

**Colonisation, formal and informal  
institutions, and development**

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WP13/09



## Resumen

El trabajo discute los intentos más recientes de identificar los factores subyacentes al crecimiento económico de largo plazo. El autor critica algunos de los argumentos y las pruebas históricas en que se basan las dos explicaciones que dominan la literatura reciente: el enfoque institucional y las que se centran en la importancia de los factores geográficos. Utilizando un enfoque deliberadamente ecléctico, el autor considera el papel de la geografía, el comercio internacional, el capital humano y la calidad institucional en la explicación del desarrollo. Se lleva a cabo una nueva estimación a través de mínimos cuadrados en dos etapas (TLSL), con variables instrumentales. Los resultados del modelo empírico confirman el papel central que las instituciones tienen en el crecimiento económico de largo plazo. Sin embargo, ciertas condiciones geográficas también parecen haber influido en las posibilidades de progreso de los países. El capital humano y la apertura comercial son menos robustos en la explicación del crecimiento económico.

**Palabras clave:** desarrollo, crecimiento a largo plazo, calidad institucional, factores geográficos, capital humano, apertura comercial.

## Abstract

This article analyses current attempts to identify the factors underlying long-term economic growth. The author criticises some the arguments and historical proofs in which are based the two main explanations which dominate recent literature: the institutional approach and those which focus on the importance of geographical factors. Using an approach which is deliberately eclectic, the author considers the role of geography, international trade, human capital and institutional quality in explaining development. A new estimation is carried out through TLSL with instrumental variables. The results of the empirical model confirm the central role of institutions in long-term economic growth. However, certain geographical conditions also seem to have influenced countries' possibilities of progress. Human capital and trade openness are less robust in explaining economic growth.

**Key words:** Development, long-term growth, institutional quality, geographical factors, human capital, trade openness.

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ISBN: 978-84-692-6741-7  
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*Half a century after the conquest of Technotlican, the Spanish judge Alonso de Zorita asked an Indian leader why the Indians so often had bad manners and the Indian replied: "Because you don't understand us and we don't understand you and we don't know what you want. You have robbed us of our order and system of government, that's why there's so much confusion and disorder" (Taken from H. Kamen, 2003: 570)*





# 1. Introduction

Economic theory identifies the national endowment of productive factors (as labour or physical and human capital) and the aggregated level of efficiency with which those resources are employed as the causes of economic progress: The modern theory of growth was based on this approach. Although that analysis is highly persuasive, it is doubtful that it can explain the extraordinary levels of international inequality and the secular process of economic *divergence* to which Pritchett (1997) refers. Furthermore, the cause of the unequal dynamic of productive factor accumulation between countries still remains to be identified. Why is it, in short, that one country is capable of accumulating physical and human capital at a faster rate than others? What is it that determines that one country makes better use than others of the opportunities presented by technological progress? Answering these kinds of questions involves looking at other factors and wider frameworks. In order to do this it is necessary to identify the *fundamental causes of the long-run growth*: a task to which economists, politicians, naturalists and historians have recently contributed.

The institutional framework has emerged from this approach as one of the potential explanatory factors of long-run development. Institutional structure defines the incentives and penalties which influence the behaviour of agents and shape collective action. In the uncertain world in which independent agents operate, with imperfect information, institutions reduce uncertainty and transaction costs and facilitate social coordination. That is why institutional frameworks may explain long-term economic development trends.

Trying to prove this hypothesis, however, is not a simple task, firstly because of the elusive nature of the concept of institutions, which is the object of varying, and sometimes ambiguous, interpretations in economic literature. Frequently it is supposed that institutions are justified because they provide efficient responses to the transaction costs of the market. That comes from the assumption that economic agents have an optimal conduct, as rational agents, that the progress of history finally weeds out inefficient institutions and that those left increase overall lev-

els of wellbeing in society. As a consequence, there is no problem in defining “optimal institutions” – those which belong to “successful” countries – and of seeking to generalise their validity beyond those countries’ borders where these institutions set up. A large part of “institution building” programmes of international donors have been driven by these assumptions.

Nevertheless, the failures of institutional “transplantation” reveal: i) that there is nothing even close to a universally optimum institutional framework which can be applied independently of the social and economic conditions of the country in question; and ii) an institution properly does not exist if it is not capable of effectively shaping the behaviour of the agents. That suggests that it is as important to analyse the rules imposed as to analyse the motivations of the individuals which follow them. That underlines the importance of the social legitimacy (or credibility) of the institutional framework as a basic dimension of institutional quality; and reinforces the highly specific context of any institutional response which aims to be successful.

Additionally, the institutional framework has to be treated as a framework which is not only made up of *formal* institutions (based on explicit and universal rules), but also of *informal institutions* (those which are more opaque and less defined): a theme on which this article will insist. The relationship, which at times is conflictive, between both types of institutions may condition the capacity for social articulation and the efficiency of the available institutional framework. That aspect is particularly relevant in the case of colonised countries which suffer the consequences of an institutional framework being superimposed on the traditional one which existed.

As well as the difficulties associated with the concept, institutional analysis also faces very diverse empirical problems. Those problems include: i) the existence of indicators of institutional quality which are still deficient; ii) the endogenous nature of the relationship between development and institutional quality; iii) the frequent correlation between the

variables which potentially explain economic development (which makes it difficult to consider them as independent factors); and iv) the possible existence of omitted variables which could condition the estimated relationships.

In spite of these difficulties, in the last few years, a wide collection of empirical studies has tended to confirm the relationship which exists between institutions and developmental level; and, although in a less conclusive way, the link which exists between institutional quality and the growth dynamic (Aron, 2000). This is shown by cross country analyses (Hall and Jones, 1999; Acemoglu et al., 2002; Rodrik et al., 2002 or Easterly and Levine, 2003), those which use panel data (Henisz, 2000; Tavares and Wacziarg, 2001, or Varsakalis, 2006) or those based on case studies (Rodrik, 2003, for example).

This article seeks to contribute additional elements to the analysis, working from a new assessment of long-term developmental factors. In order to do that, the work starts off with the debate which exists between the two main approaches which dominated recent literature: the institutional approach and those which focus more on the importance of geographical factors (epigraph 2). Although the greater explanatory role of institutions is assumed, the arguments of those who most notably represent this approach (Acemoglu et al., 2002, and Engerman y Sokoloff, 2002) are debated. In particular, the paper criticises to: i) the limited consistency of historical proof on which the institutional explanation is based (epigraph 3); and ii) the concept of institutions underlying their interpretation, emphasising the crucial role which informal institutions have in developing countries (epigraph 4). Using an approach which is deliberately eclectic, a new estimation is carried out through TSLS with instrumental variables. The importance of geography, international trade, human capital and institutional quality – four factors which are most often presented - are tested for their role in explaining development (epigraph 5).

The results of the empirical model confirm the central role which institutions have in explaining long-term economic progress. However, certain geographic conditions also seem to have influenced countries' possibilities of growth, either directly or through the other factors considered. Human capital and

trade openness are less robust factors in explaining economic development. Although the influence of institutions is confirmed, they seem to be affected not so much by historical factors (such as colonial or legal tradition), but more by variables which are susceptible to public action such as the degree of social cohesion or the way that the State is financed.

## 2. The debate between institutional and geographical factors

The analysis of the latest drivers of development has been most recently conditioned by a debate between two main hypotheses. The first primes the importance of *geographical factors*, as location of the country, land conditions, climate, the environment or geographical accessibility in determining the potential for economic progress. Although the relevance of these factors had already been highlighted by some of the pioneers in development studies (like Myrdal 1973), the most recent exploration of their significance has been carried out by Gallup, et al. (1999), McArthur and Sachs (2001), Sachs (2001) or Diamond (1997). Three strands can be found in this approach, which point to different, although not incompatible, consequences from geographical factors: i) the climate which conditions the likely result of developmental efforts and above all influences the productivity of the land and the people; ii) the geographical location, which determines the technological options, and the conditions of mobility and transport; iii) the persistence of certain diseases (*disease burden*), which appear to be influenced by the bio-physical conditions of the environment.

In all these cases, it is factors beyond (or relatively beyond) human control which determine the potential for development. The main arguments to support this hypothesis refer to the difficulties which countries have in implementing a successful development strategy if they are located between the tropics or if they do not have direct access to the sea. They also refer to the costs which certain disease epidemics prevalent in environments which are also tropical have had on life and productive activity. Countries affected by these geographical conditions tend to present a much lower level of development, reaffirm-

ing this hypothesis, even if the estimation is controlled by other factors such as colonial origins, dominant religions, ethno-linguistic fragmentation or the legal framework adopted.

Nevertheless, the relative immutability of geographical conditions makes it unlikely that they are the source of the sudden changes which various countries have undergone on their road to growth (think, for example, of China in the last two decades); it is also equally difficult to explain the divergent economic trends of countries which share similar geographical and environmental conditions (Mexico and the United States and North Korea and South Korea, for instance). However, the most direct rebuttal to this approach comes from the way in which certain societies which previously stood out for their wealth have slipped backwards: this is the *reversal of fortune* to which Acemoglu et al. (2002) refers. The most striking cases to illustrate this phenomenon are the Inca, Aztec, Mongolian or Angkor's Jimma, societies which stood out for their complexity and richness in the past and which today form part of the developing world. Given the relative immutability of geographical and environmental conditions, these changes in the international development hierarchy, in the opinion of Acemoglu et al. (2002), call into question the geographical hypothesis.

That said, however, the criticisms cited do not exclude the potential effect which the geographical environment may have on the processes of development. This is firstly because it is possible that geographical conditions are not as immutable as Acemoglu et al. (2002) assume. Changes to climatic conditions associated with serious drought or degrading pressure on a fragile ecological environment, in combination with conflicts for the control of resources, seem to have been behind the collapse of societies which were relatively evolved such as the Huari, Tiahuanaco, Calakmul, Mochica, Maya or Cahokia (Diamond, 2005; Fagan, 2008; o Mann, 2006). Additionally, it is also possible that certain environmental characteristics prove of limited significance in a certain context but highly significant in another. For example, it is possible that the inland location of some Latin American colonial capitals was of little significance at the time of their establishment when economic exchanges were limited and defensive reasoning was central,

but those locations could become an obstacle for communication and transport once those Latin American economies were integrated in the international market. However, the fact that geographical factors matter does not necessarily mean that they are the most central cause of economic backwardness.

This assumption feeds the hypothesis of those who consider that *institutions* (and not geography) determine a country's possibilities of development. Institutions set the incentives and penalties which condition the behaviour of the agents and which help to shape expectations, reducing the degree of uncertainty and transaction costs which accompany social interaction. The overall growth potential of an economy is conditioned by this means.

The advocates of this approach suggest that in the case of developing countries, the development of the institutional framework was centrally conditioned by the form which the colonisation process took. It is also possible to find two different interpretations within this approach. On the one hand there is Acemoglu and Johnson (2003), and Acemoglu Johnson and Robinson (2001, 2002 y 2006) (from now on referred to as AJR) who insist on the impact which the patterns of settlement of the colonisers had on the type of institutions which they created in the conquered territories – whether are market or *extractive* institutions. In places where the Europeans did not settle because of hostile environmental conditions and in those where there was an abundant population which could be directly exploited, forcibly conscripted or abusively dominated, the Europeans did not worry about creating a system aimed at increasing overall well-being, tending to implant institutions which were generally extractive. By contrast, where colonisation was based in occupying virgin territories and in exploiting their resources, the colonisers tried to generate institutions – partly transplanted from their countries of origins – which defended private property and the functioning of the market.

This same hypothesis has served to explain the *reversal of fortune*. It is in the most populated and urbanised areas – in other words, the richest at the time of colonisation – where predominantly extractive institutions were established, which would be an obstacle to subsequent development; while, on the

other hand, in less populated areas – those which were poorer originally – the settlement culture which finished up prevailing was one which led to the creation of market institutions, promoters of development. The reversal of fortune is in reality the result of a *reversal of institutions*.

The other variant of this institutional approach is the one which Sokoloff and Engerman (2000) and Engerman and Sokoloff (2002, 2005 and 2006) (from now on ES) suggest, that the factor endowment conditions not only the distribution of income but also the institutions in accordance with that pattern of distribution. Where there were conditions for the development of plantation with high economies of scale and the potential resource of slave labour, or where the ample availability of indigenous labour allowed forceful methods of recruitment and exploitation, the patterns of distribution were highly unequal. In these environments institutions served only a limited elite and had a limited capacity to generate overall benefits for the society. By contrast, in places where there were hardly any indigenous population and where the conditions were more apt for family farming, more democratic institutions were developed which were capable of promoting public goods, defending property rights and stimulating economic opportunity.

Whether as a result of the settlement model or as a consequence of the pattern of factor endowment, in both cases the institutions created in the colonial period are those which determine the subsequent road to development.

### 3. The institutionalist approach and the history: some critical comments

The institutionalist explanation has been well received in academic circles and in the sphere of international organisations. Echoes of this position can be found in the two studies which the World Bank devoted to the analysis of inequality and its relationship to development in Latin America: *Inequality in Latin America: Breaking with History?* and *Poverty Reduction and Growth: Virtuous and Vicious Circles*; and the same position underlying the study *World Development Report*

2006, which was entitled *Equity and Development*.

There are several reasons why the institutional hypothesis has been embraced: i) it connects with the fundamental principles of Anglo-saxon liberal philosophy – Locke, Smith or Stuart Mill – which underlie a large part of economic doctrine; ii) it insists on the role of liberal order and the defence of property rights in the foundations of progress, positions that are well received by international donors; and iii) it plays down the uncomfortable roles which both geographical as well as cultural determinism have. The institutional approach places the explanation for under-development in the social framework which shapes human conduct – institutions – aiming to make its explanation endogenous.

However, beyond their persuasiveness, are the suggested hypotheses well founded on historical evidence? The method to test this used in both cases – AJR and ES – consists in using so-called *natural experiments* which come from the results of various colonisation experiences (Engerman and Sokoloff, 2006: 38). Nevertheless, the data available is neither sufficient for the generalisation carried out nor does the information available support the hypothesis offered in all cases. It could be said that magna interpretations (“meta-historical narratives” as Coatsworth, 2007, called them) have been built up from a very limited and not always consistent empirical base. The consequences are an excessive interpretive simplification, an exaggerated confidence in historical inertia and a fragile empirical foundation based on the assumptions used.

To take the first of those problems, it is difficult for the disparate development paths of countries to be interpreted in terms of the limited binomial (extractive/exclusive institutions *versus* market/inclusive institutions) classification which AJR and ES have proposed. Latin America is a case in point<sup>1</sup>. Few colonial systems created an institutional framework which is as unified and homogeneous as the Spanish Empire (Elliott, 2006). How is it possible, therefore, for a common institutional framework to have resulted in such diverse results in terms of development?

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<sup>1</sup> The reference to Latin America seems particularly pertinent since it is one of the traditional cases of comparison used by the institutionalist approach (Engerman and Sokoloff, 1997; Coatsworth, 1993; North et al., 2000; or Acemoglu et al. 2002, 2005).

As Coatsworth and Taylor (1998:26) reminds us, differences in productivity in the richest and poorest Latin American colonies were, in 1800, “almost as great as for the entire world”. The differences manifested themselves even between countries where a relatively similar model of colonial exploitation was applied. That is the case, for example, of Cuba and northeast Brazil, where the colonial model was based predominantly on plantation and mass slave labour, but while one – Cuba – was one of the wealthiest societies at the start of the 19<sup>th</sup> century, the other – Brazil – was one of the most backward in the regional hierarchy. In fact more detailed studies do not always seem to confirm the negative differential effect of large-scale slave exploitation in terms of economic growth<sup>2</sup>.

The second criticism refers to the importance which the authors give to historical *inertia* (*path dependence*). It seems excessive to assume that the origin of today’s underdevelopment is the colonisation period in every case. In Latin America, that approach would imply the reason for today’s economic backwardness lies in facts that took place half a millennium earlier (a real “compression of history, as Austin, 2008, said). Has nothing significant happened since then? Historians do not seem to support that idea, rooting the origin of Latin America’s backwardness in much more recent times. For instance, Coatsworth (1998) cites it in the period of independence, underlining that Latin America was not underdeveloped in terms of any conventional measure (such as GDP per capita) until some time roughly between 1750 and 1850. Harber (1997) and Bulmer-Thomas (1994) locate the origin of the Latin American backwardness in the same period – the 19<sup>th</sup> century; and Prados de la Escosura (2005), who compares the region’s evolution not to the United States but to the rest of the OECD, puts that origin as late as the start of the 20<sup>th</sup> century.

The third criticism relates to the doubtful empirical foundation of some of the assumptions made by AJR and ES. There are three discrepancies which are especially worth stressing (Alonso, 2007). Firstly, the impor-

tance which ES gives to the “encomienda”, an example of an extractive institution, seems to contradict the proven dying out of this kind of land ownership and social domination in the region from the 17<sup>th</sup> century onwards (Carmagnani, 2004); and nor can the “hacienda”, also considered a model of an extractive institution, be generalised as a dominating form of agricultural exploitation. Secondly, it does not seem as if Spanish colonisation turned its back on regulation of ownership of land, mines and the means of production even for the indigenous population (Dobado, 2007). That explains the emergence of a middle – and mixed – class as early as the 17<sup>th</sup> century, which in some cases became rather important in the region (Carmagnani, 2004).

However, of all the criticisms, perhaps the most significant is the one which refers to the level of inequality associated with extractive models of colonisation. The data suggests that the inequality in Spanish Latin America, although high, was not higher than other regions which underwent successful processes of industrialisation. For example, in a recent work, Milanovic et al. (2007) tried to reconstruct from various sources the levels of inequality of some pre-industrial societies, comparing them to those today. The Gini index which they estimate for “Nueva España” (the territories which are today Mexico, a large part of Central America and the South of the United States) in 1790 was 63.5%, revealing a significant inequality (equivalent to that which exists today in highly unequal countries such as Botswana, for example). However, the Gini index for the Netherlands, one of the pioneering countries of the industrial revolution was practically the same in that period (1732): 63%, and the corresponding index for England and Wales, the emerging power of the period, although somewhat less, was not that far in 1801-3, at 51%. Why were market institutions compatible with high levels of inequality in the Netherlands and England and incompatible in “Nueva España”?

In the face of excessive generalisation, Latin America refuses to be homogenous. For example, the same estimates which Milanovic et al. (2007) make for Brazil in 1872, a Gini index of 38.7%, shows a relatively moderate level of inequality, one which is equivalent to that in Portugal today. Given the high inequality which characterises Brazil today, the

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<sup>2</sup> In fact, the studies containing the most macro-economic data do not seem to confirm the assumptions of ES. Here note the work of Nunn (2008: 165), who states: “I find that contrary to Engerman and Sokoloff’s hypothesis, there is no evidence that large-scale slavery is more detrimental for development than small-scale slavery”.

low Gini index which the country had in the 19<sup>th</sup> century might seem surprising. Nevertheless, that result has been confirmed by a recent study which puts the country's Gini index in 1872 somewhere between 38% and 40% (Bertola et al., 2008). This result contradicts ES's assumption that an extractive colonisation (based on plantations and slave labour) is associated with institutions based on high levels of inequality; while it also forces us to consider why in this case limited inequality did not lead to market institutions and a more successful developmental process as the ES's hypothesis suggests<sup>3</sup>.

Moreover, the historical analysis show that high levels of inequality seem to be, more than a conditioner, a consequence of the international developmental and integration process of those countries. So, for instance, Williamson (1999), through an estimate of the *wage-land rental*, confirms that the sharper increase in inequality in a large part of the world periphery seems to have been produced in the decades running up to the First World War; Gelman (2007) suggests that the current level of inequality in Argentina is a product of the last third of the 19<sup>th</sup> century; and Bertola (2005) confirms the same conclusion for Uruguay. The most complete estimate about this aspect, in relation to the whole of the Latin American Southern Cone, generalises the conclusion for the whole of the countries in that area (Bertola et al., 2009). Given those results, it is understandable that someone well studied in the history of the region, Coatsworth (2005: 139), concludes that: "the Engerman and Sokoloff's thesis, while plausible, is almost certainly wrong".

#### 4. Formal and informal institutions

An additional problem to the approach of AJR and ES is the disputable concept of institutions which they adopt. Although they are not always explicit, it seems that beneath the approach of these authors lie the following assumptions: i) institutions refer to the *for-*

*mal* framework which defines a set of parameters within which the agents operate; ii) it is possible to set out *a priori* an optimal (or at least adequate) institutional framework which promotes development (these are the so-called "market institutions" in AJR's terminology); and iii) this framework is made up principally of institutions concerned with defending property rights and those which guarantee democratic forms of government (to these ES adds those referred to the supply of public goods, especially those related to human resource training). This concept comes up against two problems: the contingent character of the institutional framework and the importance of informal institutions.

The first of those problems refers to the doubtful assumption that it is possible to define an optimum institutional framework without reference to the social context of each country. The existence of multiple equilibria, the complementary nature of institutions and the fact that a single institutions may carry out various functions makes it difficult to define a universally optimum response to a given problem. Even when a consensus may exist about a desirable policy, the range of institutional options to achieve that objective might be extensive. That underlines the importance of local conditions as basic determinants of the efficiency of an institutional response (Islam and Montenegro, 2002). In short, good institutions are, to a large extent, historically and socially contingent.

The uniqueness of institutional responses is what explains the efficiency of what are called *transitional institutions* (Quian, 2003): formulas designed to adapt the existing institutional framework in a specific situation to changes in the environment, which do not respond to canonical formulas of supposedly optimal institutions but which allow inefficiencies to be corrected through a dynamic and highly specific progress. Probably, from a formal point of view these responses could be considered inefficient, but in reality they are transitional means which are adapted to local conditions which generate processes of change which are consistent with development objectives. For example, no one would suggest that China is an example of liberal society or a defender of property rights (the two elements of the institutional framework which AJR most values), but its GDP per capita has grown at an average rate of 7% for

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<sup>3</sup> Nor do the micro studies seem to confirm the relationship. A study of land distribution of the Colombian region of Cundinamarca led to a team which included Acemoglu to admit the existence of an inverse relationship to that imagined by ES: "... somewhat surprising, we find a negative association between land inequality (land Gini) and political concentration" Acemoglu et al. (2008: 186).

more than two decades. What is happening? Is a successful economy trapped inside an inefficient institutional framework? What may be happening is that that country is generating highly specific institutional responses, supposedly inefficient if they are compared with the ideal model of a market economy, but highly dynamic in the specific context of the Chinese social reality. In that sense, these institutional responses are in keeping with the principle of *adaptive efficiency* to which North (2005) alludes.

The second problem refers to the limited consideration which AJR and ES make of the role which *informal institutions* play in the social make-up: in other words, those which are based not on laws or on explicit norms, but on beliefs, values, traditions and cultures. As Mokyr (2008: 75) points out, referring to the origin of capitalism: “customs, traditions, and conventions delineating acceptable behaviour were at least as important as a formal rule of law”<sup>4</sup>. Although both types of institutions exist in every society, their natures are very different since while formal institutions are open to public scrutiny and provide a framework of recognisable incentives (and penalties) for the whole of society, informal institutions are harder to identify, partly because their rewards (and penalties) are less well articulated and partly because they may be highly specific and idiosyncratic responses to the conditions of a determined social group (more than for society as a whole).

In a traditional economy (an underdeveloped country) informal institutions, based on customs and proximity, are highly efficient because they reduce transactional costs in a small market environment with limited productive specialisation. As the market expands and advances in productive specialisation, production costs are reduced but at the expense of greater space for opportunistic behaviour as relationships become more distant and more numerous. As a result, transactional costs rise, making it necessary to increasingly turn to formal and multilateral rules which are impersonal in nature (Bardhan, 2005). This process of change was studied by Greif et al. (1994) and Greif (2006)

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<sup>4</sup> Mokyr (2008: 66) states: “I argue that the traditional emphasis on formal institutions has been overemphasized (...) The importance of institutions extended beyond politics and formal institutions. (...) Formal institutions such as state-enforced patent rights have been overestimated at the expense of informal, private-order institutions”.

who compared the responses of the Genovese and Maghribian people in long-distant trade in the 15<sup>th</sup> and 16<sup>th</sup> centuries.

Through the process of change mentioned, there was more room for social dynamism, improving the “adaptive efficiency” of the institutional framework. In contrast, the abnormal perdurability of certain informal institutions could be seen as a potential obstacle to social and economic change. By being less transparent and specific, informal institutions are more inert, less subject to social criticism and less likely to promote the social mobility which is the basis of any developmental process. As North (2005: 157) states: “while the formal institutions may be altered by fiat, the informal institutions are not amenable to deliberate short-run change and the enforcement characteristics are only very imperfectly subject to deliberate control”.

The ingrained nature of informal institutions, with a high capacity for *enforcement*, can damage efficiency even when formal institutions exist if the logic of the two kind of institutions is contradictory. It is therefore possible that in places where the aim has been to transplant a formal institutional structure and superimpose it on another, informal, framework which previously existed, and which has a different logic, the result has been inefficient because it has been incapable of shaping social behaviour. This observation explains the limited success which “institutional transplantation” methods have had. They have aimed to replicate institutional responses in a developing country which are thought to be efficient in a developed country, but the responses sit poorly with the informal institutional framework which existed in the host country. Arnott and Stiglitz (1991) constructed a simple model which explains this process in the case of the insurance model. Specifically, they argued that well-functioning informal insurance mechanisms that provide protection against small shocks could undermine the diffusion of formal insurance by compromising the ability of formal insurers to impose deductibles on clients. This result could easily be generalised to other areas and markets (Stiglitz, 1999; and, more recently, Anderson and Francois, 2008).

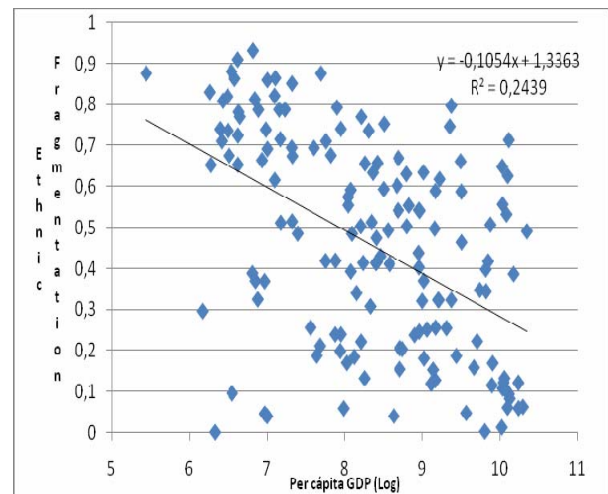
Taking into consideration these elements could help shape an alternative interpretation to that offered by AJR and ES. One could

think that in places where “land colonisation” (the settlement of virgin territories) took place formal institutions (partly transplanted from Europe) should have dominated, which better prepared them for mobility and social change in keeping with changing market incentives. On the other hand, in countries where “a colonisation of people” took place (including significant groups of indigenous peoples), formal institutions overlapped with previous informal institutions (sometimes in conflict with one another), increasing social fragmentation and making the mobility and social change, which the market domain demands, difficult<sup>5</sup>. Under this interpretation, the cause of economic backwardness might be not the colonial institutions themselves, but the institutional imbalance which the colonisation created, by overlapping new formal institutions with a framework of existing informal institutions<sup>6</sup>.

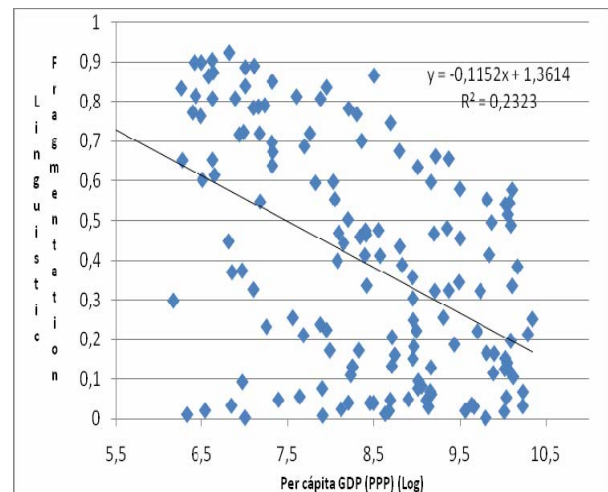
It is not easy to obtain information about the fabric of informal institutions; and less still when we are talking about past periods of history. Social fragmentation (whether ethnic or linguistic) may be, however, a good way of coming close to this phenomenon. The durability of these types of social fragmentation might be indicative of the larger presence of informal institutions. A negative relationship can be seen between the degree of ethnic and linguistic fragmentation (measured by Alesina et al., 2003) and the level of development (measured in terms of GDP per capita, PPP, in 2006, by Maddison) (graphics 1 and 2). Ethnic (and linguistic) fragmentation translates into societies which are more fragmented and unequal, observed through their positive relationship to the Gini index (graphic 3). And, finally, ethnic (and linguistic) fragmentation also makes government

difficult, judging by its negative relationship with the global governance index (graphic 4).

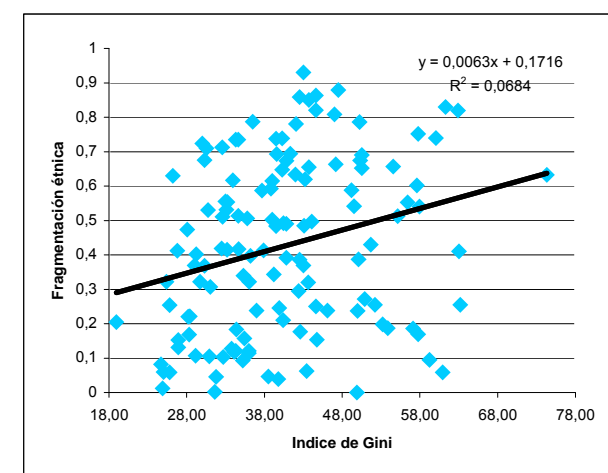
**Graphic 1: Ethnic fragmentation and development level**



**Graphic 2: Linguistic fragmentation and development level**



**Graphic 3: Ethnic fragmentation and inequality**

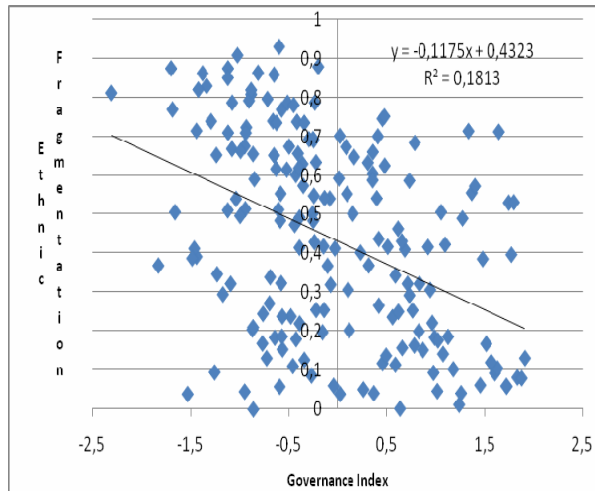


<sup>5</sup> This vision offers an alternative interpretation to the non-linear relationship between current degrees of inequality and the level of presence of (European) colonisers in the country in question, identified by Angeles (2007). His work suggests that where colonisation evolved a low presence of Europeans (the *peasant colonies*, like Subsaharan Africa) the level of inequality is not very high; it is still lower where the European presence was dominant (the *new europes*, like the United States, Canada or Australia); and, finally, inequality levels are at their higher in the case of colonies with an average presence of European colonies (the *settler colonies*, such as a large part of Latin America). It is in this type of colonies where the conflict between the institutional frameworks of the coloniser and the colonised must have been greatest and therefore where the costs of the process in terms of development may have been greatest.

<sup>6</sup> The response of the indigenous political leader refers to this in the quote at the start of this paper.



**Graphic 4: Ethnic fragmentation and Governance Index**



## 5. Empirical model

The above points can be translated into an empirical model which enters into dialogue with the previous studies on this subject. In an eclectic approach, four basic factors could take into account to explain development. They are: i) Gallup et al. (1999) and Sachs (2001) insist on the importance of geographical factors (in particular on direct access to the sea and the distance with respect to the tropics); ii) Acemoglu et al. (2002) and Engerman and Sokoloff (2002) underline the role which institutions have, conditioned by the model of colonisation which the country had; iii) to those two last factors, Rodrik et al. (2002) add the potentially positive effect of trade, measured through the degree of open trade<sup>7</sup>; and iv) lastly, Glaeser et al. (2004) argue that human capital is what conditions both the institutional capacity as well as the productive capacity of a society. To compare the importance of each one of these factors, the four are incorporated in an explanation of development (in a similar way as Rodrik et al. 2002). In other words:

$$Y_j = \alpha_1 + \alpha_2 G_j + \alpha_3 I_j + \alpha_4 T_j + \alpha_5 E_j + \mu_1 \quad (1)$$

where  $Y$  is the GDP per capita (in PPP),  $G$  the geographical characteristics,  $I$  an index of institutional quality,  $T$  the degree of open trade,  $E$  the average educational level of the

people and  $j$  refers to the country in question. The precise content of the variables is explained in the Annex II.

The geographical characteristics are assumed to be acceptably exogenous and therefore do not cause problems in the estimation. However, the three last variables (institutional quality, commercial integration and educational level) may be endogenous: in other words, it is thought that they influence the level of development but development also affects the variables in question. Additionally, there may be relationships between the variables. The following, therefore, could be proposed:

$$I_j = \beta_1 + \beta_2 Y_j + \beta_3 T_j + \beta_4 G_j + \beta_5 E_j + \beta_6 X_j + \mu_2 \quad (2)$$

$$T_j = \pi_1 + \pi_2 Y_j + \pi_3 I_j + \pi_4 G_j + \pi_5 E_j + \pi_6 Z_j + \mu_3 \quad (3)$$

$$E_j = \gamma_1 + \gamma_2 Y_j + \gamma_3 T_j + \gamma_4 I_j + \gamma_5 G_j + \gamma_6 W_j + \mu_4 \quad (4)$$

where  $X$ ,  $Z$  and  $W$  are vectors of other exogenous variables to consider.

Given the complexity in the supposed relationships, it might be worth exploring each one of the factors before proceeding to estimate the equation (1), which comprises our final goal. To do this, in order to advance in the safest way possible, the aim will be to try to identify the factors behind each one of the variables proposed in (2), (3) and (4)<sup>8</sup>. In this way, more elements will be put forward in order to test the endogeneity of the variables which is supposed and to identify possible instruments which can be used.

Additionally, in order to contend with the problem of the endogeneity it is necessary to turn to techniques such as Two Stages Least Squares (TSLS), with instrumental variables. As is known, a good instrument should satisfy two demands: i) it should be correlated to the endogenous variables included in the regression; and ii) it should be orthogonal to the error process (Baum et al., 2003). The first of the conditions can be tested through the fit of the first stage regressions, considering the explanatory power of the excluded instruments in these regressions (through the

<sup>7</sup> Although it should be highlighted that in Rodrik et al. (2002) this last variable does not prove to be significant in the estimation and even appears with a negative sign.

<sup>8</sup> It is worth pointing out that the estimates in this first stage are not designed to create structural models of the selected variables, but rather to confirm the assumed endogeneity and to identify those variables which can be used as instruments.

$R^2$  or the F-test of the joint significance of the instruments in the first-stage regressions) (Bound et al., 1995). At the same time, the test of Anderson allows for the hypothesis that the instruments are the same at zero in the estimation in the first stage to be tested. However, for models with several endogenous variables, these indicators may not be sufficiently informative. In these cases it may be useful to consider the statistic proposed by Shea (1997) as a partial  $R^2$  that takes the intercorrelations among the instruments into account. A large value of the standard partial  $R^2$  and a small value of the Shea measure is a symptom of a model that is unidentified. In order to also check the existence of weak instruments the statistic proposed by Stock and Yogo (2004) can be used, for which critical values based on the F-statistic of Cragg-Donald are offered, considering up to three endogenous variables. These authors reveal that the problem of the existence of weak variables can be produced even when the tests of the first stage are significant. Finally, the second of the conditions highlighted – instrument's independence from the unobservable error process - may be tested with the J statistic of Hansen (1982). A rejection of the null hypothesis implies that the instruments are not satisfying the required orthogonality conditions. In a similar way, the test of Sargan verifies the exogenous nature of the instruments used.

### 5.1. PRIOR STEPS

An overview of the geographical factors reveals (Table 1) that some geographical traits play a role in the process of development, in particular, variables like the distance from the tropics and the average degree of humidity, which positively influence development, and the absence of direct access to the sea, which negatively influence it. However, the average degree of altitude of a country (which could come close to indicating the transportation difficulties in mountainous terrain) is not significant. These relationships are maintained even when diverse control variables are added which could be associated with institutional quality such as ethnic and linguistic fragmentation (in a negative sense) or a legal system based on *common law* (in a positive sense). That said, the explanatory capacity of this combination of variables is limited (in the best cases they explain 53% of the variation of the variable).

The second relevant factor in explaining development is the capacity which an economy has, through open trade, to benefit from the dynamic stimuli of international markets. The openness of an economy here is proxy through the average weight of exports and imports as a proportion of GDP in the five-year period 2000-04, expressed in logarithms.

The openness of trade may seem to be conditioned by diverse factors: firstly, in a positive sense, by the degree of development of a country since it is plausible to suppose that, if everything else remained the same, the higher the level of development, the higher the international competitiveness; secondly, negatively, by the size of a country – measured by the logarithm of the population - , since this factor affects the measurement of the trade openness; thirdly, in a positive sense, by the historical potential of the markets in the region where the country is located. In order to develop the analysis proposed in the equation (3) it is worth finding out whether institutional quality or human capital influences also the level of openness of an economy.

Out of all factors proposed, the “potential of the regional market” require an explanation. If country has been historically surrounded by prosperous and populated markets, it is likely that it will have a higher degree of trade openness. In order to identify this factor a new variable was created with data corresponding from 1890-1900, on the basis that this is the moment when the first wave of globalisation took place. First, an estimation of the “potential of the national market” of each country was made, considering the population of urban nuclei (with more than 30,000 inhabitants) and the distance between the capital and each one of those, on the assumption that a country's business is concentrated in the cities. In other words, in the same way that with gravitation models the

indicator of market potential is  $\sum L_n \frac{P_i P_j}{L_{ij}}$ ,

where P stands for population, i and j for urban nuclei with that minimum population threshold and L stands for the distance between both. In cases where no city had that size, the capital and the second largest city were considered. Therefore, the more urbanised a country was and the smaller the distan-

**Table 1: Effect of geographical conditions on development**

Variables	Per capita Income (2006) (t-stat)	Per capita Income (2006) (t-stat)	Per capita Income (2006) (t-stat)	Per capita Income (2006) (t-stat)	Per capita Income (2006) (t-stat)
Latitude	3.970 *** (11.202)	3.354 *** (7.121)	3.475 *** (8.739)	3.493 *** (7.598)	3.521 *** (9.085)
Landlocked	-0.723 *** (-4.527)	-0.681 *** (-4.536)	-0.590 *** (-3.894)	-0.664 *** (-4.369)	-0.531 *** (-3.535)
Average altitude	-0.045 (-1.140)	-0.035 (-0.908)	0.058 (-1.486)	-0.031 (-0.761)	-0.060 (-1.526)
Average humidity	0.011 ** (2.581)	0.011 ** (2.559)	0.010 ** (2.419)	0.013 *** (2.966)	0.013 *** (2.918)
Ethnic fragmentation		-0.876 ** (-2.360)		-0.915 ** (-2.470)	
Linguistic fragmentation			-0.257 *** (-3.428)		-0.312 *** (-4.079)
Common Law				0.356 * (2.024)	0.415 ** (2.432)
R <sup>2</sup> adjusted	0.467	0.490	0.512	0.499	0.532
Number of countries	154	151	148	149	147

Method: OLS.

Note: (\*\*\*),(\*\*) y (\*) : significant variable at 99, 95 and 90 percent, respectively.

ce between the urban nuclei, the larger the effective size of the domestic market. The size of the regional market (which is the one which is incorporated into the estimate) comes from the weighted sum of the size of the potential of national markets of all those countries together whose capitals are located within a maximum radius of 3,000 kilometres, which is what makes up a close international market. The weighting factor was the average per capita income of each country in the reference year.

The OLS estimation confirms the role which income, population size and the potential of the regional market play in the explanation of trade openness (column 1 of Table 2). However, the potential presence of a two-way relationship between openness and income

level makes it necessary to use TSLS with instrumental variables. In column (2) GDP per capita in 1900 and those geographical variables which appear associated with income level - latitude and the absence of direct access to the sea - were used as income per capita instruments. Again, the estimation confirms the relationships assumed above and verifies the relevance of the selected instruments. In particular, the instruments pass the test of exogeneity and both the possible under-identification of the model as well as the test of the presence of weak instruments is rejected.

It would be plausible to assume that trade openness may be conditioned by institutional quality or by the level of human capital (estimated through the indicator constructed by

Barro and Lee, 2000). Given the high collinearity between income per capita and institutional quality or human capital, the estimation had to be independently carried out.<sup>9</sup> In column (3) institutional quality is incorporated as an explanatory variable. Since in this case as well, it could be an endogenous relationship, the institutional quality is instrumented through ethnic fragmentation, latitude and the origin of *common law* of the legal system. The estimation confirms the relationships although the explanatory capacity of the model is significantly lower than the one which per capita income contributes. In column (4) human capital is considered as an explanatory variable. In this case, although the variable has the correct sign, it barely reaches significance; and the variable becomes insignificant when it is combined with institutional quality or GDP per capita.

The test carried out, although it does not offer a structural model to explain trade openness, is sufficient to confirm the assumed endogeneity between income level and open trade; and to identify a series of variables which could function as adequate instruments in the estimate of equation (1).

The third relevant factor to consider is the quality of the institutions. It is not easy, however, to empirically approach that variable or to identify the factors which explain it. Firstly, there are many problems with the indicators available on institutional quality (Arndt and Oman, 2006 or Alonso and Garcimartín, 2008). For the purposes of this empirical test the most complete and safest indicator will be used, the Governance Index elaborated by the World Bank: specifically, the value of the aggregate average of the six elements of this indicator. In order to compensate for the limitations of this measurement of institutional quality and to test the robustness of the results, the test will be repeated with alternative indicators of institutional quality.

The second problem posed refers to the difficulty of identifying the factors which determine institutional quality. In this case, it will be assumed that institutional quality depends, firstly, on the income level per capita

of the country (in a positive sense): in the end, the higher the income level, the greater the demand of good institutions and also the greater the supply of the input required to generate it. Secondly, it depends (in a negative sense) on the levels of inequality of the society, which limit the extent to which agents are prepared to undertake cooperative action and which reinforce their tendency to turn to informal institutions, reducing the efficiency (and, at times, the credibility) of the formal institutional system (Alesina and Rodrik, 1993; Alesina and Perotti, 1996; Easterly, 2001; or Easterly et al. 2006)). Inequality is estimated through the Gini Index. Thirdly, the quality of institutions may also depend on the nature of the relationship between citizens and the state. If there is a sound taxation system, there will be a more demanding relationship between citizens and State: the State claims taxes, which taxpayers pay, and in turn those who contribute fiscally demand accountability and efficient behaviour from the State (Moore, 1998). That is why in cases where the State is financed through alternative resources to taxes the quality of the institutions will be poorer, which could be the case when countries have a valuable and tradable commodity such as oil, as the literature on “resource curse” has demonstrated (Ross, 1999 or Dietsche, 2007). This is borne out by analysis of the proportion of oil sales in a country’s exports. It would also be plausible to suppose that the level of openness of an economy (Rigobon and Rodrik, 2004; Wei, 2000; or Islam and Montenegro, 2002) and the level of human capital (Glaeser and Sacks, 2006 or Evans and Rauch, 2000) may play a role in the quality of the institutions, to the extent that both factors boost the efficiency of the state and the dynamic of the institutional framework (as suggested by equation 2).

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<sup>9</sup> Additionally, the variables of institutional quality and educational level appear as significant (and with the sign changed) when incorporated along with income in the explanation of the degree of openness through TSLS. The results of these estimates can be requested from the author.

**Table 2: Estimate of trade openness**

	Trade openness (t stat) (1)	Trade openness (z stat) (2)	Trade openness (z stat) (3)	Trade openness (z stat) (4)
Per capita income (ly06)	0.084 *** (2.825)	0.074 ** (2.07)		
Governance Index (ig)			0.126 ** (2.24)	
Years of training (lmae)				0.185 (1.76)
Population (lp)	-0.185 *** (-9.476)	-0.185 *** (-9.36)	-0.147 *** (-7.03)	-0.217 *** (-6.12)
Regional market (1900) (lcry)	0.091 *** (2.837)	0.100 *** (3.26)		
Europe and Central Asia (eco)			0.309 *** (4.31)	
Eastern Asia (ao)	0.665 *** (4.534)	0.623 *** (3.44)		
Latin America (al)	-0.186 ** (-2.509)			
Adjusted R <sup>2</sup> Centrated R2 Uncentrated R2	0.462	0.456 0.993	0.339 0.998	0.330 0.985
Underid. K-P test (p- value)		$\chi^2(3)= 28.543 (0.000)$	$\chi^2(3)= 40.823 (0.000)$	$\chi^2(4)= 27.380 (0.000)$
Weak id. K-P test (criti- cal value)		125.65 (10%=22.30)	82.17 (10%=22.30)	41.37 (10%=24.50)
Overid. H-J test (p- value)		$\chi^2(2)= 2.394 (0.302)$	$\chi^2(2)= 3.70 (0.157)$	$\chi^2(3)= 4.042 (0.253)$
Test on Instruments used				
Overid Sargan test (p- value)		$\chi^2(2)= 2.245 (0.325)$	$\chi^2(2)= 3.522 (0.17)$	$\chi^2(3)= 2.91 (2.91)$
Underid Anderson test (p-value)		$\chi^2(3)= 79.50 (0.000)$	$\chi^2(3)= 78.56 (0.000)$	$\chi^2(4)= 63.06 (0.000)$
Weak Inst. Cragg- Donald (critical value)		57.504(10%=22.30)	52.06 (10%= 22.30)	60.90 (10%=24.58)
Shea partial R2 (partial R2)		0.562 (0.562)	0.520 (0.520)	0.759 (0.759)
N° of countries	152	141	157	92

Column (1): Ordinary Least Square

Column (2) Instrumented variable: ly06; Included instrument: lp, lcry, ao; excluded instrument: ly1900, nsea lat

Column (3) Instrumented variable: ig; Included instrument: lp, eco; excluded instrument: lfetn, lat, legor\_uk

Column (4) Instrumented variable: lmae; Included instrument: lp; excluded instrument: lfetn, lat, legor\_uk

Note: (\*\*\*),(\*\*) y (\*): significant variable at 99, 95 and 90 percent, respectively.

Several of the explanatory variables mentioned may have an endogenous relationship with institutional quality, which means it is essential to use instrumental variables in the estimation. Before continuing with that task, it might be revealing to check that when per capita income is omitted and only exogenous variables are used, the estimate confirms some of the previously mentioned hypotheses (table 3). In particular, institutional quality seems to be associated, negatively, with

ethnic fragmentation (which is a proxy of the lacking of social cohesion) and with the proportion which oil represents in a country's exports. Two geographical variables seem significant: the distance from the tropics, positively, and the absence of direct access to the sea, which has a negative impact. At the same time, the origin of the judicial framework based on *common law* has a positive influence (as La Porta et al. 1999 or Glaeser and Shleifer, 2002 suggest). The re-

gions of Central and Eastern Europe and Southern Asia have a lower institutional quality than the variables incorporated into the explanation indicate. The relationships are confirmed when the variables of social fragmentation and the percentage of oil in exports are substituted with two more direct variables (although the two are less likely to be exogenous): the Gini index (column 2) and the weight of taxes as a proportion of GDP (column 3).

level, by the level of delayed income and ethnic fragmentation.

It is also plausible to consider the Gini Index, which estimates the inequality present in a country, as endogenous. The variable resists a simple specification and proves highly susceptible to regional particularities. Nevertheless, the most general estimation suggests that its performance is in line with that which Kuznets set out: inequality grows in

**Table 3: Estimation of institutional quality**

Variables	Governance Index (t-stat)	Governance Index (t-stat)	Governance Index (t-stat)
Ethnic fragmentation (lfetn)	-0.112 * (-1.786)		
Inequality (IGini index)		-0.770 *** (-2.978)	-0.491 * (-1.762)
Common Law (legor_uk)	0.468*** (4.003)	0.476 *** (3.576)	0.492 ** (3.067)
Latitude (lat)	3.131 **** (8.634)	3.126 *** (8.251)	2.252 *** (4.562)
Landlocked (nsea)	-0.329 ** (-2.281)	-0.340 ** (2.460)	-0.385 ** (-2.371)
Oil on export (lfuel)	-0.007 *** (-3.278)	-0.009 *** (-4.679)	
Taxes as part of GDP (tgdp)			0.022 *** (3.256)
Europe and Central Asia (eco)	-0.711 *** (-3.951)	-0.862 *** (-5.331)	-0.766 *** (-3.909)
Southern Asia (sa)	-1.221 *** (-4.508)	-1.353 *** (-4.900)	-0.926 (-3.245)
Adjusted R <sup>2</sup>	0.537	0.616	0.608
N <sup>o</sup> of countries	143	116	106

Method: OLS

Note: (\*\*\*),(\*\*) y (\*): significant variable at 99, 95 and 90 percent, respectively.

The previous exercise is limited since variables such as per capita income, the degree of openness of the economy or the level of people's education have been set aside, which would suggest that they play a role on the quality of the institutions in a country. In order to incorporate these variables it is necessary to define adequate instruments and to estimate relationships through TSLS. As we have seen, per capita income can be instrumented through the level of delayed development corresponding to 1900, and through the geographical variables related to income level (latitude and absence of sea access); trade openness, through income level in 1900 and the size of the country (estimated by the population's logarithm) and the potential of the regional market; and the educational

the initial phases of development and tends to correct itself once a certain level of per capita income has been exceeded. So, if the variable is considered as endogenous, it can be instrumented by per capita income of 1900, that same variable in the square and a regional dummy with reference to Latin America which has a specific performance in this sphere. Alternatively, the variable was also considered as exogenous.

Table 4 presents the results of this estimation, confirming the relationships which were assumed. Institutional quality is negatively affected by social inequality, both when the variable is considered exogenous (columns 1 and 2), as well as when it is considered endogenous (columns 3 and 4). The possibility of obtaining resources outside the

tax system (estimated through the proportion of oil in exports) also negatively affects institutional quality. Trade openness, as has been suggested, seems to be positively related to institutional quality, while people's educational level does not prove significant. Lastly, it should also be highlighted that other factors tackled by literature in this field, such as

the legal tradition or the colonial origin, do not prove significant in this estimation once the other variables (particularly income level) have been incorporated (a result that refutes the arguments of Mahoney, 2003, and Lange et al. 2006 about the legacy of the colonialism).

**Table 4: Estimate of institutional quality**

Variables	Governance Index (z stat) (1)	Governance Index (z stat) (2)	Governance Index (z stat) (3)	Governance Index (z stat) (4)
Per capita income (ly06)	0.769 *** (14.59)	0.713 *** (11.76)	0.591 *** (7.76)	0.547 *** (7.25)
Trade openness (ltr)		0.452 ** (2.28)		0.611 *** (3.00)
Oil ON export (lfuel)	-0.098 *** (-3.87)	-0.084 *** (-2.90)	-0.127 *** (-3.76)	-0.079 ** (-2.50)
Inequality (lgini)	-0.387 * (-1.78)	-0.445 ** (-2.09)	-2.504 *** (-5.56)	-1.550 *** (-3.78)
Common Law (legor_uk)	0.136 (1.08)	0.082 (0.63)		
Eastern Asia (ao)		-0.505 ** (-2.28)		-0.740 *** (-4.64)
Europe and Central Asia (eco)	-0.432 *** (-3.55)	-0.669 *** (-4.17)	-1.119 *** (-6.88)	-0.996 *** (-5.55)
Centered R2	0.682	0.681	0.633	0.639
Uncentered R2	0.682	0.681	0.634	0.640
Underid K-P test (p-value)	$\chi^2(3)=43.37(0,000)$	$\chi^2(3)=16.51(0,000)$	$\chi^2(4)=29.94(0,000)$	$\chi^2(4)=19.62(0,000)$
Weak identif K-P (crit- value)	97.205(10%=22.30)	12.956(15%= 9.93)	12.65(15%= 11.22)	7.385(20%= 5.35)
Overid. H-J test (p-value)	$\chi^2(2)=1.051(0,591)$	$\chi^2(2)=0.646(0,723)$	$\chi^2(3)=7.335 (0,06)$	$\chi^2(3)=5.624(0,131)$
Test on Instruments				
Overid Sargan test (p-value)	$\chi^2(2)=1.24 (0,535)$	$\chi^2(2)= 0.72 (0,697)$	$\chi^2(3)= 4.84 (0,183)$	$\chi^2(3)= 5.04 (0,168)$
Underid Anderson test (p-value)	$\chi^2(3)=68.14(0,000)$	$\chi^2(3)= 39.9 (0,000)$	$\chi^2(4)=30.84(0,000)$	$\chi^2(4)=29.45(0,000)$
Weak Inst. Cragg-Donald (critical value)	63.06(10% = 22.30)	14.81 (15% = 9.93)	8.15 (20% = 5.35)	6.22 (20% = 5.35)
Shea partial R2 (partial R2)	ly06: 0.668 (0.668)	ly06: 0.612 (0.670) ltr: 0.395 (0.432)	ly06: 0.548 (0.749) lgini: 0.309 (0.422)	ly06: 0.501 (0.751) lgini: 0.303 (0.426) ltr: 0.386 (0.422)
Number of countries	102	102	102	102

Column (1) Instrumented variable: ly06; Included instrument: lfuel, lgini, lfuel legor\_uk, eco; excluded instrument: ly1900, lat, nsea

Column (2) Instrumented variable: ly06, ltr; Included instrument: lfuel, lgini, legor\_uk, ao, eco.; excluded instrument: ly1900, lat, nsea, lp

Column (3) Instrumented variable: ly06, lgini; Included instrument: lfuel, eco; excluded instrument: ly1900, ly1900qua, lat, nsea, al

Column (4) Instrumented variable: ly06, ltr, lgini; Included instrument: lfuel, ao, eco; excluded instrument: ly1900, ly1900qua, lat, nsea, lp, al

Nota: (\*\*\*),(\*\*) y (\*): variable significativa al 99, 95 y 90 por cien, respectivamente.

Lastly, the fourth variable considered in equation (1) is the one which refers to human capital, estimated by the average number of years of study of a country's people (Barro and Lee, 2000). Initially, it is supposed that the level of human capital might be conditioned by the per capita level of the society: the higher the income, the higher the resources there will be to finance the educational system and the higher the demand for trained workers. It is also possible that institutional quality influences the educational level of the population since a suitable provision of public goods - like education - forms part of the quality of the institutions. In both cases, it can be supposed that it is a two-way relationship in the sense that both economic progress as well as institutional quality influence educational level and that education influences the productive and institutional capability of the society (as Glaeser et al. 2004 assume). This is why it is necessary to

carry out the estimation in the same way as we did in previous steps.

The estimation confirms that per capita income is a solid explanatory variable for level of training (columns 1 and 2 of table 5). This result is enough to confirm the endogeneity of the variable in (1). Nevertheless, institutional quality is not significant. That result could be due to the high level of correlation between income level and institutional quality. In fact, if the income variable is removed, institutional quality (measured through Governance Index and its component on Rule of Law) appears as a conditioning factor for educational level, although with a low explanatory capacity (columns 3 and 4 of table 5). The incorporation of trade openness into these equations does not produce significant results, which means that, initially, at least, it is not plausible to say that open trade affects people's level of training.

**Table 5: Estimation of human capital**

Variables	Average years of education (1)	Average years of education (2)	Average years of education (3)	Average years of education (4)
Per capita income (ly06)	0.391 *** (3.97)	0.385 *** (4.01)		
Governance index (ig)	0.013 (0.12)		0.490 *** (9.63)	
Rule of law (rule)		0.020 (0.21)		0.449 *** (9.61)
Europe and Central Asia (eco)	0.349 (5.65)	0.354 *** (5.35)	0.397 *** (5.23)	0.481 *** (5.76)
Centered R2	0.590	0.591	0.443	0.445
Uncentered R2	0.947	0.947	0.930	0.930
Underid K-P test (p-value)	$\chi^2(4)=35.82(0,000)$	$\chi^2(4)=32.50(0,000)$	$\chi^2(2)=35.70(0,000)$	$\chi^2(2)=34.48(0,000)$
Weak identif K-P (crit- value)	16.95(10%= 16.87)	15.29(15%= 9.93)	133.7(10%= 19.93)	123.63(10%=19.93)
Overid. H-J test (p-value)	$\chi^2(3)=0.430(0,806)$	$\chi^2(3)=0.344(0.841)$	$\chi^2(1)=0.161(0.686)$	$\chi^2(1)=0.026(0.87)$
Test on Instruments				
Overid Sargan test (p-value)	$\chi^2(3)=0.196(0.906)$	$\chi^2(3)=0.174(0.916)$	$\chi^2(1)=0.079(0.77)$	$\chi^2(1)= 0.01 (0.90)$
Underid Anderson Test (p-value)	$\chi^2(4)=40.16(0.000)$	$\chi^2(4)=36.62(0.000)$	$\chi^2(2)=63.21(0.000)$	$\chi^2(2)=61.25(0.000)$
Weak Inst. Cragg-Donald (critical value)	17.10(10%= 16.87)	14.61 (15% = 9.93)	94.43(10% =19.93)	85.85 (10%= 19.93)
Shea partial R2 (partial R2)	ly06: 0.479 (0.706) ig: 0.462 (0.680)	ly06: 0.451 (0.706) rule: 0.418 (0.654)	ig: 0.679 (0.679)	ly06: 0.658 (0.658)
Number of countries	88	88	93	93

Column (1) Instrumented variable: ly06, ig; Included instrument: eco.; excluded instrument: ly1900,ly1900qua, lfetn, as

Column (2) Instrumented variable: ly06, rule; Included instrument: eco.; excluded instrument: ly1900,ly1900qua, lfetn, as

Column (3) Instrumented variable: ig; Included instrument: eco; excluded instrument: ly1900, lfetn

Column (4) Instrumented variable: rule; Included instrument: eco; excluded instrument: ly1900, lfetn

Note: (\*\*\*),(\*\*) y (\*): significant variable at 99, 95 and 90 percent, respectively.



**Table 6: Factors determining development**

	(1)	(2)	(3)	(4)	(5)
Aggregate indicator of governance (ig)	0.857 *** (9.57)	0.852 *** (10.09)	0.852 *** (9.15)	0.766*** (10.85)	0.727 *** (5.92)
Openness of trade (ltr)	-0.019 (-0.09)	0.207 (1.04)	0,221 (1,18)	0.066 (0.40)	0.075 (0.41)
Years of educatio (lmae)					0.535 * (1.96)
Absence of direct sea access (nsea)	-0.413 *** (-3.21)	-0,245 ** (-2.16)	-0,232 ** (-2,06)	-0.300*** (2.69)	-0.350*** (-2.74)
Latitude (lat)	1.704 *** (3.39)	0.088 (0.19)	0.108 (0.23)		
Common Law			0,002 (0,02)	-0.073 (-0.60)	-0.709 (-0.56)
Sub-Saharan Africa		-0.944 *** (-6.79)	-0,962 *** (-6.57)	-0,819 *** (-4.42)	-0.683 *** (-3.35)
Centered R2	0,666	0,755	0,758	0,877	0,871
Uncentered R2	0,993	0,995	0,995	0,997	0,997
Underid K-P test (p-value)	$\chi^2(2)=25.44(0,000)$	$\chi^2(3)=28.65(0,000)$	$\chi^2(3)=29.80(0,000)$	$\chi^2(4)=20.48(0,000)$	$\chi^2(4)=13.13(0,010)$
Weak identify. test K-P (critical value)	23.45(10%= 13.43)	18.12(10%= 16.87)	19.68(10%= 16.87)	12.48(15%=11.22)	9.40 (10%= 7.77)
Overid. H-J test (p-value)	$\chi^2(1)=2.57 (0,108)$	$\chi^2(2)=1.34 (0,511)$	$\chi^2(2)=1.33 (0,514)$	$\chi^2(3)=4.21(0,238)$	$\chi^2(3)=4.30(0,230)$
Test on Instruments					
Overid Sargan test (p-value)	$\chi^2(1)= 2.62 (0.105)$	$\chi^2(2)= 0.67 (0.714)$	$\chi^2(2)= 0.69 (0.705)$	$\chi^2(3)= 3.81 (0.281)$	$\chi^2(3)= 3.70 (0.294)$
Underid Anderson test (p-value)	$\chi^2(2)=48.54(0.000)$	$\chi^2(3)=48.59(0.000)$	$\chi^2(3)=46.87(0.000)$	$\chi^2(4)=36.93(0.000)$	$\chi^2(4)=21.94(0.000)$
Weak Inst. Cragg-Donald (critical value)	23.63(10% =13.43)	17.48(10% =16.87)	16.48(10% =16.87)	11.52(15% =11.22)	4.46 (30% = 4.40)
Shea partial R2 (partial R2)	ig: 0.410 (0.417) ltr: 0.352 (0.358)	ig: 0.413 (0.419) ltr: 0.352 (0.357)	ig: 0.416 (0.429) ltr: 0.352 (0.363)	ig: 0.589 (0.623) ltr: 0.445 (0.471)	ig: 0.375 (0.773) ltr: 0.464 (0.495) Lmae:0.303(0.619)
Number of countries	141	141	141	85	76

Column (1): Instrumented variable: ig y ltr; Included instrument: nsea, lat; excluded instrument: ly1900, ly1900qua, lp, lcry  
 Column (2): Instrumented variable: ig y ltr; Included instrument: nsea, lat, as; excluded instrument: ly1900, ly1900qua, lp, lcry  
 Column (3): Instrumented variable: ig y ltr; Included instrument: nsea, lat, legor\_uk, as; excluded instrument: ly1900, ly1900qua, lp, lcry  
 Column (4): Instrumented variable: ig y ltr; Included instrument: lmae, nsea, legor\_uk, as; excluded instrument: ly1900, lp, lfetn, eco  
 Column (5): Instrumented variable: ig, ltr, lmae; Included instrument: nsea, legor\_uk, as; excluded instrument: ly1900, lp, lfetn, lat, lmae60, eco  
 Note: (\*\*\*),(\*\*) y (\*): significant variable at 99, 95 and 90 percent, respectively.

**5.2. FACTORS DETERMINING DEVELOPMENT**

After the analysis carried out, it is possible to test the weight which the four main factors (geography, institutions, trade and education) have on the processes of development. Three of those factors are endogenous (institutions, trade and human capital); geography can, by contrast, be considered exogenous. The previous steps have allowed us to identify the suitable instruments for the endogenous variables.

The estimation suggests that the level of development is explained strongest by the insti-

tutional variable: it appears as significant and with the expected sign in all the estimates (table 6). This reinforces the interpretation of Rodrik et al. (2002) and those suggested by AJR y ES. As in the study by Rodrik et al. (2002), the variable referring to trade integration does not prove significant in any of the tests, although they all present an adequate sign (which does not happen in Rodrik et al., 2002). Nevertheless, trade openness has an indirect influence on the level of development through its effect on institutional quality. Of all the variables mentioned to do with geography, it is the absence of direct sea access which proves significant, which has a negative sign, as might have been expected.

The significance of the distance to the tropics is cancelled out once a dummy reference to Sub-Saharan Africa is incorporated.

Ethnic fragmentation, which influences institutional quality negatively, and the size of the regional markets in 1900, which operates through open trade, both work with the adequate sign in the estimation of the variable. In terms of regional particularities, both southern Asia as well as Sub-Saharan Africa present development results which are lower than the model assign them.

### 5.3. ANALYSIS OF ROBUSTNESS

Given the weakness of the measurement of institutional quality, it seems reasonable to try to repeat the model using alternative indicators. In particular, firstly, the estimate was repeated using each one of the six central components of the World Bank's Governance index as expressive variables for institutional quality (Table A.1., in the Annex). In order to help the comparison the structure of the selected instruments in table 6 was maintained. The results confirm the central role which the institutions have in the explanation of development. In the same way, education is significant in all estimations. The same does not happen, however, with trade openness which, although it has an adequate sign, does not prove significant in any of the cases. With a single exception (the estimate using the Regulation component), the absence of direct sea access proves a significant obstacle to promoting development; and that is confirmed in equally general terms in the anomalous performance of Sub-Saharan Africa.

Secondly, to confirm the results, the model was repeated substituting the Governance Index (and its components) for other alternative indicators of institutional quality. More precisely, the Institutions component of the Global Competitiveness Indicator (CGI) was used, as were the Objective Governance Indicators (OGI), the Corruption Perception Index (CPI) and Doing Business (through the ranking it creates). The results confirm those of the previous pages. Institutional quality is the only variable that is significant in the explanation of development, whichever indicator is adopted. Trade openness does not prove significant in any of the options; and the educational level is significant in two (CPI and GCI).

Lastly, an alternative means of checking the robustness of the results is to repeat the exercise with the strongest quality indicator (IG) but on sub-samples of the countries. The equation was estimated for two alternative groups: i) the one made up of the poorest countries, those which make up the groups of middle-low and low income, in terms of the World Bank's classification; and ii) the one made up of those countries which were colonies of European countries. The results generally confirm those previously obtained: institutions seem to be a highly significant variable in both cases, trade openness only in the case of the colonies and educational level in those middle-low and low-income countries (Table 7). Sub-Saharan Africa tends to present a lower income level to that which would correspond to its relationship in the model.

## 6. Final considerations

As the results of the estimate show, geography and institutions powerfully influence the developmental possibilities of countries. Of the geographical conditioners, the most relevant one is that related to the absence of direct sea access. Latitude and other geographical conditioners disappear as direct variables in the explanation when other variables are incorporated. Whichever indicator is adopted, the quality of the institutions seems to condition countries' levels of development. Nevertheless, institutional quality does not seem to be conditioned by those historical factors to which other studies allude (models of colonisation or traditions of the legal system, for instance), but rather by the level of development, the degree of social fragmentation and inequality and, in some cases, by the non-fiscal nature of the main resources of the State. The educational level of the population seems to influence developmental possibilities but that relationship is weaker, depending on the indicators which are used to measure institutional quality and the group of countries chosen for the estimation. At the same time, the possible presence of a network of urban nuclei in the close region seems to have affected possibilities for countries' international integration. That said, the model is incapable of illustrating in a robust way the effect of this variable (trade openness) on the level of development. Lastly, the model shows that Sub-Saharan Africa is an exception since its degree of development is

lower than the level which the rest of the variables assign it.

The results of the empirical exercise adequately confirm the hypotheses with which we started out. However, it is worth tempering optimism by recalling the warning which Bardhan (2005; 6) once made about this type of econometric procedure: “finding an instrument that identifies an exogenous source of variation in the income determinants is quite different from unearthing an adequate and satisfactory causal explanation”.

Beyond the overall picture which the results present, crucial questions remain about how

each country took advantage of the factors which were considered here. For example, what did Australia do to overcome its limited access to regional markets and, by contrast, why did Morocco not take advantage of its relative advantage in this respect; or why did Canada overcome its high linguistic fragmentation and Madagascar not benefit from greater homogeneity? These are questions which call into doubt meta-historical constructions which propose the identification of a single and universal reason for economic backwardness and, by contrast, they underline the need to study the particularities of each case: a task which should go hand-in-hand with a deeper and more imaginative historical study.

**Table 7: Factors determining development in two groups of developing countries**

Sample	Medium-low and low income countries (1)	Former colonies (2)
Institutional quality (ig)	0.844 *** (4.14)	0.839 *** (3.69)
Openness (ltr)	0.098 (0.31)	0.491 ** (2.14)
Educational level (lmae)	0.396 * (1.85)	0.257 (0.97)
Absence of direct sea access (nsea)	-0.234 (-1.45)	-0.442 ** (-2.24)
Sub-Saharan Africa	- 0.700 *** (-4.48)	- 0.920 *** (-4.53)
Centered R2	0.800	0.813
Uncentered R2	0.997	0.996
Underid K-P test (p-value)	$\chi^2(3)=11.96(0,007)$	$\chi^2(3)=10.10(0,017)$
Weak identif K-P (crit- value)	3.72 (30%=4.30)	4.242 (30%= 4.30)
Overid. H-J test (p-value)	$\chi^2(2)=0.88 (0,643)$	$\chi^2(2)=0.869 (0,641)$
Test on Instruments		
Overid Sargan test (p-value)	$\chi^2(2)= 0.783 (0.676)$	$\chi^2(2)= 0.708 (0.701)$
Underid Anderson test (p-value)	$\chi^2(3)= 10.46 (0.015)$	$\chi^2(3)= 14.33 (0.002)$
Weak Inst. Cragg-Donald (critical value)	2.294 (30% = 4.30)	3.405 (30% = 4.30)
Shea partial R2 (partial R2)	ig: 0.427 (0.527) ltr: 0.313 (0.373) lmae: 0.469 (0.610)	ig: 0.332 (0.620) ltr: 0.505 (0.507) lmae: 0.366 (0.689)
Number of countries	36	48

Column (1): Instrumented variable: ig, ltr, lmae; Included instrument: nsea, as; excluded instrument: ly1900, lp, lfetr, lat, lmae60

Column (2): Instrumented variable: ig, ltr, lmae; Included instrument: nsea, as; excluded instrument: ly1900, lp, lfetr, lat, lmae60

Note: (\*\*\*),(\*\*) y (\*) : significant variable at 99, 95 and 90 percent, respectively.

## ANNEX I: ANALYSIS OF ROBUSTNESS

**TABLE A.1: FACTORS DETERMINING DEVELOPMENT WITH INSTITUTIONAL QUALITY MEASURED BY THE COMPONENTS OF THE GOVERNANCE INDEX**

Componet of Gov- ernance Index	(1) (Voice)	(2) (Stability)	(3) (Effectiveness)	(4) (Regulation)	(5) (Rule)	(6) (Corruption)
Governance Index	0.698 *** (4.78)	0.481 *** (3.09)	0.599 (5.20)	0.726 *** (5.09)	0.600 *** (5.29)	0.516 *** (4.60)
Openness of trade (ltr)	0.366 ** (2.05)	0.029 (0.16)	0,131 (0.80)	0,046 (0.26)	0.095 (0.45)	0.038 (0.70)
Educational level (Imae)	0.601 (2.00)	1.084 (3.16)	0.664 (2.49)	0.640 (2.07)	0.707 (2.68)	0.816 (2.93)
Absence of direct sea access (nsea)	-0.431 *** (-2.89)	-0,420 ** (-2.38)	-0,349 (-2.55)	-0,214 ** (-1.37)	-0.375 ** (2,73)	-0.450*** (-2.97)
Sub-Saharan Africa	-0.709 *** (-3.47)	-0.756 *** (-3.10)	-0,596 *** (-3.45)	-0.588 *** (-2.83)	-0.569 *** (-3.00)	-0.573 *** (-3.20)
Centered R2 Uncentered R2	0,816 0,996	0,796 0,995	0,873 0,997	0,832 0,996	0.852 0.996	0.843 0.996
Underid K-P test (p-value)	$\chi^2(5)=9.84$ (0,070)	$\chi^2(4)=14.16$ (0,000)	$\chi^2(4)=13.253$ (0,010)	$\chi^2(4)=11.94$ (0,01)	$\chi^2(4)=16.90$ (0,002)	$\chi^2(4)=15.27$ (0,004)
Weak identify. test K-P (critical value)	3.30 (30%= 4.44)	4.98 (30%= 4.40)	19.05 (5%= 12.20)	8.47 (10%= 7.77)	16.69 (5%= 12.20)	25.80 (5%= 12.20)
Overid. H-J test (p-value)	$\chi^2(4)=6.23$ (0,182)	$\chi^2(3)=7.17$ (0,066)	$\chi^2(3)=0.989$ (0,802)	$\chi^2(3)=1.57$ (0,666)	$\chi^2(3)=3.07$ (0,380)	$\chi^2(3)=0.783$ (0,853)

Test on Instruments						
Overid Sargan test (p-value)	$\chi^2(4)= 2.62(0.105)$	$\chi^2(3)= 7.97(0.04)$	$\chi^2(3)= 0.36 (0.947)$	$\chi^2(3)= 0.92 (0.819)$	$\chi^2(3)= 2.03 (0.566)$	$\chi^2(3)=0.197(0.978)$
Underid Anderson test (p-value)	$\chi^2(5)=48.54(0.000)$	$\chi^2(4)=17.96(0.001)$	$\chi^2(4)=20.012(0.000)$	$\chi^2(4)=17.56(0.000)$	$\chi^2(4)=27.05(0.000)$	$\chi^2(4)=25.13(0.000)$
Weak Inst. Cragg-Donald (critical value)	23.63(10%=13.43)	17.48(10%=16.87)	3.98 (30% = 4.40)	3.35 (30% = 4.4)	6.08 (20% = 5.35)	5.49 (30% = 4.40)
Shea partial R2 (partial R2)	voice: 0.200 (0.664) ltr: 0.458 (0.513) lmae: 0.180 (0.646)	stab: 0.272 (0.614) ltr: 0.442 (0.513) lmae: 0.295(0.644)	efect:0.355(0.779) ltr: 0.476 (0.513) lmae: 0.283 (0.644)	ig: 0.281 (0.684) ltr: 0.469 (0.513) lmae: 0.261(0.644)	rule: 0.442 (0.739) ltr: 0.468 (0.495) lmae: 0.371(0.619)	corrup: 0.424(0.807) ltr: 0.455 (0.513) Lmae: 0.342 (0.644)
Number of countries	77	77	77	77	77	76

Column (1): Instrumented variable: voice, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, ly1900qua, lp, lfetn lmae60 al eco

Column (2): Instrumented variable: stability, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, lp, lfetn lmae60 al eco

Column (3): Instrumented variable: efectiv, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, lp, lfetn lmae60 al eco

Column (4): Instrumented variable: regul, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, lp, lfetn lmae60 al eco

Column (5): Instrumented variable: rule, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, lp, lfetn lmae60 al eco

Column (6): Instrumented variable: corrupt, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, lp, lfetn lmae60 al eco

**TABLE A.2.: FACTORS DETERMINING DEVELOPMENT WITH INSTITUTIONAL QUALITY MEASURED BY ALTERNATIVE INDICATORS**

	(1) (OGI)	(2) CPI	(3) GCI (Institut)	(4) DB
Governance indicator (ig)	1.939 *** (5.23)	0.239 *** (4.98)	0.570 *** (3.52)	-0.022 *** (-4.62)
Openness of trade (ltr)	0.007 (0.03)	0.090 (0.39)	0.148 (0.57)	-0,050 (-0.21)
Educational level (lmae)	-0.055 (-0.12)	0.842 *** (2.93)	1.005 ** (2.53)	-0.137 (-0.33)
Absence of direct sea access (nsea)	0.148 (0.46)	-0,468 ** (-2.79)	-0.448 ** (-2.12)	-0,165 (-0.93)
Sub-Saharan Africa	-0.344 (-1.14)	-0.549 ** (-2.66)	-0.398 (-1.59)	-0.719 *** (-3.16)
Centered R2 Uncentered R2	0,679 0,993	0,813 0,966	0,705 0,995	0,739 0,994
Underid K-P test (p-value)	$\chi^2(4)=7.808(0,09)$	$\chi^2(4)=14.55(0,005)$	$\chi^2(4)=14.97(0,004)$	$\chi^2(4)=10.34(0,035)$
Weak identify. test K-P (critical value)	7.09 (20%= 5.35)	27.25 (5%= 12.20)	72.33 (5%= 12.20)	11.94 (10%= 7.77)
Overid. H-J test (p-value)	$\chi^2(3)=0.54 (0,90)$	$\chi^2(3)=2.30 (0,51)$	$\chi^2(3)=1.82 (0361)$	$\chi^2(3)=0.80 (0,849)$
Test on Instruments Overid Sargan test (p-value)	$\chi^2(3)=0.49 (0.920)$	$\chi^2(3)=2.17 (0.53)$	$\chi^2(3)= 1.25 (0.739)$	$\chi^2(3)= 0.37 (0.94)$
Underid Anderson test (p-value)	$\chi^2(4)=9.34 (0.052)$	$\chi^2(4)=32.89 (0.000)$	$\chi^2(4)=27.64(0.000)$	$\chi^2(4)=14.45(0.006)$
Weak Inst. Cragg-Donald (critical value)	1.57 (30% = 4.40)	8.59 (10% = 7.77)	6.97 (20% = 5.35)	2.26 (30% = 4.40)
Shea partial R2 (partial R2)	ogi: 0.137 (0.513) ltr: 0.456 (0.517) lmae: 0.183(0.640)	cpi: 0.551 (0.803) ltr: 0.474 (0.517) lmae: 0.447(0.640)	gci: 0.507 (0.659) ltr: 0.554 (0.556) lmae: 0.473(0.626)	ig: 0.207 (0.619) ltr: 0.414 (0.474) lmae: 0.224 (0.649)
Number of countries	75	75	64	75

Column (1): Instrumented variable: ogi, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, ly1900qua, lp, lfetn lmae60 al eco

Column (2): Instrumented variable: cpi, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, lp, lfetn lmae60 al eco

Column (3): Instrumented variable: compet\_index, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, lp, lfetn lmae60 al eco

Column (4): Instrumented variable: db, ltr, lmae; Included instrument: nsea, ast; excluded instrument: ly1900, lp, lfetn lmae60 al eco

## **ANNEX II: DATA SOURCES AND DESCRIPTION OF VARIABLES**

Institutional Quality: 2006 World Bank Governance Indicators average

Per capita Income: per capita GDP (PPP) 2006 and 1900. Source: Maddison

Gini Index: Latest year available. Source: World Bank.

Education: Average years of school for the population aged over 25 years. Source: Barro and Lee (2000)

Taxes: The main source of homogeneous information on tax revenue is provided by the IMF through Government Finance Statistics, which, in turn, is used by the World Bank in World Development Indicators. However, both sources face two serious problems. On the one hand, the series are incomplete for many developing countries. On the other, data usually refer to central governments, which is inaccurate information in highly decentralized countries. Therefore, to overcome these problems several sources have been used. For Latin America, Gomez Sabaini (2005) has been employed, except for Venezuela, whose data corresponds to the World Bank. For the OECD countries, we used the data provided by this organization. For the rest of countries, two sources have been used. Firstly, the World Bank in countries for which data is available and reliable. The WB provides data from income tax excluding social security. Also, it provides separately data for the latter. Therefore, it has been proceeded to add them up. The University of Michigan World Tax Database is the second source used in countries for which the WB has no data (<http://www.bus.umich.edu/OTPR/otpr/>) or is not reliable. Data year is 2000. Yet, in some cases, data was not available for that year, and we selected the closest year available, with a maximum difference of three years (see Garcimartin et al., 2006).

Openness rate: exports plus imports as a percentage of GDP (2000-4 average). Source: World Bank  
Ethnic Fragmentation. Source: Alesina et al. (2003)

Population: 2004. Source: World Bank

Oil on export: Percentage of fuel exports on total exports. 2004. Source: World Bank

Geographic location: Latitude in absolute value of each country's capital, divided by 90. Source: Central Intelligence Agency, The World Factbook 2007

Common Law: Origin of the legal system. Source: La Porta (1999) website of Quality of Government.

Colonial Origin: own elaboration based on Bertocchi and Canova (2002)



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