polity IV* database, such as the occurrence of coups d'état (1946-2011), major episodes of political violence (1946-2008), size of forcibly displaced populations (1964-2008), a fragility index (1995-2011), etc. It is worth noticing that Beck et al. 2001 built another database covering 177 countries over 21 years (1975-1995). The latter database includes 108 variables describing elections, electoral rules, types of political system, party composition of the government coalition and opposition, and the extent of military influence on government.

Political power partly results from the political institutions described above (*de jure*), and from the distribution of resources across groups (*de facto*). Examples of groups of influence affecting political decisions and economic institutions are: religious groups, ethnic groups, military forces, workers' and firms' unions, diaspora members abroad, etc. Various databases can be used to document the size of these groups and the distribution of *de facto* political power. For example, Alesina et al. (2003) have collected data on the relative size of linguistic, ethnic and religious groups; they used them to construct an index of fractionalization for 215 countries and territories for the period of the late nineties. Docquier et al. (2009) have estimates of the size of the emigrant diasporas by country of destination, by education level and by gender for 195 countries in 1990 and 2000.

[1] See http://www.systemicpeace.org/polity/polity4.htm.

Many data sources can be used to document economic institutions. The main databases are the following:

- *Transparency International* produces measures of perceived corruption. Corruption is defined as the abuse of entrusted power for private gain.[2] The CPI (Perceived Corruption Index) measures the perceived level of public sector corruption in many countries. The CPI is a composite index reflecting the views of observers from around the world, including experts living and working in the countries and territories evaluated. The recent 2012 CPI provides data for 176 countries. The first wave was issued in 1995 but for a limited number of countries (41).
- The *Governance matters* project started with the work of Kaufmann et al. (1999). The most recent methodology is described in Kaufman et al. (2009). The database reports six broad dimensions of governance for over 200 countries over the period 1996-2011. The six dimensions will be defined in the next section. The database also relies on experts' views. The six aggregate indexes are reported in standard normal units, ranging from approximately -2.5 to 2.5.
- The *Doing Business* database provides measures of business regulations and their enforcement from 2003 to the present.[3] Each economy is ranked according to 10 sets of indexes: starting a business, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency. A composite "Ease of Doing Business" has been constructed and used to rank countries.
- The PRS group has produced country ratings for three types of risk (political, economic and financial risks) from 1984 to the present.[4] Their *International Country Risk Guide* (ICRG) database now monitors 140 countries; fewer observations were available for the 1980's. A composite index of country risk combines the three components above. Compared to the previous databases, one advantage of ICRG is that longitudinal data are available on a longer horizon of about 30 years for many countries.
- *Freedom house*, a non-governmental organization, has produced comparative data on the level of democracy and freedom in all countries and dependent territories from 1972 to the present. The survey measures freedom according to two broad categories: political rights and civil liberties. The results of the survey are presented in a dataset that contains three main variables: an index of the level of political rights, an index of civil liberties, and the Freedom House Index (FHI), which is the average of the other two indices. The 2011 version includes 204 countries; fewer observations were available for earlier years.
- The Heritage Foundation has produced data on *Economic Freedom around the World* since 1995. Detailed information are provided for 185 countries on property rights, freedom from corruption, fiscal freedom, government spending, business freedom,

[2] See http://www.transparency.org/research/cpi/.
[3] See http://www.doingbusiness.org/.
[4] See http://www.prsgroup.com/Default.aspx.

labor freedom, monetary freedom, trade freedom, investment freedom and financial freedom.

- Andrei Shleifer has developed a cross-country database on *Legal origins*.[5] It distinguished countries adhering to Common Law and legal systems based on the Civil Law (French, German, Scandinavian and Socialist legal origins).
- Sachs and Warner (1995) have developed data on *Openness to trade*. They judge a country to have a closed trade policy when it has at least one of the following characteristics: nontariff barriers covering 40 percent or more of trade, average tariff rates of 40 percent or more, a black market exchange rate that is depreciated by 20 percent or more relative to the official exchange rate, a socialist economic system, a state monopoly on major exports. They document the year of openness for a large number of developed and developing economies.

3. Correlation with economic development

Measures of economic institutions are highly correlated. To illustrate this, let me focus on the six indices of governance provided in the *Governance Matters* database described in Kaufman et al. (2009). They capture various dimensions of institutional quality:

- Voice and accountability captures 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.
- Political stability and absence of violence measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
- Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
- Regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
- Rule of law captures 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.
- Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as the "capture" of the state by elites and private interests.

[5] See http://www.economics.harvard.edu/faculty/shleifer/dataset.

First, as shown in Table 1, these various dimensions of governance exhibit correlation rates ranging from 0.60 to 0.95, with a mean equal to 0.85. For this reason, it is very difficult to identify the dimensions that induce the largest growth potential. Second, the correlation rates between the level of development (as measured by the log of GDP per capita) and these six indexes of governance are also very great. Figure 1 shows that the semi-elasticity of GDP per capita to the quality of governance varies between 0.78 and 1.06, with R-squared ranging from 0.36 to 0.65. The largest correlation rates are identified for Government effectiveness and the Rule of Law.

Table 1. Correlation between governance indexes

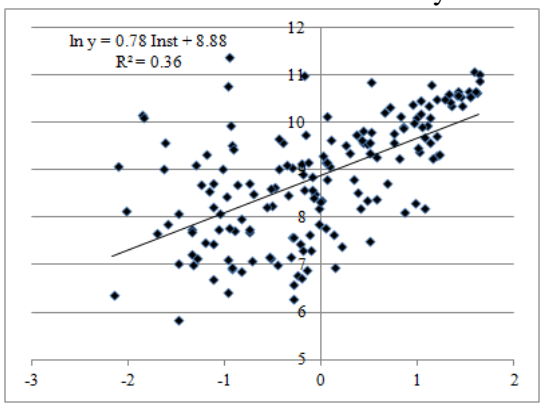
	Voice	Stab	GEff	Reg	RoL	Corr
Voice and accountability (Voice)	1.00	0.70	0.78	0.77	0.83	0.79
Political stability (Stab)	0.70	1.00	0.69	0.60	0.77	0.75
Government effectiveness (GEff)	0.78	0.69	1.00	0.93	0.95	0.93
Regulatory quality (Reg)	0.77	0.60	0.93	1.00	0.90	0.85
Rule of Law (RoL)	0.83	0.77	0.95	0.90	1.00	0.95
Control of corruption (Corr)	0.79	0.75	0.93	0.85	0.95	1.00

Own calculations based on "Governance Matters VIII" database, Kaufman et al. (2009).

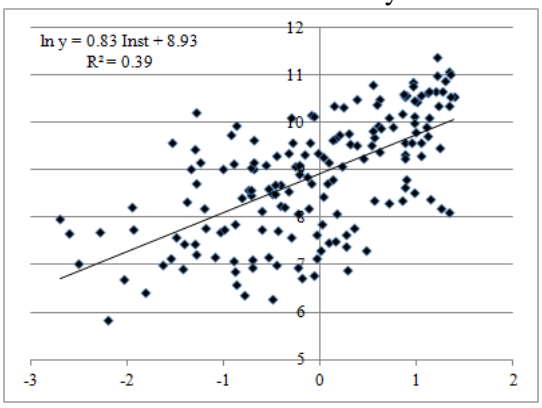
Comparing the dynamics of institutional quality and development reveals a different picture. In Figure 2, the growth rate of each variable is represented on the vertical axis and its initial level is represented on the horizontal axis. A convergence phenomenon is at work if, on average, the growth rate is a decreasing function of the initial level of the variable. In that case, countries with initially low levels of institutional quality or development tended to improve at a faster pace than countries with initially high levels. It appears that institutional quality has converged across countries in the recent past and over a longer horizon: both CPI index (over the last decade) and the ICRG index of socio-economic conditions (over the last three decades) exhibit convergence. On the contrary, there is no sign of convergence in GDP per capita over the recent past or over a longer period. Hence, the dynamics of institutions differs from that of economic development. The correlation between the growth rate of GDP per capita and the growth rate of the ICRG index is lower than 0.3. This confirms that relationships between institutions and growth or development might be complex, and possibly involves long lags.

Figure 1. Correlation between governance and GDP per capita (year 2011)

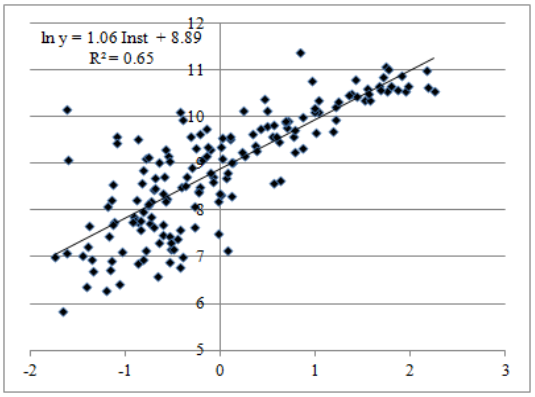
1.a. Voice and accountability



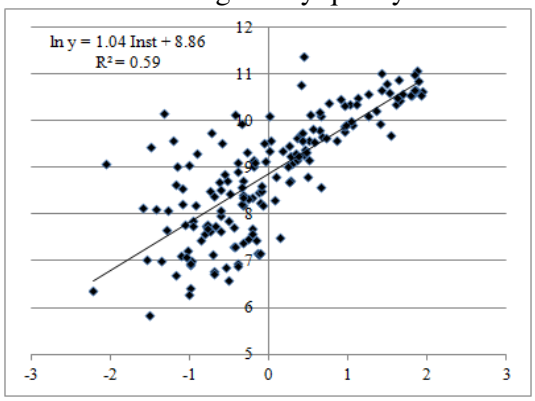
1.b. Political stability



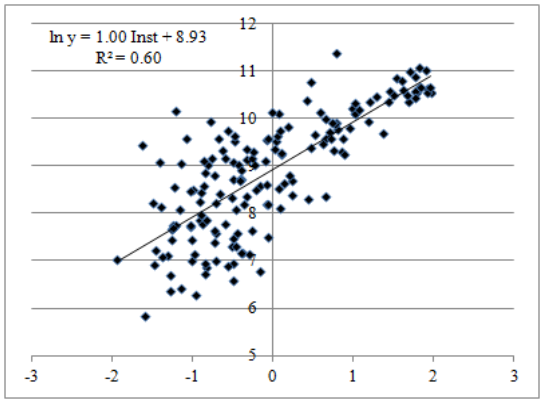
1.c. Government effectiveness



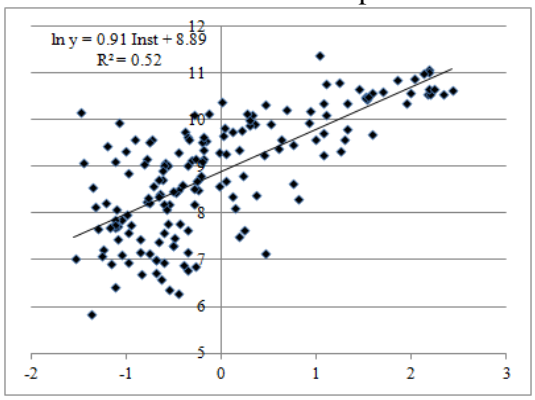
1.d. Regulatory quality



1.e. Rule of Law



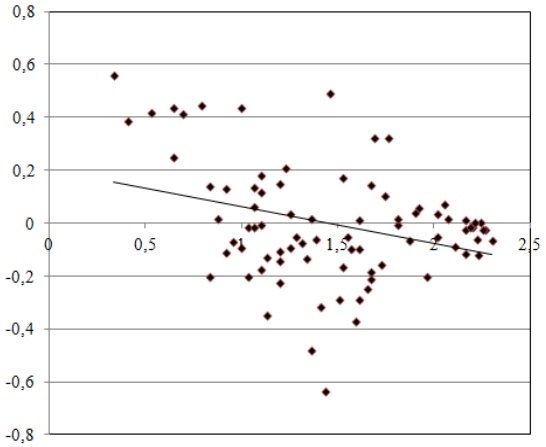
1.f. Control of corruption



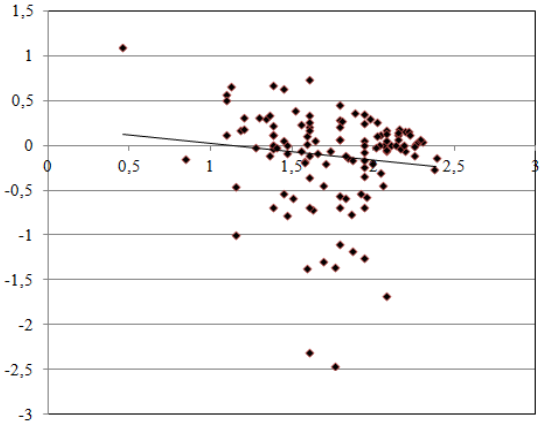
Own calculations. Legend: ln y = log of GDP per capita, measured in PPP value (Source: World Development Indicators), Inst = governance index (Source: "Governance matters VIII" database, Kaufman et al. 2009).

Figure 2. Cross-country convergence in institutions and development

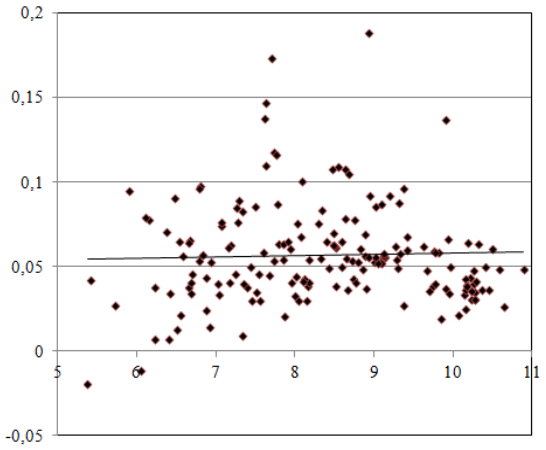
2.a. Corruption perception index 1998-2011



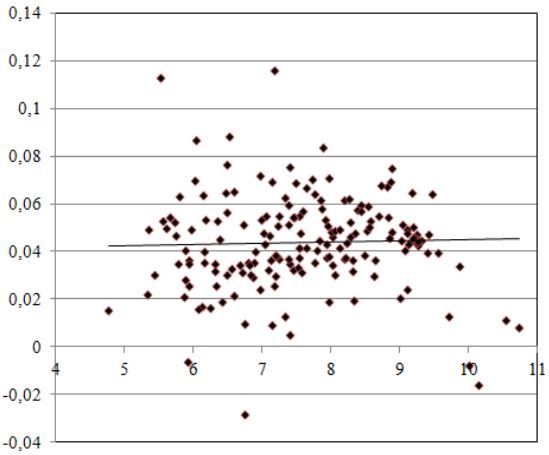
2.b. Socio-economic conditions 1985-2006



2.c. GDP per capita 1998-2011



2.d. GDP per capita 1980-2011



Own calculations. Legend: The growth rate of the variable is represented on the vertical axis and its initial level is represented on the horizontal axis. CPI is taken from Transparency International (83 observations), Socio-economic conditions are obtained from the ICRG database (123 observations), log of GDP per capita is measured in PPP value and obtained from the World Development Indicators (174 observations).

4. Identifying causation

The identification of bivariate correlations between institutions and growth can be improved if one allows economic growth to be affected by other determinants or control variables. More sophisticated relationships between variables can be quantified using the powerful tools of econometrics. An empirical model assessing the link between institutions and development could be written as following:

$$\ln Y_{it} = \alpha + \beta \times Inst_{it} + \sum_k \gamma^k \times Control_{it}^k + \varepsilon_{it} \ ,$$

where $\ln Y_{it}$ is the log of GDP per capita in country *i* at period t, $Inst_{it}$ is a set of measures of institutional quality, $Control_{it}^k$ is a vector of *k* other explanatory variables, ε_{it} is the error term, and $(\alpha, \beta, \gamma^k)$ is a vector of parameters to be estimated. Variants of this model can be used (e.g. variants with a delayed influence of institutions or, in the spirit of Figure 2, a "beta-convergence" model that explains the growth rate of GDP per capita on the left-hand side, $\ln Y_{it}/Y_{t-1}$, using the same explanatory variables and the lagged level of GDP on the right-hand side).

A positive coefficient for β reflects a positive association between institutions and development. However association does not mean causation. Identifying a causation link is difficult for several reasons:

- First, correlation between $Inst_{it}$ and $\ln Y_{it}$ can be driven by the existence of unobserved variables Z_{it} affecting both institution quality and development. In that case, variables are spuriously correlated but causally unrelated.
- Second, correlation can be driven by a reverse causality relationship, i.e. $\ln Y_{it}$ affecting $Inst_{it}$. For example, Dawson (2003) has explored the causality relationship between political/economic freedom and growth.
- Third, identifying a relationship might be difficult if variables are subject to serious mismeasurement problems.
- Fourth, data on institutions and development are available for a limited set of countries and periods. This may induce problems of small sample size and selection (more missing observations for some groups of countries).
- Fifth, the reduced-form specification used in the regression might not reflect the actual technology of transmission of the influence of institutions on development, either because the functional form is not appropriate (Is the effect linear, convex/concave, monotonic?) or because several components of institutions must interact. In such a case, the regression suffers from a misspecification bias.

In general, solutions have been proposed to solve these problems. To capture unobserved heterogeneity, adding a large number of controls can partly solve the problem but generates problems of collinearity between variables. If data on controls are not available or imprecise, it is common to use country and time fixed effects, i.e. imposing that unobserved characteristics can be captured with a constant for each country and a constant for each period: $Z_{it} = z_i + z_t$. The drawback is that an unobserved shock that is specific to one country and one period (e.g. election of a good or bad political leader) cannot be accounted for.

Reverse causality issues can be addressed by using Instrumental Variables (IV) regressions. The principle is to find one or several instrument(s), i.e. one or several variable(s) that do not belong to the set of controls (an instrument has no direct effect on the dependent; here, economic growth) and are correlated with the endogenous explanatory variables (here, institutional quality). The IV method consists in running a first-stage regression of the endogenous explanatory variable on the instrument(s); this first-stage purges the explanatory variable from reverse causality. Then, in the second-stage, the dependent can be regressed on the predicted or instrumented level of the explanatory variable. The IV method also corrects for mismeasurement problems and unobserved heterogeneity.

These solutions are difficult to implement in the case of institutions and growth. Finding an instrument predictive of institutions without directly impacting economic growth is a very complex task. In addition, the impossibility to account for time and country-specific shocks affecting growth and institutions (e.g. election, revolution, political reforms) is also a major problem. Finally, the absence of longitudinal data on institutional quality for a large number of countries and for a long period is another source of concern. Several studies have tried to address these issues. I review below some of the major contributions and then discuss their drawbacks.

4.1. Insights from the current literature

The most influential studies in the literature on institutions and growth address the reverse causality issue by relying on instrumental variable regressions. Based on the fact that institutions are strongly persistent, the quality of institutions is instrumented in the first stage using variables reflecting the settlement decisions of colonizers and imperial powers between the 16th and the 19th century.

Hall and Jones (1999) have studied the causes of cross-country variation in output per worker. They found that the differences in capital accumulation, productivity, and therefore output per worker are driven by differences in institutions and government policies, referred to as social infrastructure. To quantify the impact of institutions (as measured by an average of 5 indexes taken from the ICRG database, and by Sachs-Warner's index of openness to trade), they accounted for feedback effects from output per worker to social infrastructure. They instrumented social infrastructure with geographical and linguistic characteristics of an economy: distance from equator and the extent to which languages of Western Europe are

spoken as a mother tongue. They viewed these characteristics as "measures of the extent to which an economy is influenced by Western Europe, the first region of the world to implement broadly a social infrastructure favorable to production". They concluded that the country with the best institutions has between 25 and 38 times higher output per worker than the country with the worst institutions. Differences in social infrastructure rather than differences in factor endowments therefore account for most of the observed cross-country variations in output per worker.

Acemoglu et al. (2005) refined the Hall and Jones' study and related the quality of institutions in developing countries to the type of colonial experience. They distinguished two types of European colony. Colonized countries with a temperate climate (e.g. North America, Australia, etc.) were suitable for agriculture and settlement. Colonial powers put in place *institutions of settlement*, which are very similar to those in their home countries. In contrast, countries with adverse climatic conditions and rampant diseases were seen mainly as sources of rent. Colonial powers put in place *institutions of extraction*, which were designed to facilitate extraction of resources and their transfer to the imperial power. The latter give much less importance to property rights, political and economic freedom. After the end of the colonial era, these institutions proved to be persistent: colonial powers were replaced by home-grown dictators who continued to use the extractive institutions for their personal benefit. Hence, in their IV regressions, Acemoglu et al. (2005) used data on mortality of European settlers, soldiers and missionaries to predict the quality of institutions in developing countries. In the first stage, they found a strong negative correlation between Europeans' mortality and quality of institutions. When using institutions instrumented by the mortality figures to explain differences in per-capita incomes across countries, they found that institutions account for up to three quarters of the variation in incomes across countries.

Another strand of literature, summarized by La Porta et al. (2008), goes under the name of Legal Origins Theory (LOT). This literature finds significant evidence that different socio-economic outcomes can be traced back to fundamental differences in legal traditions, the crucial divide involving the opposition between common and civil law (with the former proving more conducive to economic success). It picks up the thread of older comparative law theories, by considering English, French, German, Scandinavian and Socialist "legal origins" as determinants of distinctively different levels of quality of government and economic performance. More precisely, it begins with the important question of why the stock markets of London and New York were so much larger and dynamic in the 1990's than those of Paris and Frankfurt. The key proposition is to link the level of financial development to the existence and strength of legal rules providing investor protection (La Porta et al. 1997 and 1998). From this starting point, the proponents of LOT have made several seminal empirical contributions to the interdisciplinary research on comparative development:

- First, they argue that the quality of the legal rules can be measured and quantified for an important group of countries, using national commercial laws as a proxy for the strength of investor protection.

- Second, they posit that the legal rules protecting investors vary along legal traditions, with common law systems being more protective of outside investors than civil law systems.

- Third, in line with their initial proposition, they show empirically, in a cross-section of countries, that the level of legal investor protection is indeed a strong predictor of financial and economic development. In order to avoid the objection of reverse causality (i.e. countries improve their laws as their financial markets develop), "legal origin" is used as an instrument for legal rules in a two-stage regression procedure, where the second stage explains financial development. Their key argument is that legal traditions were introduced through conquest and colonization, and were hence largely exogenous to the current level of financial development.

Further studies have examined the influence of legal traditions on some other spheres of economic activity. Civil law is systematically associated with a greater influence of government ownership and regulation than common law, which is empirically identified as leading to undesirable market outcomes, such as greater corruption, larger unofficial economy and higher unemployment levels (La Porta et al 2002, Djankov et al. 2002, Botero et al. 2004). See also La Porta et al. (2008) for a comprehensive review. To summarize, LOT's most influential thesis is that common law favors the trust of uninformed capital owners among professional insiders acting as agents in the best interest of their principals, as opposed to the case for civil law (common law countries are perceived as more protective of private property than civil law countries). This claim is justified on religious, sociological and political grounds.

4.2. Discussion and caveats

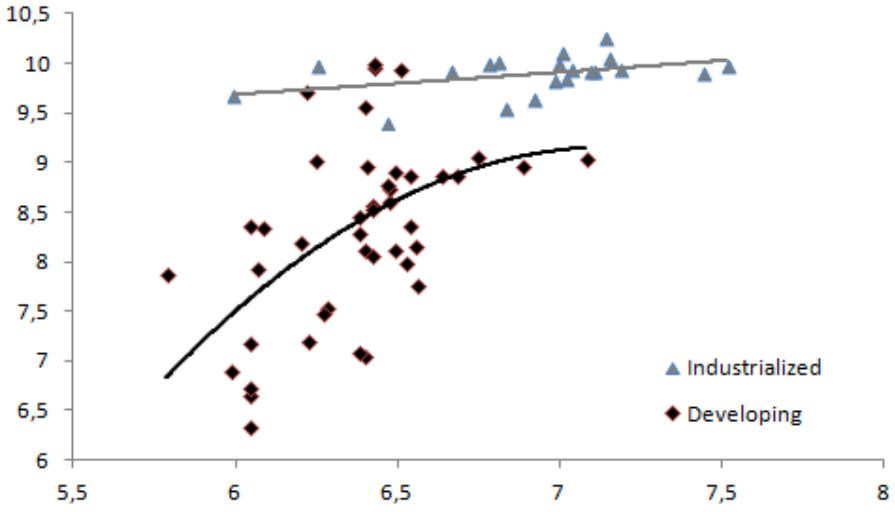
The goal of Hall and Jones (1999) and Acemoglu et al. (2005) was to quantify the causal impact of institutions on growth. The choice of instrumental variables is always a matter of concern. Instruments are assumed not to have a direct effect on the dependent variable. They use geographical characteristics, 18th century mortality rates, and linguistic characteristics. Are they good instruments?

Although debated in the literature, the theories developed by Ashraf and Galor (2013) and Diamond (1997) see geographical locations and disease as the main determinants of economic performance before the industrial revolution. In the Ashraf-Galor's theory, the channel of transmission is the level of genetic diversity in the population (which varies with distance from Africa), whereas Jared Diamond's theory emphasizes the role of biodiversity (which mainly varies with latitude). Other studies have shown that geographical characteristics impact diseases and productivity, although the native populations have developed (partial)

immunity to tropical diseases.[6] As far as linguistic characteristics are concerned, they might affect human and physical capital accumulation through emigration rates or information/transaction costs between countries. For example, Docquier et al. (2009) have shown that brain drain rates are larger in English speaking countries, and that many countries are losing more than 50 percent of their "brains".

Ultimately economic factors in the colonial era impacted colonizers' decisions and are likely to be very persistent. To illustrate this, I use Maddison's data on GDP per capita in the years 1820 and 2000. The level in 1820 is used as a proxy for the level of development before the colonial expansion. As shown in Figure 3, regressing the log of GDP in 2000 on the log of GDP in 1820 shows that the development level in the 18th century is an excellent predictor of the current development level in both industrialized countries (data available for 20 industrialized countries are represented in grey) and developing countries (data available for 42 developing countries are represented in black). This is confirmed by econometric studies. Bockstette et al. (2002) showed that population growth (a good proxy for economic development during the Malthusian epoch, and institutional quality in antiquity) are excellent predictors of income per capita and economic growth in the recent decades. From this, it might be argued that the type of institution implemented by imperial powers was statistically linked to unobserved factors affecting long-run economic performance. The quantitative assessment of the development impact of institutions must be taken with caution.

Figure 3. Log of GDP per capita in 1820 (X axis) and in 2000 (Y axis)



Own calculations based on historical data on GDP per capita from Maddison (2007).

[6] Acemoglu et al. (2005) argue that mortality of Europeans is a valid instrument and not a proxy for climate and geography because tropical countries were often among the richest countries prior to colonization (e.g. Mughal Empire in India, Aztecs in Mexico and Incas in Peru).

The LOT approach argues that fundamental differences in legal traditions explain cross-country differences in development. The "legal origin" variable is used in the first-stage as a predictor of key determinants of financial development. While fully recognizing the merits and the methodological rigor of the LOT approach, I also believe that the effect is less clear due to misspecification and mismeasurement problems:

- The simple divide based on legal origin – although meaningful – neglects conceptual aspects such as the difference between law and regulations, and does not take into account the cost of "access to justice". Any growth-enhancing legal system will prove to be useless if people cannot access justice. In other words, legal origin may matter, but only if the rules are actually enforced. This is in line with Acemoglu et al. (2005) who see the decision to implement *institutions of settlement* or *institutions of extraction* as endogenous.

- The legal origin variable hides important differences cutting across the common law/civil law divide (Schmiegelow 2009), the most striking being US reliance on legislated regulation of financial markets (associated by LOT with civil law legal process) as against the English tradition of judge-made law (Dam 2006). Also there are problems in coding countries clearly as common law or civil law. For example, LOT codes most Latin American countries as part of French legal origin, although they have become hybrid legal systems as a consequence of far-reaching English and American influence (Dam 2006). Although Thailand and the Philippines have mixed legal origin systems (Kawai and Schmiegelow, forthcoming), the Philippines is classified as a common law country and Thailand is classified as a civil law country.

- LOT's empirical contribution is essentially based on a static cross-country analysis, which cannot fully exploit the effects of legal changes inside given countries. These two limitations may also explain why existing studies generally fail to find a clear effect of legal origins on aggregate growth (La Porta et al. 2008, p. 302).

To illustrate this, regressing the current log of GDP per capita to its level in 1820 and with two dummy variables for civil law and common law, I obtain a non significant effect for the legal origin variable at the 10 percent level (a star indicates a significant effect at the 1 percent level):

$$\ln Y_{i,2000} = -7.0^{*} + 2.4^{*} \ln Y_{i,1820} + 0.10\,Com - 0.02\,Civ \quad (103\,obs)$$
$$\ln Y_{i,2000} = -7.0^{*} + 2.4^{*} \ln Y_{i,1820} + 0.30\,Com + 0.30\,Civ \quad (75\,obs)$$

These results hold true for the sample of 103 rich and poor countries (first equation), or for the sample of 75 developing countries (second equation). Again, quantitative predictions of the influence of legal systems must be taken with caution.

5. Conclusion

What are the recommendations for future research? Institutional inertia is strong, any institutional changes in quality and any effects on development are likely to operate slowly. Instead of comparing a large number of countries on a cross-country basis, it might be interesting to focus on a smaller sample of countries and collect long-term data on institutional and economic changes. For example, to overcome the "static" limitations of existing LOT studies, Balas et al. 2009 built an index of procedural formalism for every year since 1950, for a sample of 40 countries. They found evidence that national legal systems are not converging. However, they did not relate the degree of procedural formalism to economic outcomes. A historical analysis was also conducted by Boucekkine et al. (2010) and chapter 3 of this book). We selected countries that have experienced institutional changes at different periods. Then we tested for discontinuities in their growth trajectories related to institutional changes. Our sample includes eight countries which can be seen as mother countries of legal origins, financial centers or newly industrialized economies (France, Germany, Japan, South Korea, Switzerland, Taiwan, the UK and the US) over a very long period (1870-2008). As far as institutions are concerned, we focus on how default rules are legally treated and codified for ten economically important contract types. The economic impact of default rules on economic growth was detectable by econometric panel analysis and proved to be strong. Although we controlled for time/country fixed effects and imposed a lag structure in the spirit of Granger (current GDP growth is affected by lagged codified rules), our analysis is admittedly subject to an endogeneity issue: there might be unobserved time-varying characteristics affecting default rule codification and growth simultaneously. However, our results dismantle and temper the LOT theory by illustrating the role of contract theory in economic institutions. Obviously, extending this analysis to developing countries having received their laws as colonial transplants would require accounting for the way codified default rules are implemented and enforced. Part II of this volume begins addressing this task with chapters on access to justice in selected developing countries.

Are there alternative and better methods to capture causation? Randomized controlled trials (RCT) are increasingly used in economics to identify causal relationship and compare the effectiveness of alternative policies. In line with clinical experimentation, the principle is to randomly select subjects from a population and submit them to a treatment; other subjects will not be treated (control group). If the treatment and control groups were randomly selected ex-ante, their post-treatment difference can be attributed to a causal impact of the treatment. In these studies, the randomization stage is important. And RCT are usually conducted on small groups; this raises the issue of their external validity.

It is obviously too costly and difficult to conduct RCT at the level of a country, or in several countries. For this reason, economists have been increasingly searching for natural experiments, i.e. comparing the dynamics of two groups which were initially similar and experienced different natural unexpected shock. In this case, the assignment occurs naturally, without the researcher's intervention. For example, Acemoglu et al. (2005) see the separation between Communist North Korea and private-market South Korea in 1945 as a natural

experiment (the 38th parallel experiment). Both countries were fairly identical in economic characteristics and performance before 1945. Today, South Korea is more than ten times richer than North Korea. They see the ex-post difference in their economic trajectories as resulting from the impact of institutions. Boucekkine et al. (2010 and chapter 3) refer to the systematic difference between how centralized planned economies such as North Korea or the former GDR and market economies such as South Korea and West Germany before 1989 coped with the problem of offering complete contingent solutions for any unforeseen future state of affairs. The former needed to elaborate a new plan or new single centralized command; the latter could rely on the principle of private autonomy of market participants for concluding contracts, with contract law default rules easing business by reducing transaction costs, rebalancing information asymmetries and solving the problem of incomplete contracts in a decentralized manner. However, we recognize that, in the Korean case, it is difficult to disentangle the part concerning the development gap, which is attributed to economic institutions and legal differences, from that due to the political support and assistance North Korea received from China and the Soviet Union, and South Korea from advanced democracies. Searching for other quasi-natural experiments might be useful to understand the causal effect of institutions on growth.

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