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# Institutions and growth: *can human capital* be a link?

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This paper attempts to provide a sounder link between institutions and economic growth. It does so by i) identifying those institutions which might matter the most with respect to economic performance, ii) providing a rationale as to why they might matter, and iii) confronting that rationale with some systematic empirical evidence. We postulate that the central and common characteristic of relevant institutions is that they give agents a voice, a stake in the system. By doing so, they increase the appropriability of benefits or, conversely, reduce the amount of rent-seeking. A composite index of the extent to which these institutional characteristics are attained is constructed for 19 Latin American countries for the years 1960 to 1986. Within an otherwise standard growth model, our institutional development index is shown to contribute significantly to the explanation of the variations in growth rates of per capita income across countries and over time. Some determinants of institutional development, across countries as well as decades, are also identified. In contrast to existing studies which emphasize a nexus between institutional development and per capita income growth operating through physical capital accumulation, our results suggest that a similar nexus operating through human capital formation may be stronger.

# I

## Introduction

On the research agenda of economics, institutions today occupy a rather similar position to that occupied by technology forty years ago. Although Abramovitz and Solow were clearly not the first economists to emphasize their importance, they were pioneers in at least two fundamental ways. First, they courageously dismissed the profession's belief that the topic should be better left to others, in this case, to engineers. Second, they understood that without an explicit and cogent attempt at quantification, there would be neither a marshalling of talent to research the topic, nor any substantial progress. They knew the profession needed some measure of its ignorance.

After three Nobel prizes, it would be difficult to find today anyone who believes that institutions should be better left to others, presumably political scientists. In the case of institutions, however, nothing is yet to be seen that is anything like the impressive marshalling of talent working on the topic, the profession's enthusiasm, and the sequence of major breakthroughs that marked the study of technological change in the 1960s. Not only does the profession still seem to be looking for the size of the residual or a measure of its ignorance, but also the links between institutions and economic growth remain very much

underexplored. As a result, we are left with many unanswered questions, among them: Which institutions matter most for economic growth, and why? Can these relevant institutions be measured, and if so, how? Can their effect on economic growth be demonstrated? What are the determinants of these institutions? What is the link between institutions and economic growth? Can this link be human capital?

This paper attempts to contribute at least modestly to answering these important questions, on the basis of the Latin American experience. It begins, in section II, by surveying the characteristics of institutions deemed important to economic growth. It then describes an essential, central and common characteristic of growth-promoting institutions: namely, that they give agents a voice, a stake in the system, thereby increasing the appropriability of benefits or, conversely, reducing the amount of rent-seeking. More specifically, we identify the importance of an institution for economic development with the degree to which it helps to ensure that the tastes, needs and preferences of the citizenry are reflected in i) the organization of the State, ii) the functioning of the government, and iii) the formulation and implementation of public policies.

Based on this notion, in section III we construct a comparative index of institutional development (CIID) for 19 Latin American countries for the period from 1960 to 1986. In section IV we incorporate our CIID measure into an otherwise standard model of economic growth. Since the CIID would seem to be potentially endogenous, section V explores its determinants and re-estimates the growth model using instruments that represent the CIID rather than the index itself. Taken together, our results demonstrate the significance of the CIID in explaining economic performance and, moreover, they point to a strong and potentially important nexus between institutional development, human capital and growth in per capita income. Finally, section VI presents our conclusions.

Why should the experience of the 19 Latin American countries used in this paper be of relevance in this context? There are several important reasons behind this choice. First, in no other part of the world

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have the shifts in development strategy and the attendant structural reforms been as striking. Second, since sustaining these reforms appears to remain a more serious challenge in Latin America, success in extending and sustaining them would seem to require an especially delicate balance with respect to the role of the State. While in some respects the State needs to be strengthened to take on new tasks (Edwards, 1995), in other respects its role may have to be diminished and changed so as to allow greater play for the market (Wiesner, 1994; Naím, 1995). Third, among the developing regions, the data required for measuring and endogenizing institutional development are only available for Latin America. Given our interest in

examining human capital as a possible link between institutions and economic growth, it is relevant to note that it is in Latin America that it has been suggested that institutional development can contribute positively to economic development only if it succeeds in realizing more fully the region's human capital potential (Londoño, 1995). Last but by no means least, it is in Latin America, with its relatively high level of resource endowments but its very considerable growth rate differences from one decade to another (with especially disappointing growth rates since the late 1970s), that the case for examining the role of institutions in explaining growth rate differences would seem to be of paramount importance.

## II

### Which institutions matter for economic growth, and why?

Although very substantial progress has been made in explaining both the determinants and effects of institutions at the microeconomic level (Lin and Nugent, 1995) and variations in growth rates across countries (Barro and Sala-i-Martin, 1995), much less progress has been made in explaining the relationship between institutions and economic growth.<sup>1</sup> Five features of institutional analysis would seem responsible for limitations in this respect: i) the persistent difficulty of operationalizing the term "institution" (Ménard, 1995); ii) as suggested by Bardhan (1996, p. 1), the insufficient attention given to the identification of "which institutions affect the process of development and *how*"; iii) the pessimistic tone of much of the literature, with its emphasis on "path dependency" and "institutional impediments" to development; iv) the excessively narrow and often negative role attributed to the State by many modern practitioners of institutional analysis, and v) the general failure to integrate politics and the tradeoffs between efficiency and distribution into policy objectives (Robinson, 1996).

<sup>1</sup> Porter and Scully observe that "Like two ships passing in the night, there exist two bodies of scholarly literature that are largely unaware of each other, but are related to the problem of economic growth: the neoclassical theory of economic growth and the new institutional economics" (Porter and Scully, 1995, p. 17).

Each of these limiting features and ways of overcoming them will be considered in turn. First, we feel that the much-belaboured distinction between institutions and organizations has been over-emphasized and should be softened.<sup>2</sup> At the same time, however, we believe that institutions need to be more strongly distinguished from policies and policy strategies. Indeed, it may be hypothesized that differences in institutions can explain why the effectiveness of a common policy adopted to overcome the same problems in two different countries may vary consider-

<sup>2</sup> For example, North (1990, p. 107) defines institutions as society's rules of the game, that cannot be seen, felt or even measured, and "organizations" as the players, i.e., "groups of individuals bound by a common purpose to achieve objectives" (North, 1995, p. 23). A softening of the distinction would seem desirable because of: i) the fact that the very substantial time devoted to drawing such an inevitably arbitrary distinction could be better spent on empirically investigating relevant hypotheses concerning the effects of either or both, and ii) in the light of the important time delays and rent-seeking behaviour which arise from conflict-prone reforms, the demonstrated ability of certain organizations to reduce these conflicts and thereby contribute to a better match between policies and long-run economic development.

ably.<sup>3</sup> This leads us to a conclusion similar to that of Adelman and Morris (1989, p. 1429): "institutions matter greatly because they determine which government policies are likely to be adopted, and which institutions will be strengthened, introduced or weakened."

With respect to which institutions matter, even the following brief survey reveals some very useful suggestions. For example, North asserts that "the inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary underdevelopment in the Third World" (North, 1990, p. 54). Likewise, Reynolds (1983, p. 976) attests that "the single most important explanatory variable [in explaining long-run development] is political organization and the administrative competence of the government." Olson (1996, p. 6) emphasizes the role of incentive structures, which depends not only on what economic policies are preferred in each period, but also on long-term or institutional arrangements: the legal systems that enforce contracts and protect property rights, and the political structures, constitutional provisions and the weight of special-interest lobbies and cartels. Similarly, Sachs and Warner (1995, p. 5) argue that countries with inefficient institutions, such as those which do not have secure property rights, credible trade openness policies, convertible currency, etc., are unlikely to achieve any convergence (towards higher stable levels of per capita income), whatever the underlying production function or initial level of human capital. According to Easterlin (1996, p. 56), the establishment of the rule of law, the fulfilment of contracts, political stability, and the elimination of arbitrary appropriation or taxation of property by despots or others, together with universal education, are among the most essential institutions for modern economic growth.<sup>4</sup> Finally, Abramovitz and David (1996, pp. 50-51) identify

"social capacity" –defined as the attributes, qualities and nature of the people and of social organization which originate in social and political institutions and influence reactions to economic opportunities– as the factor affecting a country's capacity to catch up.<sup>5</sup>

With regard to the third limiting feature –the pessimistic approach taken to the possibility that institutions may be modified– the above-mentioned success of the new institutional economy at the micro level –that is to say, in showing how and why the agents can escape the institutional and poverty traps that beset them and the vicious circles of underdevelopment– may suggest that parallel efforts at the macro level to bring about institutional changes favouring growth could be equally effective.

Finally, with regard to the third and fourth features –excessively narrow concepts of the State and economic analysis– it should be noted that "good" institutions, such as well-defined property rights, do not drop down like manna from heaven. In actual fact, as North (1995, p. 20) points out, it is the political system which defines and enforces property rights. Consequently, it would seem reasonable that economic policy considerations should play a larger part in explaining the causes and macroeconomic effects of institutions<sup>6</sup> (Lin and Nugent, 1995, p. 2325). Doing this would not only broaden the scope of institutional analysis but would also build an effective and useful bridge between two approaches which are related but have so far been kept apart: that of development specialists regarding "governance", and that

<sup>3</sup> The usefulness of this distinction has been widely recognized in drawing lessons for other regions from the East Asian miracle, e.g., in understanding how heavily interventionist policies have been helpful to growth in East Asia but apparently harmful to growth in other countries.

<sup>4</sup> As already noted, our econometric results solidly confirm this view. While the effect of institutions on economic development seems to be independent of investment in physical capital, the same is not true of investment in human capital. In particular, the effect of the growth of human capital only becomes statistically significant once international development is achieved.

<sup>5</sup> "Social capacity" includes the culture of a society; the priority given to economic achievement; the rights, restrictions and obligations connected with property ownership; and all the incentives and inhibitions to which they can give rise with respect to effort, investment, enterprise and innovation. It also affects the form and activities of organizations, including the provision of public services and infrastructure.

<sup>6</sup> As Bates (1995, p. 44) suggests, "Thus, taking political factors into account helps to explain the direction and magnitude of the deviations from the status quo permitted by economic institutions and sheds some light on the reasons for their variable behaviour. The new institutionalism has its roots in economics. In order to fill its agenda, however, it must move towards the study of politics too. It must take account of the distribution of power in society and the impact of the political system on the structure and behaviour of the economic institutions".

of political scientists regarding "democracy".<sup>7</sup> Likewise—and quite naturally—the analysis of institutions would tend to lead in a more normative direction: if the institutions that matter can also be changed, more attention should be given to finding the best way of promoting the development of institutions that foster growth.

The—admittedly selective—study made here of the institutions considered to be important for long-term growth suggests how some of the main limitations in the analysis of institutions could be overcome. With regard to the last two cases, this is done by incorporating economic policy considerations in such analysis. We thus arrive at the following premise: the quintessential institution for economic development is the degree to which the tastes, needs and preferences of citizens are reflected in i) the organization of the State, ii) the functioning of the government, and iii) the formulation and implementation of public policies.

Unlike much of the literature on institutions and development, which is based almost exclusively on the product or results of institutions—item i) of the previous paragraph—our proposal lays great stress on the inputs of the institutional development process (items ii) and iii) of the previous paragraph). Thus, the essence of a successful institutional development process does not lie only in the degree of State inter-

vention, the efficient provision of public goods, or its ability to credibly precommit to policy decisions (Rodrik, 1992).<sup>8</sup> Rather, it should also depend on the character of the process in which these institutions and policies are determined<sup>9</sup> and, in particular, on the "stake" in the system which agents perceive they have.

Although certainly not the only way of identifying institutional development, our approach suggests that institutions that are transparent and give individuals a "voice" (Hirschman, 1970) or stake in the system could significantly improve macroeconomic performance in the long run.<sup>10</sup> If they are given a greater "voice", all participants in the economic system feel that they have a "stake" in the system. When this occurs, agents perceive an increase in the appropriability of the benefits of their economic activities, and this should reduce the extent of their rent-seeking activities.

Identifying the essential institutions for economic growth also raises afresh the identity of the main link between institutions and growth. The literature on property rights has led us to believe that physical capital formation should be the key link, in that institutional development is often embodied in the accumulation of physical capital (through the development of capital and financial markets). The way in which capital and financial market institutions emerge can reduce uncertainty and/or affect the ac-

<sup>7</sup> Governance is marked by the formulation of predictable, open and enlightened policies (that is to say, by transparent processes); a civil service imbued with a professional ethos; an Executive which is answerable for its actions, and a vigorous lay society which takes a part in public affairs, all under the rule of law (World Bank, 1994, vii). The concept of democracy held by political scientists comprises three independent elements: i) the existence of institutions and procedures through which citizens can express their effective preferences between elective policies and leaders; ii) the existence of effective restrictions on the Executive's use of its powers; and iii) guaranteed civil liberties for all citizens. It should be noted that this definition does not speak of "voting" but of the effective transmission of preferences (see Becker, 1983, regarding this important distinction). Other aspects, such as the rule of law, systems of checks and balances and effective responsibility, may be considered as means or manifestations of these general principles. Finally, it is important to acknowledge that these questions, which had not previously been considered part of the traditional purview of economic science, are now increasingly coming within that field, because of the recently expanded coverage of economics. We may recall, for example, the defence of constitutional governments made by Buchanan (1975), the analysis of cycles of participation made by Hirschman, and the recent empirical studies of the relation between democracy and growth made by Helliwell (1994) and Barro (1996).

<sup>8</sup> Similarly, with respect to the supply of public goods, our concept of institutional development gives at least as much weight to choices among the different public goods and the way in which society arrives at those choices as it does to the efficiency of their provision. There is no need, moreover, to assume that efficiency in provision and the way in which the choices are made of goods to be produced are independent of each other.

<sup>9</sup> For example, with respect to property rights, our definition considers important not only the security of such rights but also the means by which they are distributed (Shleifer, 1994). That the means by which a property right is distributed can significantly affect efficiency and growth can be illustrated by the well-known efficiency comparisons between tariffs and various means of allocating import quotas. If the quota is given away free, it can give rise to substantial rent-seeking in the form of different agents trying to obtain the quota (i.e., the right to import the restricted amount). If the quota is allocated to the domestic producer of the imported good, that agent will have monopoly power and hence further distort resource allocation and lower efficiency. On the other hand, if the quota is competitively auctioned it will be equivalent to a tariff and have no additional welfare or growth-inhibiting effects.

<sup>10</sup> The relationship between the "representativeness of government" and economic growth has recently been formalized by Boone (1995) and featured in the literature on the political economy of growth (Alesina and Perotti, 1992).

cessibility of external finance for different sizes and types of firms.<sup>11</sup>

Yet, an equally strong case might be made for the embodiment of institutional development in the form of human capital or at least for viewing institutional development as complementary to human capital.<sup>12</sup> Of relevance to such issues are the widely observed and substantial differences in the private and social rates of return on human capital, usually in favour of the former. Since the gap between private and social rates tends to be considerably larger in the least developed countries, where institutional development is also low, and educational opportunities are limited primarily to a small elite group, the high private rates of return may well reflect education-induced opportunities for rent-seeking.

On the other hand, at higher levels of institutional development, the link between education and

rent-seeking might be less pronounced, reducing the inflated private rate of return to education while raising its social rate of return (Murphy, Schleifer and Vishny, 1991).<sup>13</sup>

Brazil serves as a good example of the hypothesized relationship between institutional development and the rates of return to education. Even though the private rates of return tend to decline with the level of education, according to Psacharopoulos (1973), in 1970 the private rate of return to university-level education was a whopping 38% but the social rate of return a more modest 14%. As will be shown below, our index of institutional development reveals a relatively low value for Brazil at that time but substantially higher values later on. This would seem consistent with a subsequent rise in the social rate of return to education relative to the private one.<sup>14</sup>

### III

## The comparative index of institutional development (CIID)

As we noted earlier, we hypothesize that the quintessential institution for economic development is the degree to which the tastes, needs and preferences of the citizenry are translated into the functioning of government, the organization of the State, and the formulation and implementation of public policies. In the following paragraphs we will construct a Comparative Index of Institutional Development (CIID) based on generally observable indicators which, we

believe, capture (at least collectively) some essential differences in growth-related institutional environments across countries and over time.

<sup>11</sup> Haber (1994) provides historical evidence on this issue. See also Roubini and Sala-i-Martin (1992) and De Grigorio and Guidotti (1995) for empirical evidence on the negative contribution of financial development to economic growth in Latin America. For instance, in De Grigorio and Guidotti financial development is proxied by the ratio of bank credit for the private sector to GDP, and the relationship is found to be negative in the region. On the effects of different types of market development on different sizes of firms, see Nugent and Nabili (1992).

<sup>12</sup> Throughout this paper, we follow the tradition in applied economics of restricting the concept of human capital to the outcomes of the formal educational system. We recognize, however, that there are other dimensions to this concept (e.g., on-the-job training and improvements in health status), and that these could be even more important in the context of the least developed countries. See Becker (1993) for the many aspects of the concept of human capital, as well as for arguments stressing outcomes of the formal education system.

<sup>13</sup> When the aforementioned characteristics of an appropriate institutional environment are satisfied, and educational opportunities are extended broadly, the competitiveness of advancement through the educational system should be increased. Eventually, this would raise the competitiveness of markets and serve to reinforce healthy institutional development. By contrast, if educational opportunities were instead more narrowly distributed, advancement would likely be determined more by family wealth, ethnic origin, etc., and as a result positive feedbacks to institutional development would be much less likely.

<sup>14</sup> Another way to illustrate this point is to contrast the experiences of South Korea and Venezuela (World Bank, 1993 and 1994). While public expenditure on education in 1985 was 4.3% of GNP in Venezuela but only 3% of GNP in South Korea, the share of the education budget allocated to primary education was 83.9% (2.5% of GNP) in South Korea but only 31% (1.3% of GNP) in Venezuela. In most of Latin America, the outcome of the educational system is characterized by high levels of illiteracy, educational inefficiencies such as high grade repetition and under-investment in primary education, and the enhancement of existing inequalities (Fajnzylber, 1990) by over-spending on higher education (Morley, 1995; Londoño, 1995). Taken together, these factors greatly increase the likelihood of the lack of healthy links between education and institutional development in the region.



To be sure, there are other indexes that capture some aspects of institutional development.<sup>15</sup> Yet, for the following reasons, we believe there is a need for a new index. First and foremost, the alternatives are extremely restrictive in terms of time coverage. Since none of their indicators are available for years prior to 1971,<sup>16</sup> none is able to capture the effects of the substantial differences in either institutional orientation or economic growth between the 1960s and 1990s (e.g., the reversal in growth patterns that followed the oil shocks and the debt crisis).

Second, the available alternatives are incomplete in that they fail to consider what we have called the "input side" of the process. For instance, the indicators used by Knack and Keefer focus exclusively on the efficiency of the provision of public goods (an outcome), but exclude important factors such as the choice of the specific public goods to be provided and the way in which that choice is made. Likewise, the contract-intensive money measure (CIM) of Clague, Keefer, Knack and Olson (1995) is perhaps too closely related to credit flows, financial intermediation and investment to lend conviction to their argument that the causality goes from CIM to the rate of growth.

Third, existing measures have been subject to an implicit selection bias in that country coverage has been restricted to countries where foreign investment is, or has been, important. Only for such countries has there been sufficient incentive to invest in the development of the information necessary for constructing such indicators.<sup>17</sup>

A fourth and final reason is methodological. Since institutional development is multidimensional, any single index requires aggregation, the results of which may be sensitive to arbitrary choices of weights. For example, Mauro's index of institutional

efficiency was obtained by averaging nine indicators, thereby arbitrarily weighting each of them equally.<sup>18</sup> Although the arbitrariness of weighting the individual components of the aggregate index can be reduced through the use of principal components and other methods,<sup>19</sup> most authors (except Knack and Keefer) have chosen not to use them, generally on the mistaken grounds that the underlying variables were highly correlated.

To overcome the latter shortcoming, the construction of our CIID variable is based on the principal components method.<sup>20</sup> First, we selected the eight indicators listed in table 1 (from Gurr, 1990) as the "underlying variables" of the CIID.<sup>21</sup> As noted in the table, these include both the competitiveness and openness of executive recruitment, constraints on chief executives, competitiveness and regulation of participation, legislative effectiveness and selection, and limitations on the economic scope of government actions. Each of these eight indicators is scored according to the coding indicated in table 1. Admittedly, for lack of relevant indicators across countries and over time, this index may give short shrift to other components of what Trebilcock (1995) refers to as the "institutional matrix", such as the quality of both the bureaucracy and the legal system.

Because of the different scales used in these eight indicators, it is necessary first of all to standardize their values, next to use the covariance matrix as the starting point, and finally to equate the resulting index (CIID) to the value of the "dominant factor"

<sup>15</sup> Such as those found in Scully (1988), Mauro (1995), Knack and Keefer (1995), Clague, Keefer, Knack and Olson (1995) and Gwartney, Lawson and Block (1996).

<sup>16</sup> Because they base their index on the widely available data on the components of the money supply, Clague, Keefer, Knack and Olson (1995) constitute a significant exception. In contrast, the Gastil indexes used by Scully start in 1973, and those used by Knack and Keefer (1995) only extend from 1972 on in some cases and from 1980 on in other cases. The indicators Mauro (1995) used, which come from Business International (now incorporated into The Economist Intelligence Unit), are available from 1971 on, and, finally, the indicator constructed by Gwartney, Lawson and Block (1996) is available only from 1975 on.

<sup>17</sup> For example, the set of indicators Mauro used for Latin America are available for Argentina, Chile and Mexico, but not for Bolivia.

<sup>18</sup> The Economic Freedom Index constructed by Gwartney, Lawson and Block (1996) has 17 components. These authors offer three versions of the index, each based on a different aggregation scheme. One gives equal weight to all 17, while the other two use survey responses of two different types -from "experts on economic freedom" and "experts on particular countries" to rank these 17 components over time.

<sup>19</sup> Another method used to construct composite indexes is the Borda ranking technique. See Thomas and Wang (1996) for a recent example of indexes of "distortions" and "interventions", constructed using the Borda technique.

<sup>20</sup> One use of the principal components method is to identify a small number of "latent variables" in such a way as to retain as much information (variance) as possible from the original or underlying variables. For this purpose, it estimates linear combinations of these original variables, all orthogonal to each other (components), with the property that the components are "uncovered" in decreasing order according to the amount of the total variance in the original variables that they capture (Greene (1990), pp. 271-273).

<sup>21</sup> An advantage of these data is that they are non-proprietary and available from the Inter-University Consortium for Political and Social Research (ICPSR).

TABLE 1

## Variables underlying the CIID (codes)

Competitiveness of manner of generation of the executive authorities	0 = power transfers not regulated 1 = hereditary succession, designation or a combination of both 2 = one executive is chosen by hereditary succession and the other by competitive elections 3 = selection is the result of a competitive election between two or more major parties or candidates
Openness of executive generation	0 = power transfers not regulated 1 = hereditary succession (closed) 2 = hereditary succession plus executive or court selection of an effective chief minister 3 = selection of an effective chief minister through elections 4 = open recruitment process
Constraints on Chief Executive	1 = unlimited authority 2 = (intermediate category) 3 = slight to moderate limits on executive authority 4 = (intermediate category) 5 = substantial limitations 6 = (intermediate category) 7 = parity or subordination of the executive
Competitiveness of participation	1 = competition suppressed 2 = restricted/transitional participation 3 = factional competition 4 = transitional competition 5 = competitive
Regulation of participation	1 = unregulated participation 2 = factional or transitional 3 = factional/restricted 4 = restricted 5 = regulated participation
Legislative effectiveness	0 = no legislature exists 1 = ineffective 2 = partially ineffective 3 = effective and independent of the executive
Legislative selection	0 = no legislature exists 1 = non-elective 2 = elective
Scope of government actions	1 = totalitarian 2 = (intermediate category) 3 = segmental plus 4 = (intermediate category) 5 = segmental 6 = (intermediate category) 7 = segmental minus 8 = (intermediate category) 9 = minimal.

Source: Gurr (1990).

(i.e., the first component). This yields a "set of loadings" for each individual country, used to generate a time series of values of CIID for the period 1960 to 1986,<sup>22</sup> from which decade averages are derived.

Since the CIID is also based on subjective indicators constructed by Gurr from different, country-specific secondary studies, the values of the index are

more comparable across time than across countries. Not surprisingly, there is substantial variation in the index across countries at any particular time period. Yet there is also a surprising amount of variation over time: substantial increases between the 1960s and early 1980s in Brazil, Colombia, Dominican Republic and Paraguay, substantial declines in Chile, Costa Rica, Jamaica, Mexico, Nicaragua and Uruguay, and substantial fluctuations in Bolivia, Ecuador, Guatemala, Honduras, Peru and El Salvador.

<sup>22</sup> On average, the first of the principal components captures 70% of the variance.

## IV

### The impact of institutions on economic growth

In order to answer the question "Do institutions matter?", in this section we add our index of institutional development (CID) to an otherwise standard Solow growth model, and then use that model to explain variations in growth rates across 19 Latin American countries in the last three decades. The use of the Solow model is motivated primarily by the fact that it contains a shift parameter that "reflects not just technology, but resource endowments, climate, *institutions* and so on" (Mankiw, Romer and Weil, 1992, pp. 410-411, italics added), thereby making explicit the link between institutions and economic growth. Additional advantages of the Solow model in this context are: i) the comparisons it affords with the many other studies which use this framework, ii) its ability to test some other important hypotheses such as (a) that income per capita should be positively related to savings and negatively related to population growth rates, and (b) that countries converge to their steady-state levels of income per capita, and iii) that it works especially well (with convergence properties fulfilled) in samples of relatively homogeneous countries like those of Latin America.<sup>23</sup>

The central piece in this model is, of course, a production function with positive and diminishing marginal products and constant returns to scale. It relates output ( $Y$ ) to a pair of essential inputs, capital and labor ( $K$  and  $L$ ), and to the shift parameter ( $A$ ) representing either technology or institutions. If the function is of Cobb-Douglas form, output in period  $t$  is:

$$(1) \quad Y_t = K_t^\alpha (AL_t)^{1-\alpha} \quad 0 < \alpha < 1$$

<sup>23</sup> Several authors have found the Solow framework, at least in modified form, to be superior to the endogenous growth models. For example, Cardoso and Fishlow (1992) find an augmented version of the Solow model incorporating the external sector to be superior. Even among those who embrace the endogenous growth framework, there is open recognition that its "silence with respect to the underlying model" is an important shortcoming (De Gregorio, 1992, p. 69). Levine and Renelt (1992) provide evidence that the econometric results from endogenous growth studies tend not to be robust. Finally, it should be noted that we do not know of other studies on the role of institutions and economic growth that attempt to establish this relationship from a standard theoretical framework.

It is assumed that the technological or institutional progress is labour-augmenting and that the rates of growth of population ( $n$ ), technological or institutional progress ( $g$ ) and depreciation ( $\delta$ ) are constant and exogenous for any period.<sup>24</sup> If  $k$  is the capital-labour ratio and  $y$  is income per worker, the assumptions about the growth of population and technology imply that, in the steady state (i.e., when the various quantities grow at constant rates),  $k_t$  would converge (for small values of  $n$ ,  $g$  and  $\delta$ ) to a value  $k^*$  given by:

$$(2) \quad k^* = \left[ \frac{s}{n+g+\delta} \right]^{1/(1-\alpha)}$$

Substituting (2) into the production function and taking logs, the steady-state income per worker becomes:

$$(3) \quad \ln \left[ \frac{Y_t}{L_t} \right] = \ln A_0 + gt + \frac{\alpha}{1-\alpha} \ln(s) - \frac{\alpha}{1-\alpha} \ln(n+g+\delta)$$

This yields the well-known hypotheses of the Solow model: the higher the rate of saving, the richer the country; and the higher the rates of population growth, labour-augmented technological change and depreciation, the poorer the country.

The model not only predicts that income per capita in each different country will converge to its steady-state value, but also yields estimates of the speed at which this convergence occurs. Let  $y^*$  be the steady-state level of income per worker from (3), and  $y_t$  be the actual value at time  $t$ . In the neighbourhood of the steady state, an approximation of the speed of convergence  $\beta$  is given by:

$$(4) \quad \frac{d \ln(y_t)}{dt} = \beta [\ln(y_{t-1}^*) - \ln(y_{t-1})]$$

where  $\beta = -(n+g+\delta)(1-\alpha)$ .

<sup>24</sup> See also Dixit (1976), Artus (1993), and Barro and Sala-i-Martin (1995).

It should be noted that the speed of convergence depends on the determinants of the steady state as well as on the level of income per worker at the beginning of the period.<sup>25</sup>

There are good reasons to expect that this model would perform better when tested for samples that are relatively homogeneous (in the steady-state sense). For example, Mankiw, Romer and Weil (1992) obtain quite different parameter estimates for countries of the Organization for Economic Cooperation and Development (OECD) than for non-oil exporting LDCs. They found evidence of "unconditional convergence" among the OECD countries,<sup>26</sup> but little or no such evidence for their larger—and much less homogeneous—samples. Since our sample is limited to Latin American countries, this framework would seem quite appropriate for beginning our investigation of the impact of institutional development.

Our first step is to assess the specification given in Mankiw, Romer and Weil (1992). They assume that  $g$  and  $\delta$  are constant across countries (because the technology frontier is universal and data on country-specific depreciation rates are not available) and take the values 2% and 3%, respectively.<sup>27</sup> They also assume that the effects of population growth ( $n$ ) and savings ( $s$ ) are independent of country-specific factors (captured by the stochastic term), thereby justifying ordinary least squares estimation. The Mankiw, Romer and Weil specification therefore requires that a coefficient for initial incomes [from (4)], a constant, and a stochastic term should all be added to equation (3) above. This specification also assumes that the production function is the same across countries and over time. Table 2 shows the results for

TABLE 2

**Latin America (19 countries):  
Tests for conditional convergence<sup>a</sup>**  
(Dependent variable: log difference of GDP per working age person, 1960-1985)

Constant	2.409 (2.266)	2.259 (1.980)
Ln (YGO)	-0.455 (-3.965)	-0.438 (-3.553)
Ln (I/GDP)	0.492 (3.216)	0.5333 (2.942)
Ln (n+g+ $\delta$ )	0.054 (0.725)	0.051 (0.667)
Ln (SCHOOL)		-0.014 (-0.460)
Adjusted R <sup>2</sup>	0.55	0.53
Observations	19	19

Source: Data taken from Mankiw, Romer and Weil, 1992.

<sup>a</sup>  $t$ -statistics are in parentheses. YGO is GDP per working-age person in 1960.

Investment (I/GDP) and population growth ( $n$ ) are averages for 1960-1985.

( $g+\delta$ ) is assumed to be 5%. SCHOOL is the average percentage of the relevant working-age population enrolled in secondary school in 1960-1985.

the specification, obtained with the use of their data for Latin America.<sup>28</sup>

In general, this specification fits the data quite well. The adjusted R<sup>2</sup> is only slightly smaller than the one obtained by Mankiw, Romer and Weil (1992) for their sub-sample of 22 OECD countries (0.65). This seems to support our claim that Latin America may be more homogeneous (in terms of determinants of the steady state) than the world as a whole or even Asia or Africa alone. In other important respects, however, the results are mixed.<sup>29</sup> On the one hand,

<sup>25</sup> The concept of conditional convergence does not imply any tendency for the dispersion (or variance) of per capita incomes to decrease (the latter is often referred to as  $\sigma$  convergence) (Barro and Sala-i-Martin, 1995, pp. 383-387).

<sup>26</sup> The importance of homogeneous samples can be appreciated from the fact that Barro and Sala-i-Martin (1995) present similar findings (unconditional convergence) for the states of the U.S.A., regions within Europe, and prefectures in Japan.

<sup>27</sup> This is obviously a very strong assumption, as correctly pointed out by Srinivasan (1994, p. 271). Yet, since this is not directly relevant to our present purposes, and for convenience, the same assumption is made here. Helliwell discusses studies that use different values of  $g$ , thus giving international transfers of knowledge a key role to play in the convergence process (Srinivasan, 1994, p. 237). See also Goldman, Kato and Mui (1991).

<sup>28</sup> The sample is the same set of 19 countries referred to in table 2. It should be noted that for none of these Latin American countries was the quality of the data used as low as the "D" rating of the Penn World Tables, Mark 5.6 (which is reserved for data based on extremely scarce primary sources and considered to be of inferior quality).

<sup>29</sup> The small sample size may also adversely affect these results. Nevertheless, problems are common in growth studies which include human capital, as is well documented by Benhabib and Spiegel (1994) and Pritchett (1996).

the convergence and the investment coefficients both have the expected signs and are significant. On the other, the coefficients for human capital and growth of population have the "wrong" signs, although neither is significantly different from zero.<sup>30</sup>

To help overcome these shortcomings in the application of the model to Latin America we have made the following modifications: i) the inclusion of a time-dimension by separating the cross-sections by decades (1960s, 1970s and 1980s); ii) the use of a better proxy for human capital,<sup>31</sup> and iii) the introduction of our comparative index of institutional development (CIID).

A central issue in the use of panel data is how to deal with heterogeneity of the data and, consequently, with the choice of estimation procedure. In our case, heterogeneity is treated in part by the introduction of decade dummy variables, implying the use of the fixed effects method (Hsiao, 1986). In the present context, use of this method implies that, although the underlying production function is the same for each country, it may differ over time.<sup>32</sup> As noted above, we believe the experience of the countries in the region to be relatively homogeneous, although their performance during the 1980s ("the lost decade") was in stark contrast to that of previous decades.<sup>33</sup> Two other reasons for the choice of the fixed effects method are that it permits comparison with previous studies and that it facilitates the use of a simultaneous equations approach.

Our next step is to assess the way in which the Mankiw, Romer and Weil (1992) specification from table 2 would behave with the above modifications in

the human capital measure, the inclusion of dummy variables for the 1970s and 1980s (to reflect changes in the production function over time), and subsequently the inclusion of the CIID. The data sources and descriptive statistics are presented in table 3 and the results in table 4.

The specifications in the first three columns of table 4 test for unconditional convergence (column 1), and for conditional convergence in the basic version of the Solow model (column 2) and in the human capital-augmented version (column 3).

It should be noted that the coefficients for convergence (initial income,  $\ln Y_0$ ), the dummy variable for the 1980s in all three columns, and the share of investment as a proportion of GDP ( $\ln I/GDP$ ) in columns (2) and (3) are significant and of the expected sign. These results are quite robust since they obtain regardless of subsequent changes in specification.

With respect to the coefficients on population ( $\ln n+g+\delta$ ) and growth of human capital ( $HKGROWTH$ ), our results only marginally improve upon the ones in table 2 (i.e., those obtained with the data and specification of Mankiw, Romer and Weil, 1992). Although the coefficients on population and human capital are not significant, at least they have the expected signs (and for human capital this holds irrespective of the specification).

Beginning with column (4), the results reflect the inclusion of our index of institutional development ( $\ln CIID$ ). Its inclusion raises the value of the adjusted  $R^2$ , and its coefficient is positive and significant. Even when investment is excluded from the model, as shown in column (5), the coefficient of CIID remains positive and significant. More importantly, it should be noted that in column (6), when we

<sup>30</sup> These last two results (on human capital and population) are very important because they could constitute a case against the use of the Solow model for this particular region. This would not be so, however, if in fact education has been characterized by over-investment in higher education and/or inefficient allocation of resources. These possibilities suggest the need for better measures of educational investment in the labour force than gross enrollment rates. In addition to the usual shortcomings, gross enrollment data are particularly problematic for Latin America. Morley shows that, between 1986 and 1989, Brazil failed to graduate 78% of those who entered primary school, Guatemala 64%, Honduras 57%, and Bolivia 50% (Morley, 1995, p. 60 et. seq.).

<sup>31</sup> We chose to use the Barro and Lee (1993) data and to define human capital as the average years of schooling of the population over 25 years of age. The other comparable option would be the Nehru et al. data set, but two of the countries in our sample (Guatemala and Dominican Republic) are not covered by it.

<sup>32</sup> To evaluate this assumption that the production function is the same across countries, but differs over time, we reestimated all the specifications below using a random-effects estimator, the Fuller-Battese error components model. The results (available from the authors on request) are very similar to the ones presented below (using a fixed effects estimator) and, therefore, the assumption seems to be a reasonable one to maintain.

<sup>33</sup> See Fishlow (1991), Cardoso and Fishlow (1992), and Edwards (1995).

TABLE 3

## Descriptive statistics and data sources

	Mean	Std Dev	Minimum	Maximum	Source
Growth rate of real per capita GDP <sup>a</sup>	1.28	2.34	-3.48	6.85	Summers and Heston, 1994
Growth rate of population <sup>a</sup>	2.42	0.7418	0.3209	3.75	Summers and Heston, 1994
Average rate of investment	16.0721	4.8688	7.18	28.47	Summers and Heston, 1994
Log of real per capita GDP at start of decade	7.8253	0.5072	6.9412	8.9539	Summers and Heston, 1994
Population at start of decade	14,102	23,716	1,145	121,286	Summers and Heston, 1994
Comparative index of institutional development	1.6115	0.7347	0.0263	2.8822	Own calculations
Growth rate of stock of human capital	1.8592	1.2538	0.1152	5.3756	Barro and Lee (1993)
Human capital at start of decade	3.5758	1.2806	1.1550	6.6300	Barro and Lee (1993)
Ratio of public expenditure on tertiary education to primary plus secondary	0.3222	0.2069	0.0303	1.4000	UNESCO, <i>Statistical Yearbook</i> , various issues
Gini coefficient for land holdings	0.8503	0.0603	0.6940	0.9400	Persson and Tabellini (1992) Adelman and Fuwa (1994)
Black market exchange premium	0.3121	0.4965	-	2.9550	Barro and Lee (1993)
Civil liberties	3.0818	1.7301	0.5000	6.0000	Barro and Lee (1993)
Revolutions	0.2175	0.3191	-	1.3	Barro and Lee (1993)
Coups d'Etat	0.0713	0.1143	-	0.4000	Barro and Lee (1993)
Coefficient of variation of growth of real per capita GDP	1.0881	0.4877	0.3294	2.7063	Summers y Heston, 1994
Rate of change of labour force in agriculture	-1.545	1.066	-4.700	0.624	FAO, <i>Production Yearbook</i> , various issues

<sup>a</sup> By the ordinary least squares method.

TABLE 4

**OLS (ordinary least squares) results,<sup>a</sup> based on Solow and Mankiw, Romer and Weil**  
(Dependent variable is OLS growth of real per capita GDP; number of observations is 57 = 3 x 19)

	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.408 <sup>b</sup> (2.866)	0.208784 (0.966)	0.181036 (0.811)	0.33565 (1.629)	0.41494 <sup>d</sup> (1.904)	0.290241 (1.449)
ln (Y0)	-0.0497 <sup>c</sup> (-2.574)	-0.0489 <sup>c</sup> (-2.613)	-0.0466 <sup>c</sup> (-2.416)	-0.064 <sup>b</sup> (-3.497)	-0.0621 <sup>b</sup> (-3.172)	-0.0614 <sup>b</sup> (-3.474)
ln (I/GDP)		0.02445 <sup>c</sup> (2.101)	0.0237 <sup>c</sup> (2.008)	0.0262 <sup>c</sup> (2.423)		0.024477 <sup>c</sup> (2.343)
ln (n+g+δ)		-0.047432 (-0.823)	-0.051800 (-0.883)	-0.03696 (-0.691)	-0.031783 (-0.555)	-0.04685 (-0.903)
HKGROWTH			0.001249 (0.595)			0.003686 <sup>d</sup> (1.836)
ln (CIID)				0.0077 <sup>c</sup> (2.564)	0.00732 <sup>c</sup> (2.260)	0.0099 <sup>b</sup> (3.159)
Adjusted R <sup>2</sup>	0.5152	0.5528	0.5439	0.6174	0.5609	0.6438

<sup>a</sup> Numbers in parentheses are *t*-statistics. (Y0) is per capita GDP at the beginning of the decade. Population growth (*n*) is the OLS growth rate, per decade. I/GDP is average investment rate per decade. Following Mankiw, Romer and Weil (1992), (*g*+*δ*) is assumed to be 5%. HKGROWTH is the rate of change in average years of schooling of the population over 25 years of age (from Barro and Lee, 1993). CIID is the authors' index of institutional development.

<sup>b</sup> Significant at the 1% level.

<sup>c</sup> Significant at the 5% level.

<sup>d</sup> Significant at the 10% level.

include our human capital variable (*HKGROWTH*), the coefficients of both institutions and human capital are now positive and significant, whereas, before, the effect of human capital alone was not significant.<sup>34</sup> One possible explanation lies in the possibility that, if left unchecked by appropriate institutions, those with more human capital may be motivated to take advantage of rent-seeking opportunities, thus implying that human capital accumulation may be counterproductive to economic growth. On the other hand, with appropriate institutions, the incentives for rent-seeking activities may be reduced and those for productive activities increased, thereby raising the attainable rate of economic growth (Murphy, Schleifer and Vishny, 1991).<sup>35</sup>

We believe this to be our most meaningful finding, namely, that only after the CIID is included does the effect of human capital become positive and significant.<sup>36</sup> In contrast with existing studies which emphasize a nexus between institutional development and per capita income growth operating through physical capital accumulation, these results suggest that a similar nexus operating through human capital formation may be stronger.

Given that the CIID is itself a very specific aggregation of the eight individual indicators (shown in table 1), a question which arises naturally in such a situation is whether the aggregate CIID performs better, worse or the same as its individual components.

Notably, however, the aggregate index has a level of significance exceeding that of any individual component alone.<sup>37</sup>

Judging by the values of the adjusted coefficient of determination and the robustness of the results, the preferred specification is that in column (6). Note that the value of adjusted  $R^2$  is 0.61, which is quite comparable to that obtained by Mankiw, Romer and Weil (1992) for their OECD sample (with a reported adjusted  $R^2$  of 0.65) and considerably higher than the values they obtained for their LDC samples (adjusted  $R^2$  of 0.46).<sup>38</sup>

The coefficients of initial income (convergence), investment, and the dummy variables for the 1980s have the expected signs and remain highly significant across the different specifications. Indeed, their significance is raised slightly by the inclusion of the CIID and the accumulation of human capital. Our results with respect to the CIID strongly suggest that institutional development should be considered among the variables which have to be controlled in explaining the continent's postwar growth experience. Institutions do matter for economic growth and when both the CIID and human capital appear in the same equation, the explanatory power and significance of each is increased. This suggests the existence of an important and hitherto neglected nexus between institutions and growth as measured through human capital.

<sup>34</sup> In order to further explore the relationship between human capital and institutional development, various interaction terms and non-linearities were introduced, taking us farther from the Cobb-Douglas form and closer to the translog form (Lau, 1996). Yet, as discussed in an earlier version of the paper, the introduction of quadratic terms for CIID and *HKGROWTH* and a CIID-*HKGROWTH* interaction term failed to increase the explanatory power or to alter the other results significantly. For this reason, such results are not presented here (they are available from the authors on request).

<sup>35</sup> Another interesting possibility is provided by Azariadis and Drazen (1990) who formalize the Bowman-Anderson-Easterlin argument that there are threshold externalities associated with the accumulation of human capital: that is to say, that economic growth should be correlated with human investment relative to per capita income, with high rates of growth being associated with the prior attainment of especially high levels of human investment relative to per capita income (Azariadis and Drazen, 1990, p. 519). See Behrman (1993) for the relevance of these considerations in the Latin American context. It should be noted that the recent empirical literature incorporates this possibility, albeit indirectly, by preferring to use secondary education enrollment data as a proxy for human capital.

<sup>36</sup> While the accumulation of human capital is also a central concern of some contributors to the endogenous growth literature (Barro and Sala-i-Martin, 1995; IDB, 1993, and Behrman, 1995), the reasons and mechanisms they put forward are very different from those given here.

<sup>37</sup> In a previous version of this paper, we presented results of a comparison between our aggregate index (CIID) and its individual components (listed in table 1). Instead of the CIID, we included all its individual components in the specification in column (6) of table 5. We observed that none of these coefficients was "more significant" than the coefficient of the CIID itself. Also, using the components instead of the CIID generates a lower adjusted  $R^2$ . These results are available from the authors upon request.

<sup>38</sup> Notice, however, that our results differ from those of Mankiw, Romer and Weil (1992) in that theirs are from a cross-section of countries.

# V

## What explains institutional development?

Having established that institutions do indeed matter (with respect to economic growth), it becomes important to further examine both how this role is played and the direction of causality. These are the objectives of the present section.

In order to identify the factors that account for differences in institutional development, we face two challenges: the lack of a rigorous theoretical model, and the corresponding paucity of relevant empirical exercises. While, as indicated above, there is a substantial literature on the impact of institutional variables on economic growth,<sup>39</sup> there is much less on the impacts of economic growth on institutional development. Three fine exceptions<sup>40</sup> to this assertion are a) an article by Bilson (1982) explaining variations in the Gastil index of civil liberties across 55 countries in 1979, b) a paper by Helliwell (1994) evaluating the two-way linkages between democracy and growth for a panel of 125 countries for the years 1960-1985, and c) a paper by Porter and Scully (1995) explaining two-way feedbacks between economic growth and constitutional changes.

Although the Bilson study on civil liberties used seven important explanatory variables,<sup>41</sup> only two (namely, per capita real income and the ratio of wages and salary payments to GNP), turned out to

have effects significantly different from zero. Both had the "wrong" signs, however.

Helliwell (1994), on the other hand, combined Gastil's civil liberties and political rights indexes into a measure of democracy, and pooled data on 125 countries for the period 1960-1985 to evaluate the two-way linkages between democracy and growth. His main findings were that the level of income per capita and secondary school enrollment both have positive and significant effects on the level of democracy, and that the degree of democracy is significantly higher in the OECD countries, significantly lower in six oil-dependent countries of the Middle-East, slightly lower in Africa and slightly higher in Latin America than in the remaining countries of Eastern Europe and Asia (Helliwell, 1994, p. 228). He also finds that the direct effect of democracy on growth is negative, but that its indirect effect (through education and investment) is positive and somewhat stronger.

Porter and Scully (1995) explain how the needs to offset the diminishing returns to factor accumulation in the neoclassical growth model give rise to attempts in the political market to change the "rule space". Although these authors stop short of a full-fledged attempt to apply such a model empirically, they illustrate its application by the need to make national markets more efficient in the nineteenth-century United States. This need was realized through the federalization, and hence harmonization, of many state and local rules and regulations and was reflected in the acceleration of new legislation. Under certain conditions (including the efficiency of the political allocation of rights: an idea very close to the spirit of the CIID in this paper), the allocation of rights and obligations through such rule changes can be of lower cost than that effected through private contracts and transactions.

In this light, our approach to the identification of the determinants of institutional development starts by devising three classes of variables, namely, initial conditions; structural variables; and the following other direct determinants of the CIID: Gastil's index of civil liberties (*CIVLIB*), the interaction between the

<sup>39</sup> The best examples are Scully (1988), Knack and Keefer (1995), and Mauro (1995).

<sup>40</sup> We selectively emphasize the contributions which had the greatest impact in the economics literature. It should be clear, however, that there are a number of political science studies that should also be considered. In this vein, see Burkhart and Lewis-Beck (1994) and the references therein.

<sup>41</sup> These were (1) the level of real income per capita (expected to have a positive sign), (2) the size of the country proxied by its population, (3) the ratio of exports to GNP (positive effect), (4) the ratio of central government expenditure to GNP, (5) the ratio of agricultural income to GNP (both (4) and (5) having effects of ambiguous direction), (6) the ratio of wages and salary payments to GNP (expected to have a positive effect because a "high labour/income ratio is typically associated with a skilled and literate work force and with a relatively even distribution of income" (Bilson, 1982, p. 105), and (7) the growth rate of per capita GNP over the period 1970 to 1976 (expected to have a negative effect due to the fact that, according to Olson, "rapid economic growth is a disruptive and destabilizing force that leads to political instability" (quoted in Bilson, 1982, p. 106).



average number of revolutions and coups d'état per decade (*REVCOU*) and the black market exchange rate premium (*BMP*), the latter being a proxy for overall economic distortions. Our expectation is that the effects on the CIID of the first two variables would be positive and that of *BMP* negative. For initial conditions, we include the beginning-of-decade levels of population (*POP 0*), human capital (*HK 0*) and real per capita GDP (*In Y0*). Our expectation is that the effects on the CIID of the first variable would be negative and the latter two positive. Finally, as structural variables, we include the percentage of the labour force working in agriculture (*PCTCGAG*), the Gini coefficient for land ownership (*GiniLand*), the ratio of public expenditures on tertiary education to public expenditures on primary and secondary education (*INEQT PS*),<sup>42</sup> and dummy variables for the 1970s and 1980s (*DUM70* and *DUM80*, respectively). We expect the direction of the effects on the CIID to be negative in the first three cases and ambiguous in the latter two. Interaction terms between some of these structural variables were also introduced.

Although the results presented in table 5 are exploratory and should therefore be interpreted carefully, they are not without interest. Column (1) of table 6 gives our initial results for the CIID, based on the first four variables mentioned above plus the dummy variables for the 1970s and 1980s. Although all coefficients have the expected signs, only one of them (*BMP*) turns out to be statistically significant. The level of overall economic distortions seems to be a powerful hindrance to the establishment of a sound institutional framework.

As shown in column (2), introducing the initial condition variables does not improve the results. It is noteworthy that the effect of *BMP* is still negative and significant, and that the level of human capital turns out to be positively related to the level of institutional development. The three remaining structural variables are introduced in the specification shown in column (3). It should be noted that, while all have

their expected negative signs, none is significant.<sup>43</sup> It may also be noted that all previous results, including the significantly negative effect of *BMP* on institutional development, are essentially unaffected by the introduction of these terms.<sup>44</sup>

Given the aforementioned relevance of income inequality in general and rent-seeking in particular to our CIID measure, the lack of significance of some of our inequality-related structural variables (*INEQT -PS*) is somewhat disconcerting. Yet, since the effects of these variables need not be independent of each other, in the specification given in column (4) we include an interaction term between them. Note that the sign of the interaction term turns out to be positive (suggesting a reinforcing effect), but more importantly, that the introduction of this term raises the absolute value of the negative coefficients as well as the significance of the two separate types of inequality. Finally, note that the inclusion of this interaction term also raises the significance levels of *BMP*.

The above results allow us to identify some factors contributing to the observed intertemporal and intercountry variations in our index of institutional development. We see that policy distortions and inequalities are the main determinants of that index. It is somewhat surprising to note that the initial conditions play quite an insignificant role. The estimates shown in column (5) are deemed best and serve as the basis for endogenizing the CIID. Yet, the possibility of simultaneous equation bias (to the extent that the CIID is really endogenous in the growth equation) raises issues concerning the direction of causality.

Table 6 presents the results of our efforts to remove this possible source of bias and to see how much difference doing so makes: we recalculated the production function, using the predicted values of the CIID given by the previous analysis.

Column (1) of table 6 shows the results for the per capita income growth rate obtained by the two-stage least squares method, substituting the predicted value of CIID (from column 2) for its actual value in

<sup>42</sup> It is quite well documented for Latin America that the distribution of human capital is one of the major causes of the persistently high income inequality (Behrman, 1993; Londoño, 1995; Morley, 1995; Berry, 1996). Further, data availability across countries and over time was a crucial factor in the choice of using the determinants instead of using the income distribution data directly. For instance, these data are not available for Bolivia for all three decades covered by this study (Deininger and Squire, 1996).

<sup>43</sup> The results are not changed if we include each determinant one at a time or if, instead of the interaction terms, we use revolutions and coups separately.

<sup>44</sup> We also experimented with other structural variables, but the results were similarly unsatisfactory. These variables included urbanization, the size of the middle class (third quintile in the income distribution), levels instead of rate of change of the labour force in agriculture, and the ratio of public expenditure on tertiary education to that on primary education (instead of primary and secondary).

TABLE 5

**OLS (ordinary least squares) estimation  
results for the CIID equation <sup>a</sup>**

(Dependent variable is log of CIID;  
number of observations is 57 = 3 x 19)

	(1)	(2)	(3)	(4)	(5)
Constant	0.508802 (0.943)	-10.997943 (-1.520)	-7.130958 (-0.992)	0.253676 (0.033)	2.06081 (0.267)
BMP	-0.8207 <sup>b</sup> (-3.118)	-0.715945 <sup>c</sup> (-2.674)	-0.767 <sup>b</sup> (-2.982)	-0.80655 <sup>b</sup> (-3.306)	-0.78124 (-3.154)
CIVLIB	0.175158 (1.407)	0.038966 (0.273)	0.001829 (0.013)	0.048117 (0.364)	0.124254 (0.979)
REVCOU	-2.349367 (-1.331)	-2.760597 (-1.567)	-2.795151 (-1.673)	-2.67501 (-1.693)	
ln (YO)		1.362371 (1.401)	1.68551 <sup>d</sup> (1.769)	1.585619 <sup>d</sup> (1.758)	1.399613 (1.537)
POP 0		-0.0000038 (-1.174)	0.0000079 (0.369)	-0.000011 (-0.491)	-0.000016 (-0.460)
HK 0		0.557943 (1.414)	0.67181 <sup>d</sup> (1.721)	0.295608 (0.717)	0.214968 (0.527)
INEQT_PS			0.091166 (0.124)	-27.99896 <sup>d</sup> (-2.044)	-29.426 <sup>c</sup> (-2.123)
GiniLand			-0.0821 <sup>c</sup> (-2.429)	-0.14271 <sup>b</sup> (-3.280)	-0.147 <sup>b</sup> (-3.350)
PCTCHGAG			-0.896798 (-0.696)	-0.63082 (-0.515)	
INEQT_PS x GiniLand				0.318286 <sup>d</sup> (2.053)	0.3339 <sup>c</sup> (2.129)
Adjusted R <sup>2</sup>	0.0638	0.0841	0.1836	0.2704	0.2443

<sup>a</sup> Numbers in parentheses are t-statistics. CIID is the authors' index of institutional development.

BMP is the black market exchange rate premium. CIVLIB is Gastil's index of civil liberties.

REVCOU is the average number of revolutions times the average number of coups d'Etat, per decade.

(YO) is the real per capita GDP at the beginning of the decade.

HK 0 is the average number of years of schooling of the population over 25 years of age, at start of decade. POP 0 is the population at start of decade. GiniLand is the Gini coefficient for land ownership.

INEQT\_PS is the ratio of public expenditure on tertiary education to public expenditure on primary and secondary education.

PCTCHGAG is the rate of change of the percentage of the labour force working in agriculture.

<sup>b</sup> Significant at the 1% level.

<sup>c</sup> Significant at the 5% level.

<sup>d</sup> Significant at the 10% level.

the growth equation. It should be noted that when this is done, all the previous results remain valid. In addition, the significance of both institutional development and the accumulation of human capital are increased.

Given the possibility that these results obtain because the initial level of human capital is among the

first-stage determinants of the CIID, in column (3) of table 6 we show the two-stage least squares estimates of the parameters of the growth equation obtained after excluding the initial conditions variables from the CIID equation. The results for this streamlined CIID equation are given in column (4). As can be seen, this change does not alter the results obtained earlier.

TABLE 6

**2SLS (two-stage least squares) estimation results<sup>a</sup>**  
*(Number of observations is 57 = 3 x 19)*

	Per capita GDP growth (1)	CIID (2)	Per capita GDP growth (3)	CIID (4)
Constant	0.231133 (1.132)	12.954153 <sup>b</sup> (3.564)	0.305327 (1.478)	2.060810 (0.267)
ln (Y0)	-0.055116 <sup>b</sup> (-3.089)		-0.068274 <sup>b</sup> (-3.578)	1.399613 (1.537)
ln(I/GDP)	0.020837 <sup>c</sup> (1.927)		0.021503 <sup>d</sup> (2.008)	
ln (n+g+δ)	-0.054306 (-1.016)		-0.062904 (-1.183)	
HKGROWTH	0.004590 <sup>c</sup> (2.026)		0.004536 <sup>d</sup> (2.033)	
ln (CIID)	0.013326 <sup>c</sup> (2.738)		0.013377 <sup>b</sup> (2.792)	
BMP		-0.841141 <sup>b</sup> (-3.509)		-0.781242 <sup>b</sup> (-3.154)
CIVLIB		0.199194 <sup>d</sup> (1.850)		0.124254 (0.979)
INEQT_PS		-32.253824 <sup>c</sup> (-2.714)		-29.424568 <sup>c</sup> (-2.123)
GiniLand		-0.147159 <sup>b</sup> (-3.504)		-0.147273 <sup>b</sup> (-3.350)
INEQT_PS x GiniLand		0.364231 <sup>c</sup> (2.717)		0.333876 <sup>c</sup> (2.129)
HK 0				0.214968 (0.527)
POP 0				-0.000010488 (-0.460)
Adjusted R <sup>2</sup>	0.6216	0.2519	0.6266	0.2443

<sup>a</sup> Numbers in parentheses are *t*-statistics. The CIID equation in column (3) does not contain initial conditions variables (i.e., *ln Y0*, *HK 0*, and *POP 0*).

<sup>b</sup> Significant at the 1% level.

<sup>c</sup> Significant at the 5% level.

<sup>d</sup> Significant at the 10% level.

## VI

### Conclusions and suggestions for further research

We believe that we have been able to advance understanding of the determinants of per capita growth by bringing institutional development explicitly into an otherwise standard growth model. In particular, when institutional development is defined (as in our CIID) in such a way as to give the “input side” of institu-

tional development the same attention as the “output side”, this turns out to have a robust, positive and significant effect on the rate of per capita income growth across countries and over time. We believe that this index is relevant for economic growth because of the greater “stake in the system” that indi-

viduals would be likely to feel in countries and time periods characterized by high levels of CIID. With such high values of the CIID, the opportunities for rent-seeking would seem to be reduced, thereby raising the incentive for the efficiency-enhancing exercise of "making one's voice heard" and causing greater energies to be devoted to productive economic activities.

Moreover, the fact that the CIID index displays considerable variation not only across countries but also over time suggests that the relevant institutions for economic growth are not as fixed as they are generally perceived to be. This calls attention to the possibility that institutions (as opposed to policies) could deliberately be changed in ways that would raise the overall rate of economic growth. Moreover, since an important reason for the positive influence of the CIID on economic growth is due to the reduction in opportunities for rent-seeking caused by the fact that more people feel they have a "stake" in the system, the positive influence of institutional development on growth need not occur at the expense of greater income inequality.

Another and perhaps even more important finding concerns the identity of the link between institutional development and economic growth. Both the positive effect of the level of human capital on our institutional development index (CIID) and the fact that both the magnitude and significance of the effect of human capital growth on per capita income growth are raised by the inclusion of the influence of the CIID on growth suggest that human capital could constitute an important link by which institutions affect growth.<sup>45</sup> While this need not refute the relevance of physical capital formation as another link between institutions and development, given the virtually exclusive attention that has been given to the physical

capital link in the existing property rights literature, this is an important finding. At a minimum, greater attention should be given in future research to the triadic relationship between institutions, human capital and real per capita income growth. At a maximum, this would suggest the genuine importance of identifying policies which would increase both human capital and the CIID and thereby raise the attainable rate of economic growth.

Our growth analysis also demonstrates that, when the sample is limited to countries which are relatively homogeneous, considerable support is provided for the findings of unconditional and conditional convergence and the effect of the investment rate on the rate of economic growth. All of the relevant measures for these variables were found to have the expected signs and to be statistically significant, especially when the simultaneous equation bias is eliminated. Hence, in the latter respects the results also confirm the findings of previous studies, suggesting the relevance of physical capital investment and conditional convergence, after controlling for a number of variables that now include institutional development.

Our analysis of institutional development demonstrated that the CIID responds negatively to the overall level of distortions in the economy (represented by BMP), and inequality in educational expenditures or land ownership. These findings seem to support our interpretation of the CIID as a measure of institutional development that reflects "stake in the economic system" and is therefore of direct relevance to the rate of economic growth rather than to political democracy as it might at first sight seem.

Our suggestions for future research are the following:

i) Priority should be given in future research to analysis of the triadic relationship between institutions, human capital and economic growth. This may be particularly important in the context of Latin America, because of substantial evidence that the average level of education is distorted (toward types which yield high private rates of return, due to opportunities for rent-seeking, but low social rates of return).

ii) Given the relatively low value of the adjusted  $R^2$  in the equation for the CIID, a second priority for future research should be given to the introduction of additional variables which would increase the explanatory power of the model without increasing its complexity unnecessarily.

<sup>45</sup> Since the CIID and rent-seeking should be negatively correlated, the finding of a significant negative effect of human capital growth on CIID appears to support Pritchett's conjecture that "the institutional environment in many countries has been sufficiently perverse that accumulated human capital has no effect on, or even has lowered, economic growth even though the returns to schooling have been substantial because schooling has facilitated rent-seeking" (Pritchett, 1996, p. 33). See also the important work of Murphy, Schleifer and Vishny (1991), discussed earlier.

iii) It would be valuable to investigate different lag structures in order to provide additional insights into the direction of causality.

iv) Another important extension of these models would be to improve some of the measures used as explanatory variables. Candidates for improvement would include the human capital measure (for example, by the inclusion of health indicators) and the CIID itself (by including aspects related to the bureaucracy and judiciary).

v) Finally, once the aforementioned extensions and improvements are carried out for Latin America, for which the relevant data for computing the CIID and human capital are more readily available and the homogeneity problems are somewhat less severe than in other regions, it would be highly desirable to extend the analysis to other regions such as Sub-Saharan Africa and Asia.

(Original: English)

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