# *World financial liberalization and its effects on capital flows*

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***Abstract***

*This paper investigates the determining factors in private capital flow, differentiating foreign direct investment (FDI) from other flows and emphasizing the role of financial liberalization and. Two reasons brought about this examination. The first is the substantial increase in private capital flow mainly in the 90s, not only in developed countries but also in developing ones. The second is a greater liberalization process in these economies. This article builds financial liberalization indicators based on political rules. The capital account liberalization is introduced as an explanatory variable in the model that investigates the determinants behind the capital flows. The resulting estimates confirm the econometric results suggested by some of the literature on the subject: the size of the market and the rate of inflation are important variables to explain the private capital flows, just like the infrastructure is relevant when it comes to developing nations. The positive influence of capital account liberalization on capital flows, which comes up in robust estimates, contrasts with the results included in the recent literature on this issue. The new findings are attributable to the differentiation between the types of capital flows, to the use of a proper liberalization indicator and to the econometric method applied.*

***Key-words:*** *Liberalization, Capital flows, FDI, determinants of capital flows*

***JEL Code:*** C82, F21, F32, O16, O24

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# 1 Introduction

Starting in the 80s, and mainly in the 90s, two facts became decisively in international relations: a significant rise in private capital flows and the capital account liberalization. This process began in developed nations and found fertile ground in developing ones. As argued by Edwards (2000), it flourished in the 90s when market-oriented reforms were implemented. At the same time capital flows increased, channeled mainly through foreign direct investment (FDI). According to Froot (1993), worldwide flows of FDI increased almost threefold between 1980 and 1990.

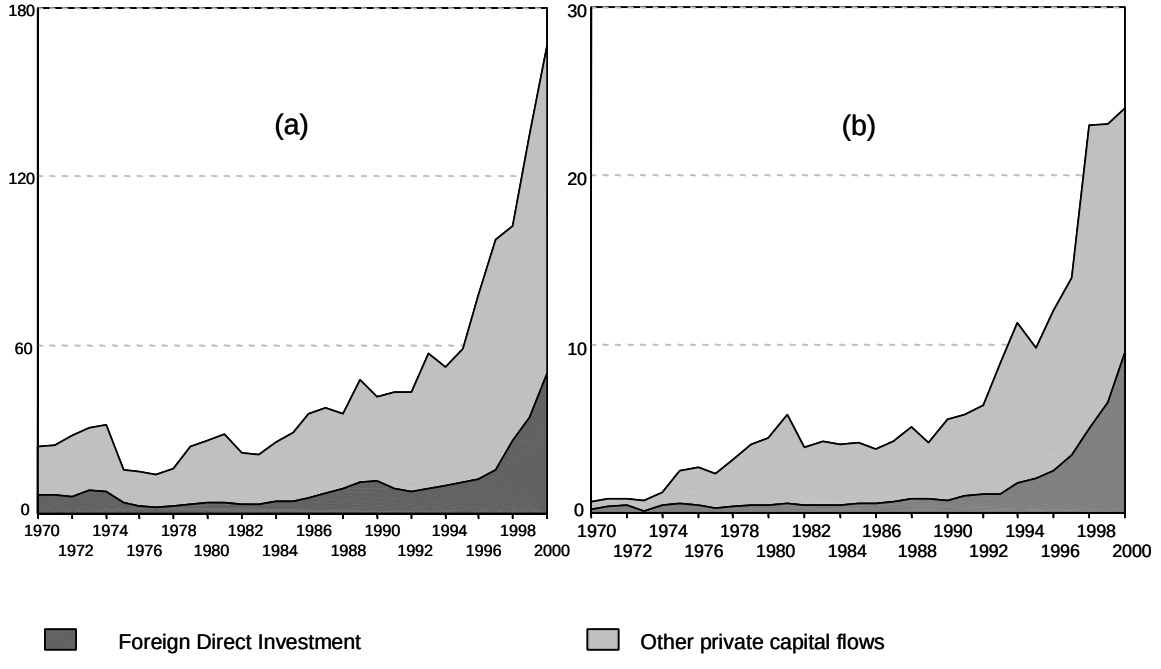
Considering a sample of 19 developed nations, the flows of FDI as a percentage of GDP leaped from 1.2% in 1980 to 3.1% in 1990. This stream was extended into the next decade, when FDI flows reached 9.4% of the GDP of these economies. Other types of private capital also experienced a substantial grow in their flow in the 90s, when the share of private flow in the GDP bounded from 10.6% in 1990 to 32.7% in 2000[2]. Looking at developing nations, it can be seen that flows of "official capital" also changed dramatically in the 90s. In these countries, the total amount of private flows in relation to GDP experienced remarkable expansion, from 6.2% in 1990 to 17.5% in 2000[3]. Data shown in Chart 1(a) illustrate this process. Following a period of instability of the average private capital flow, going from the first oil crisis to the debt crisis at the end of the 80s, the levels of investment were quite similar to those prevailing in the early 70s. This situation contrasts with that seen in the 90s, of period of significant growth. This aggregated flow however does not reflect certain economic events, like the recent financial crises[4].

For this reason, this article took a step further in discriminating the other capital flows from FDI, following the discussion found in the literature regarding the unique nature of these flows, mainly during times of crises. Krugman (2000), for instance, developed a model to investigate the nature of capital flows in pre-crisis situations in developing nations. Among other findings, this author shows that a crisis is usually followed by two types of capital flows. At the same time that short-term capital rapidly flees the country, FDI sees this scenario as an opportunity to

[2] Data concerning the total private capital flow and gross foreign direct investment in relation to the gross domestic product, in 1995 US dollars, were obtained from the *World Development Indicators 2002*, published by the World Bank (2003). The sample was the group of countries listed in Table 1.
[3] Id ibidem.
[4] Asia (1997), Russia (1998), Brazil (1999) and Argentina (2001)

pick up bargains in local companies. Considering a sample of 32 developing countries[5], we see that in fact the flow of FDI behaves differently from that of other private capital flows, as shown in Chart 1(b)[6].

**Chart 1**
Flows of private capital – total sample (a) and developing countries (b)
1970-200, in constant 1995 US$ billions




Source: World Development Indicators 2002

The nature of private capital flows is present in other recent studies that seek to establish how precisely these flows affect economic growth, such as that of Soto (2003). The same concern with capital flows is seen in studies that discuss the problem of financial vulnerability through the analysis of the nature of private capital flow and of the effectiveness of political measures capable of controlling these flows. This line of thinking is espoused by Edwards (2000), Krugman (2000), Stiglitz (2000), Goldstein and Razin (2002), Lehmann (2002), Willett, Keil and Ahn (2002), and Fies (2003).

[5] These countries are identified in Table 1, in the next section.
[6] Even FDI has been displaying different characteristics in the recent period because, as pointed out by the UNCTAD (2000) document, a good share of this flow is not greenfield investment, but rather for mergers and acquisitions.

It must be pointed out that all this literature does not investigate the determining factors behind capital flows. Generally speaking, these articles focus only FDI determinants, at the same time that a limited number of recent studies in this line of work discriminate the total private capital flow and its relation with liberalization. This paper seeks to fill this gap by first analyzing the determinants behind private capital flow and its main components – FDI and portfolio investment. Second it places liberalization as a determinant behind capital flows.

The present approach is unlike most of the literature in that it builds a liberalization indicator based on political rules. This brings another unique element of this study, namely the use of more suitable econometric methods. The construction of this indicator sought to first minimize measuring problems and second create a measure of liberalization that can be developed as one of the determinants of capital flow, and thus allow to separate the influence of the liberalization of capital accounts on capital flows from that exerted by other factors. Many authors even consider that the term "liberalization" is better applied to rising capital flows than to the set of institutional and political changes that, among other factors, encourage the flow of capitals. Examples of these studies are Günçavdi, Bleaney and McKay (1998), Gelos and Werner (2001), Sancak (2002), and Forbes (2003). The findings of this article demonstrate that liberalization of capital mobility is a robust determinant of capital flow, in contrast with inconclusive results brought by recent literature on this issue.

The next section shows the construction of the liberalization indicator for a sample of 51 countries, from 1970 to 2000. The third section brings the empirical model and the data used in the analysis. The fourth section deals with the estimation of capital flow determinants. This is followed by concluding remarks in the last section.

## *2 The capital account liberalization indicator*

Economic liberalization can be understood as the freedom resident agents have in taking decisions in operations with non resident agents. From this perspective, liberalization indices must measure the degree of government neutrality in relation to economic transactions of the country with other countries. In the literature[7] the liberalization process is measured by "result"

[7] A detailed overview of the type of indicators found in many studies is presented by Edison, et alli (2002). More specific considerations are found in Lora (1997), Quinn (1997), Morley, Machado and Pettinato (1999), and Edison and Warnock (2001).

indicators as well as political rules indicators. In the first case, ratios such as the flow of capital as a percentage of the GDP are taken as measures of liberalization. In the second case, indicators are built that seek to gauge the degree of liberalization achieved as the result of governmental policies.

In the case of "result" indicators, although the approach uses the flow of capital in the economy, it is not possible to evaluate its determinants with any degree of precision. If there is, say, a high liquidity in the international market, the rising flow will not reflect necessarily a shift in policy at the country of destination. Even if such changes in policies do occur, it is necessary to check the intention in relation to the result. Considering we are dealing with macroeconomic stabilization policies – tax reforms, for example – their primary purpose is not a rise in capital flow, even this being a consequence. In the case of a lowering of barriers in trade and capital accounts transactions, the chief aim is to encourage financial flows. Consequently, liberalization acts as one of the factors spurring capital flows. Thus the need to differentiate capital flows from policies that can affect them, measured through rule indicators.

### *2.1 Procedures for building the indicator*

The liberalization indicator built in this section allows direct observation of the changes that took place in the policies aiming the lifting of restrictions, mainly in regard to financial flows, whether in the trade account or capital account. The construction followed the methodology suggested by Quinn (1997). The liberalization index suggested by Quinn (1997) aims to investigate how the regulation of a country's foreign accounts affects its economic variables, such as growth, government outlays, business taxes, and income distribution. This approach was preferred over others because it can be applied to a large group of countries, employing criteria that allow a more flexible defining of the degree of freedom, which in turn is closely associated to the relative neutrality of the policies in relation to the operation of the markets.

A possible alternative to the above method would be the construction of a binary indicator that shows the presence of restrictions to current and capital transactions. This was employed by Rodrik (1998). It has the positive aspect of being very straightforward yet it has two serious shortcomings. One is the arbitrariness at the cutting point between the open and the closed economies; the other is the omission of the relative magnitude of the liberalization. A third option would be to work in the line of liberalization indicators built for Latin America – Lora (1997) and

Morley, Machado and Pettinato (1999). In this case however the specific evaluation criteria used by the respective authors are not available. The trade liberalization measure comprises the average level of tariffs and their dispersion. The international financial liberalization measure consists of four components: i) control of foreign investment; ii) curbs on profit and interest transfers; iii) controls in foreign funding; and iv) controls in capital outflow. In the case of the second component, the general idea is quite close to that suggested in the Quinn (1997) methodology. The trade reform however does not consider non-tariff barriers nor regulations on how an economic agent can make use of the financial assets resulting from his or her operations. That is, even if the methodology were indeed available, the criterion used in the trade account does not allow an evaluation of the financial restrictions imposed on trade.

Codification that allows to distinguish between trade liberalization and financial liberalization follows a method similar to that used by other authors, attributing values to controls imposed under the legislation of the different countries, as shown in the Annual Report on Exchange Arrangements, Exchange Restrictions (AREAER), published by the IMF. The AREAER emphasizes the reporting of laws that affect the capacity of economic agents in undertaking international financial transactions (Quinn, 1997, p. 535).

For the indicator built in this article, which focuses more on financial flows, the idea is to evaluate the relative influence on government-approved and market-mechanism transactions. The total indicator is placed in the interval ranging from 0 to 14 points, which is divided into three blocks. The first block, spanning from 0 to 2, refers to acceptance of Article VIII[8] and to the existence of terms of commitment that ease the setting of more liberal economic measures, following international agreements. The second block includes current transactions, including trade transactions like imports (0-2) and exports (0-2), in addition to income transfers involving payments (0-2) and collections (0-2). Consequently, the second block displays points that vary from 0 to 8. Lastly, the third block refers to capital transactions, with points ranging from 0 to 4, and is divided into transactions that involve payment (0-2) and those relative to collections (0-2).

The rating definition within the intervals has a common criterion and evolves discretely in 0.5 point steps for every additional criterion reached. If the transaction demands government approval, the highest rating is 1.0. Only in the event this transaction takes place through the market

[8] Acceptance of Article VIII means that restrictions can exist in the capital account, but not in the current account.

will the rating exceed this value[9]. As a general rule transactions are divided into those that demand government sanction and those that do not. In the first case the rating has a further subdivision, as follows: i) if transactions are restrained or simply prohibited, the rating is nil; ii) if transaction approval is subject to restrictive conditions, meaning that it is not always granted, the rating steps up to 0.5; and iii) if approval is automatic, the rating reaches 1.0. In the second case, in which transactions do not demand official approval and take place through market instruments, we also have some subdivisions, namely, iv) if the transaction is taxed, the rating is 1.5; and v) if the transaction is not subject to any restrictions or taxes, the rating is the highest, 2.0.

This indicator, not unlike what happens with the international financial liberalization indicator proposed by Morley, Machado and Pettinnato (1999), has the disadvantage of carrying a certain degree of subjective evaluation regarding the effects of legislation on the actual liberalization process, resulting in small deviations between ratings conducted by different researchers. This can represent a problem if the deviations between the different ratings do not follow a random pattern. The Quinn (1997) approach is not free from another problem common to political and rules indicators, related to the fact that the effect of the rule can be limited by the absence of mechanisms for carrying out obligations.

Regarding the advantages of this methodology, three aspects come up. The first of them, common to all rule indicators, is the identification of the effect of the policy. The second, specific to this indicator, is the source of information (AREAER), which is the same for measuring trade liberalization or financial liberalization. AREAER reports, for each country since 1950, legislation that regulates transactions with other countries, always using the same criteria. This brings time and space consistency to the underlying information for the liberalization index. The third advantage, also unique to this indicator, is related to the fact that the ratings are in absolute terms, and for maximum liberalization the grade given is 14. This characteristic[10] allows us to observe the behavior of the liberalization process along time for a number of countries, which can be included in the sample independently, without having to change the whole rating process.

[9] For a more detailed description of the restrictions considered in the rating please see Appendix 1.
[10] This means that we do not limit the degree of liberalization to the countries present in the sample. The scale is independent from the sample

The construction of the indicator demanded the reading of 31 AREAER reports. A total of 51 countries were rated and the investigation period spanned from 1970 to 2000. The option to start in 1970 was because this was the first year featuring available data on capital flow – to be discussed more extensively in the next section. The choice of countries was based on the sample provided by Quinn (1997), which listed ratings for these economies for 1973, 1982 and 1988, an aspect that allowed us to compare our findings with those of this author, something important in the critical evaluation of the first results. On the whole, 19 developed and 32 developing nations were chosen for study. Of the latter, 19 were Latin American economies and 13 were from other regions of the globe. The index, with an interval from 0 to 14, was normalized for the 0 to 1 interval, to preserve the characteristic of absolute measure.[11]

Table 1. Total sample of countries – Liberalization Indicator, 1970-2000

| Groups | Countries |
|---|---|
| **Developed countries** (19) | Austria, Australia, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Great Britain, the United States. |
| **Developing countries** (32) | **Latin America**: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, Venezuela.<br>**Africa and Asia**: South Africa, South Korea, Egypt, the Philippines, Ghana, Hong-Kong, India, Indonesia, Malaysia, Pakistan, Syria, Thailand, Tunisia. |

### *2.2 The liberalization index from 1970 to 2000*

The averages, for the whole sample and for groups of countries, are shown in Table 2. All observations except that for 1970 are an average of a particular year and the four preceding years. The table shows the capital account liberalization index (CAPOPEN) and the liberalization index (OPENNESS), which comprises the policies relative to these economies' current accounts. Data show that in these three decades practically all groups of countries liberalized their economies, to a higher or lower degree. Of all the countries in the sample, only Honduras and Mexico were exceptions to this rule. The 19 developed nations in the sample underwent the most intensive liber-

[11] In order to develop this rating, we had the help of many assistants, in light of the extensive documentation consulted. The capital and trade accounts ratings for each country and for each year was always conducted by more than two individuals, to minimize possible problems in interpreting those countries' legislation. We thank for the help of Mariana Fujii, Yeun Cheon, Alexander Xavier and Silvio Campos in the task of rating the 51 countries of the sample.

alization processes of all countries studied, whether from an absolute or relative perspective, especially after the 80s. Nonetheless, just like their developed equivalents, Latin American countries experienced considerable liberalization, although this process somewhat leveled during the debt crisis in the 80s.

Table 2. Liberalization Index, 1970-2000

| | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|---|---|
| **Developed nations** | | | | | | | |
| CAPOPEN | 2.29 | 2.29 | 2.43 | 2.62 | 3.14 | 3.59 | 3.74 |
| OPENNESS | 8.37 | 8.58 | 9.09 | 9.79 | 11.14 | 12.62 | 12.98 |
| **Developing nations** | | | | | | | |
| CAPOPEN | 1.94 | 2.02 | 1.97 | 1.85 | 2.05 | 2.70 | 2.96 |
| OPENNESS | 6.44 | 6.68 | 6.75 | 6.30 | 6.87 | 8.85 | 9.88 |
| **Latin America** | | | | | | | |
| CAPOPEN | 2.26 | 2.20 | 2.09 | 1.87 | 2.18 | 2.93 | 3.27 |
| OPENNESS | 7.55 | 7.43 | 7.42 | 6.64 | 7.31 | 9.57 | 10.68 |
| **Total sampe** | | | | | | | |
| CAPOPEN | 2.07 | 2.12 | 2.14 | 2.14 | 2.46 | 3.03 | 3.25 |
| OPENNESS | 7.16 | 7.39 | 7.62 | 7.60 | 8.46 | 10.25 | 11.04 |

Source: The authors' calculation, based on *AREAER* codification.

Chart 2 illustrates this his behavior. An important aspect of the findings is that in following the changes in the different groups of countries, we see that developing nations raise capital flow controls at times of debt crises, and that developed nations keep an uniform pace until the end of the 90s. In developing economies, especially in Latin American ones, liberalization has a late start, as from the half of the 80s.

In spite of the differences found in the liberalization processes between the groups of countries, it is important to highlight that a convergence process took place towards higher liberalization among all economies, both developed and developing ones. Chart 3 shows that this trend was more intensive among developed countries.

**Chart 2**
Liberalization Indicator according to groups of countries, 1970-2000

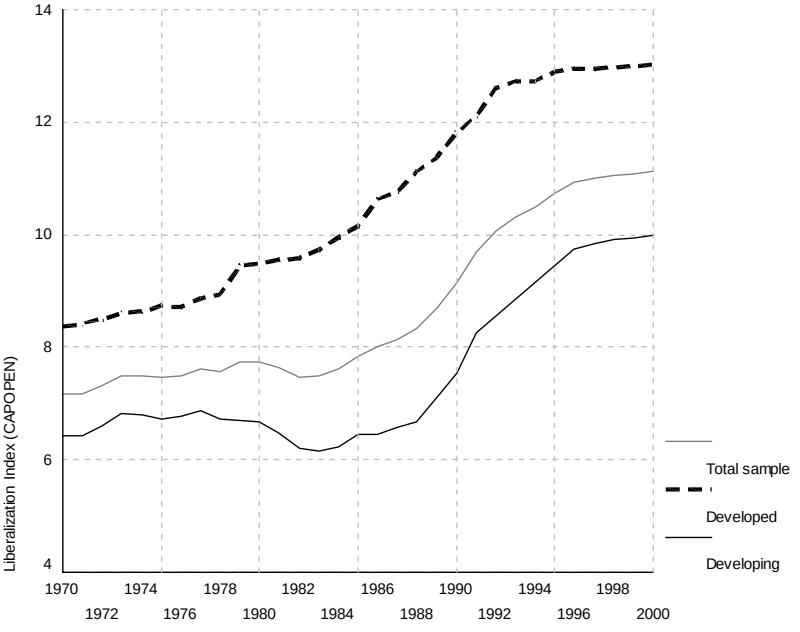
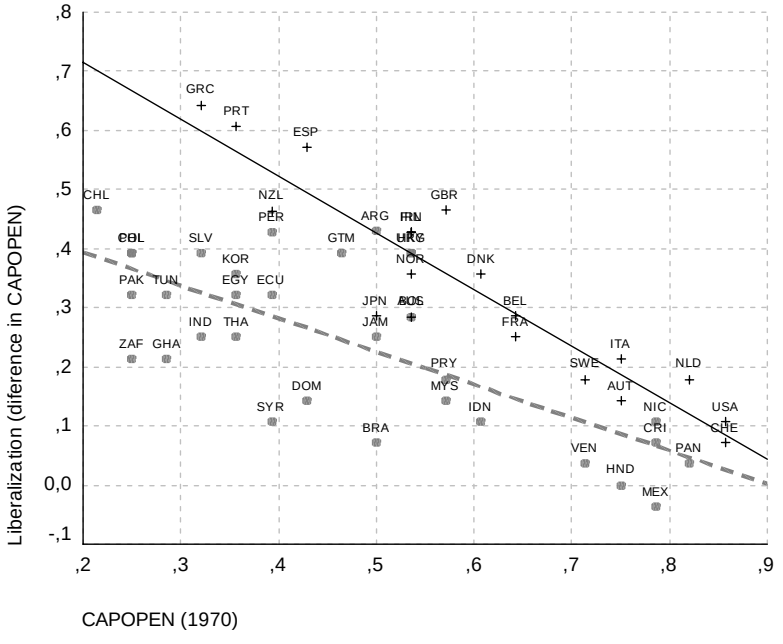



**Chart 3**
Convergence of the liberalization process, 1970-2000



## *3 Model and data*

The literature on capital flows centers on determinants of foreign direct investment (FDI) and analyzes how this can improve asset allocation and competitiveness in those countries. Dunning and Narula (1996), to give an example, expand on the model suggested by Dunning (1984) and suggest that countries can be rated into different stages of development, according to their capacity to absorb or perform foreign direct investment. The authors propose a log-linear specification in their FDI flow-analysis models, using a cross-section database for sample of 88 countries in 1992. Among factors considered important in the studies carried out by Dunning (1984) and Dunning and Narula (1996) are the following: endowment of natural resources[12], size of the markets[13] and government policies. Another important factor in properly understanding FDI flows was pointed out by McCulloch (1993) and by Graham and Krugman (1993), namely foreign-trade barriers. Lim (2001) mentions not only such barriers, but also the degree of financial liberalization of those economies. Based on a compilation of the recent literature on FDI determinants, this author suggests that the size of the market and availability of infrastructure are likewise important factors.

The size of the market, approximated by the GDP or GDP per capita, has a significant and positive correlation with FDI in practically all studies. Elements pertaining to infrastructure have a positive correlation with FDI, but to a larger degree in developing nations. The importance of infrastructure is also evident in the studies of Munnell (1992) and Gramlich (1994). Other factors deemed important in determining FDI are labor costs, fiscal incentives and institutional aspects related to regulatory concerns, both bureaucratic and legal. Lim (2001) shows that these factors appear in the literature with non-conclusive results, in particular because of the measurement problems. Works conducted by UNCTAD (1998) and (1999) also investigate FDI determinants and confirm the relevance of some of the factors mentioned before, such as market size, labor costs and liberalization. It is interesting to see that according to UNCTAD (1998) the gathering momentum of the liberalization process in the countries called attention to policies that could affect FDI, but which previously had not been considered important in this aspect. Examples of

[12] Dunning and Narula (1996) conclude that the endowment of natural resources does not matter in determining flows, in particular the inflow of FDI.
[13] In the case of developed nations, this aspect is studied by Gosh and Wolf (2000).

this are macroeconomic policies, which result in stable inflation rates, and production-structure organization policies, which influence the supply, organization and quality of the production resources.

The empirical model used in this paper is based on the determinants most named in the literature to explain three types of capital flow: total private capital flows, foreign direct investment and other private capital flows. The total private capital flows consider both inflows and outflows countered by fixed or variable returns. The first case includes bank loans, securities and other private credits. The second case contains foreign direct investment and portfolio investments[14]. The use of the capital flow is justified by two reasons. The first is that it allows decomposition of capital flows, separating FDI flows from other private capital flows. The second is that the use of capital flows, rather than of inflows, is justified because it is more compatible with the liberalization indicator, which considers restrictions to both financial inflows and outflows.

Regarding determinants, the aim was a simple model, considering the variables found most significant in the literature. Consequently, market size, infrastructure availability, inflation rate and average education of the labor force were all included as explanatory variables. While the degree of liberalization does not appear with conclusive results in the literature, it was also included because of the availability of the new database for this variable, as shown in Section 2.

The size of the market, considered the most robust variable in this type of specification, is present in the model through the GDP per worker, at constant prices ($y$). To reflect the quality of the production resources this study took into account the infrastructure conditions, based on the infrastructure development indicator ($IDI$)[15], and the education level ($u$), represented by the average number of years the labor force spent in school. The model also included the inflation rate ($\pi$), which represented an indicator of macroeconomic stability. Lastly, the degree of liberalization is represented by the CAPOPEN liberalization indicator. The specification of the model suggested is based on Dunning and Narula (1996) and related the logarithm of the capital flow per worker with the aforementioned explanatory variables. In this specification, the variable $z$ represents each kind of private capital flows per worker.

$$\ln(z)_{it} = \beta_0 + \beta_1.(CAPOPEN)_{it} + \beta_2.\ln(y)_{it} + \beta_3.\ln(IDI)_{it} + \beta_4.\ln(\pi)_{it} + \beta_5.(u)_{it} + \varepsilon_{it}$$

[14] Regarding the definitions of capital flows employed in this paper, please see World Bank (2003)
[15] A detailed explanation of the construction of the Infrastructure Development Index is found in Appendix 2.

In estimating the above equation, the panel data estimation was applied, which is superior to the cross-section analyses used by, for example, Dunning and Narula (1996). Panel data estimation allows to control country effects, which arise from non-observable characteristics. This procedure permits to remove the bias resulting from the correlation between these characteristics and the explanatory variables[16]. An additional problem is the possibility that a rise in capital flow not only be determined by per-worker output, but also influence the rise thereof, causing simultaneity bias. To deal with this problem, we estimated models in two stages, using as additional instrumental variables for product per worker their classic determinants, namely the savings rate and the break-even investment rate[17].

The sample consists of the 51 countries listed in Table 1, during a period spanning from 1970 to 2000. For each of the countries seven observations were used, with five-year intervals, namely 1970, 1975, 1980, 1985, 1990, 1995 and 2000. Therefore, the panel dataset has an 51 observations for each of 7 periods. According to the econometric protocol adopted, for each of the three dependent variables – total private capital flow, FDI flow and other private capital flows – seven regressions were performed. They were: (1) ordinary least squares (OLS) with pooled data, without including the liberalization indicator; (2) ordinary least squares (OLS) with pooled data, including the liberalization index; (3) fixed-effects model; (4) random-effects model; (5) two-stage model with pooled data; (6) two-stage fixed effects model; and (7) two-stage random effects model. This analysis allows us to identify the effects on estimators of different econometric techniques, which supplies valuable information regarding the occurrence of problems such as omission bias and simultaneity.

It should be pointed out that in the fixed-effects model, estimations are calculated based on the differences existing in each country along the time period, considering then the $R^2$ within this group. In the random-effects model, estimations include information not only about the differences observed in the countries, but also along the time period, thus generating more efficient parameters. In this case we take the total $R^2$, which considers not only intra-group but also inter-group variations[18]. The random-effects model is consistent only if the country-effects are not related to other explanatory variables. The correlation between the country effects and the inde-

[16] For some considerations on panel estimates, please see, for example, Greene (2000), Wooldridge (2002) and Islam (1995).
[17] In this regard please see Temple (1999).
[18] Some considerations regarding this problem are found in Forbes (2000).

pendent variables, as well as the presence or nonpresence of systematic differences between random and fixed-effect estimators, is evaluated using the Hausman test. The nil hypothesis of the test is that no significant differences exist between parameters estimated using fixed effects and those using random effects, and the computed value of the statistics is compared to the critical value of a chi-square distribution. If the hypothesis is rejected, there is a systematic difference that requires the inclusion of an omitted variable control, which is the fixed country effect.

The date were extracted from World Development Indicators 2002, published by the World Bank (2003), except education, which was provided by Barro and Lee (1996), and the CAPOPEN liberalization indicator, built using the methodology shown in second section of this paper. The original data for private capital flows and FDI flows, in current US dollars, were converted into constant 1995 dollars, using the same GDP deflation procedure. The data were then divided according to the number of workers (approximated using working-age population). This resulted in another variable "other private capital flows", by subtracting FDI from the total private capital flow. "Other private capital flows" considered only observations with valid FDI values. The variables are in logarithm form.

Regarding explanatory variables, after 1975 the liberalization indicator is the simple arithmetical average for the five preceding years, including the period observed. In regard to this variable, normalization was used in the interval from 0 to 1, in which 1 shows the greatest possible degree of liberalization. In addition to the liberalization indicator, an infrastructure development indicator[19] was also built, which after 1975 also considers the simple arithmetical average of the five preceding years, including the period observed. The GDP per worker is stated in 1995 US dollars. In light of available information, inflation figures were based on the implicit GDP deflator. After 1970 the data consider the geometrical average of the five preceding years, including the period observed. The data are also expressed in natural logarithms. Lastly, average education of the workforce is represented by the average number of years of education of individuals aged 15 and over.

To obtain instrumental variables for the GDP per worker, the savings rate and break-even investment rate were also included. Savings rate was obtained from the simple average of the previous 20 years of domestic saving rates. Since World Bank (2003) data are available only after

[19] The methodology for building this indicator is detailed in Appendix 2.

1960, for 1970 the simple average of the previous 10 years was used and for 1975 that of the previous 15 years. These data are also in natural logarithms. The break-even investment rate is the sum of population growth (geometric average of the previous five years), the depreciation rate (3% p.a.) and the technical progress rate (2% p.a.) constant in time and equal for all countries in the sample. Table 3 summarizes the statistics of the variables used.

Table 3. Summary statistics, 1970-2000

| Variable | Average | Standard deviation | Minimum | Maximum | No. of observations |
|---|---|---|---|---|---|
| **Dependent** | | | | | |
| Total flow of private capital per worker (1995 US$ ln) | 6.530 | 2.059 | -0.844 | 11.733 | 283 |
| FDI flow per worker (1995 US$ ln) | 4.912 | 2.111 | -3.190 | 10.295 | 270 |
| Other private capital flow per worker (1995 US$ ln) | 6.342 | 1.975 | -0.945 | 11.554 | 270 |
| **Explanatory** | | | | | |
| Capital account liberalization indicator — (CAPOPEN) | 0.616 | 0.233 | 0.175 | 1.000 | 357 |
| GDP per worker (ln - US$ 1995) – ln($y$) | 8.858 | 1.340 | 5.935 | 11.148 | 357 |
| Infrastructure development indicator (ln) – ln($IDI$) | -2.385 | 1.462 | -7.713 | -0.108 | 322 |
| Inflation rate (ln) – ln($\pi$) | 2.240 | 1.195 | -1.084 | 7.742 | 353 |
| Average education of the workforce — $(u)$ | 6.275 | 2.490 | 1.480 | 12.050 | 356 |
| Savings rate (ln) — ln$(s)$ | 2.997 | 0.355 | 1.260 | 3.597 | 344 |
| Break-even rate (ln of %) — ln$(n + g + d)$ | -2.732 | 0.148 | -3.061 | -2.444 | 357 |

Sources: World Bank(2003) and Barro and Lee (1996).

## *4 The determinants of capital flows*

This section presents the estimations of the influence of the above variables on the capital flows. First, the results of the estimations of the determinants of the three types of capital flows for the whole sample of countries are presented. Then the results for the different groups of countries are analyzed, namely: developed nations, developing nations and Latin America.

### *Estimations for the total sample of countries*

Table 4 shows the estimations of the determinants of the private capital flows. The regression (1) shows that the GDP per worker, infrastructure and inflation are significant and have the expected sign. The liberalization indicator is positive and significant in estimations using OLS with pooled data (2) and fixed effects (3), the most suitable in this case according to the Hausman test. In the latter, the GDP per worker and education are also positive and significant. In the two-stage estimation, which deals with the possible simultaneity bias, the coefficients associated to

the degree of liberalization, to GDP per worker, to infrastructure and to the education are all positive and significant in the random-effects model, the most suitable in this case.

Table 4. Determinants of total private capital flow, 1970-2000

| **Total private capital flow** | | With liberalization | | | Two stages – with liberalization | | |
|---|---|---|---|---|---|---|---|
| | Pool | Pool | Fixed effects | Random effects | Pool | Fixed effects | Random effects |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| CAPOPEN | | 2.0395*** | 1.6140*** | 1.9898*** | 1.9748*** | 1.6793*** | 1.8068*** |
| | | (0.2842) | (0.3802) | (0.3132) | (0.2964) | (0.4038) | (0.3626) |
| GDP per worker – ln(*y*) | 0.8373*** | 0.9453*** | 1.7172*** | 0.8927*** | 0.7597*** | 0.3746 | 0.5554** |
| | (0.1140) | (0.1057) | (0.3139) | (0.1208) | (0.2218) | (0.7619) | (0.2793) |
| Infrastructure – ln(*IDI*) | 0.3795*** | 0.1664 | 0.0785 | 0.1904* | 0.3243 | 0.2615 | 0.3905** |
| | (0.1165) | (0.1110) | (0.1380) | (0.1156) | (0.1984) | (0.1751) | (0.1942) |
| Inflation – ln($\pi$) | -0.1515*** | -0.0387 | -0.0081 | -0.0454 | -0.0492 | -0.0851 | -0.0675 |
| | (0.0493) | (0.0480) | (0.0608) | (0.0516) | (0.0493) | (0.0759) | (0.0551) |
| Education – *(u)* | 0.0552 | 0.0370 | 0.1800** | 0.0890 | 0.0433 | 0.2375** | 0.1197** |
| | (0.0408) | (0.0376) | (0.0881) | (0.0549) | (0.0385) | (0.0961) | (0.0600) |
| No. of observations. | 276 | 276 | 276 | 276 | 273 | 273 | 273 |
| Adjusted $R^2$ | 0.808 | 0.838 | 0.541 | 0.840 | 0.837 | 0.502 | 0.832 |
| Hausman test | | | | 12.99 | | | 2.66 |

Note: The number in parentheses represent standard deviation of the estimators, significant at 1% (***), at 5% (**) and at 10% (*). In the adjusted $R^2$, we considered the intra-group value in the fixed-effects model and the total value in the random-effects model.

Table 5. Determinants of the foreign direct investment (FDI), 1970-2000

| **Foreign direct investment (FDI)** | | With liberalization | | | Two stages – with liberalization | | |
|---|---|---|---|---|---|---|---|
| | Pool | Pool | Fixed effects | Random effects | Pool | Fixed effects | Random effects |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| CAPOPEN | | 1.8207*** | 1.8493*** | 2.2169*** | 1.7578*** | 1.8857*** | 2.1093*** |
| | | (0.3538) | (0.4912) | (0.4000) | (0.3678) | (0.5044) | (0.4538) |
| GDP per worker – ln(*y*) | 0.4298*** | 0.5365*** | 2.0128*** | 0.5656*** | 0.4171 | 1.1699 | 0.4058 |
| | (0.1365) | (0.1318) | (0.4181) | (0.1522) | (0.2720) | (1.0078) | (0.3385) |
| Infrastructure – ln(*IDI*) | 0.7350*** | 0.5440*** | 0.3617** | 0.5188*** | 0.6469*** | 0.4918** | 0.6203** |
| | (0.1383) | (0.1370) | (0.1737) | (0.1461) | (0.2407) | (0.2154) | (0.2426) |
| Inflation – ln($\pi$) | -0.2953*** | -0.1827*** | -0.2021** | -0.2240*** | 0.1900*** | -0.2531*** | -0.2298*** |
| | (0.0604) | (0.0616) | (0.0810) | (0.0685) | (0.0628) | (0.0959) | (0.0712) |
| Education – *(u)* | 0.0363 | 0.0228 | 0.0907 | 0.0413 | 0.0268 | 0.1314 | 0.0541 |
| | (0.0483) | (0.0461) | (0.1140) | (0.0688) | (0.0468) | (0.1269) | (0.0730) |
| No. of observations | 263 | 263 | 263 | 263 | 260 | 260 | 260 |
| Adjusted $R^2$ | 0.753 | 0.775 | 0.592 | 0.778 | 0.776 | 0.586 | 0.779 |
| Hausman test | | | | 27.52 | | | 8.80 |

Note: The number in parentheses represent standard deviation of the estimators, significant at 1% (***), at 5% (**) and at 10% (*). In the adjusted $R^2$, we considered the intra-group value in the fixed-effects model and the total value in the random-effects model.

Table 5 shows the determinants of the foreign direct investment flow. The regression (1) shows they are significant and have the expected sign for the GDP per worker, infrastructure in-

dicator and inflation. The introduction of the liberalization indicator presents a positive and significant coefficient in the estimations of regressions (2) and (3). In the latter, a fixed-effects estimation, we also see significant and positive GDP per worker and infrastructure indicator. Inflation is significant with a negative sign. In the two-stage estimation, the liberalization, infrastructure and inflation indicators are all significant and have the expected sign.

Table 6 shows the determinants of other private capital flows. In regression (1) as well as in the two previous tables, the GDP per capita, infrastructure and inflation appear significant and have the expected sign. In regressions (2) and (3), the liberalization indicator is positive and has the expected sign, and the GDP per worker is positive and significant. In the two-stage estimation with random effects (7), the liberalization indicator, the GDP per worker and the infrastructure indicator all have positive and significant coefficients.

Table 6. Determinants of other private capital flows, 1970-2000

| **Other private capital flows** | | With liberalization | | | | Two stages – with liberalization | | |
|---|---|---|---|---|---|---|---|---|
| | Pool | Pool | Fixed effects | Random effects | Pool | Pool | Fixed effects | Random effects |
| | (1) | (2) | (3) | (4) | | (5) | (6) | (7) |
| CAPOPEN | | 1.8269*** | 1.6952*** | 1.9665*** | | 1.7920*** | 1.7903*** | 1.7204*** |
| | | (0.2999) | (0.3844) | (0.3268) | | (0.3135) | (0.4168) | (0.3849) |
| GDP per worker – ln(*y*) | 0.9071*** | 1.0141*** | 2.4234*** | 1.0921*** | | 0.8971*** | 0.6240 | 0.6577** |
| | (0.1178) | (0.1117) | (0.3272) | (0.1281) | | (0.2319) | (0.8328) | (0.3008) |
| Infrastructure – ln(*IDI*) | 0.3173*** | 0.1256 | -0.0443 | 0.0954 | | 0.2233 | 0.1871 | 0.3308* |
| | (0.1194) | (0.1162) | (0.1359) | (0.1185) | | (0.2052) | (0.1780) | (0.1964) |
| Inflation – ln($\pi$) | -0.1739*** | -0.0609 | 0.0476 | -0.0257 | | -0.0676 | -0.0498 | -0.0542 |
| | (0.0521) | (0.0522) | (0.0634) | (0.0556) | | (0.0536) | (0.0793) | (0.0596) |
| Education – *(u)* | 0.0163 | 0.0028 | 0.0298 | 0.0292 | | 0.0063 | 0.1295 | 0.0745 |
| | (0.0417) | (0.0391) | (0.0892) | (0.0593) | | (0.0399) | (0.1049) | (0.0663) |
| No. of observations | 263 | 263 | 263 | 263 | | 260 | 260 | 260 |
| Adjusted $R^2$ | 0.788 | 0.814 | 0.530 | 0.817 | | 0.813 | 0.463 | 0.809 |
| Hausman test | | | | 20.59 | | | | 0.21 |

Note: The number in parentheses represent standard deviation of the estimators, significant at 1% (***), at 5% (**) and at 10% (*). In the adjusted $R^2$, we considered the intra-group value in the fixed-effects model and the total value in the random-effects model.

The estimation using OLS with pooled data – which is closer to cross-section estimations, more common in the literature – omits some important results regarding the explanatory variables and the magnitude of the liberalization coefficient. In relation to the explanatory variables, all estimations made using the OLS with pooled data presented the same variables as determinants to explain the three types of capital flows. The introduction of the liberalization indicator and the use of other estimation techniques show that explanatory variables are not the same for all types

of capital flows. In the case of the total capital flow, inflation does not appear as a relevant variable, in spite of being so for the FDI flow. In the case of the other private capital flows, only liberalization and the size of the market are always relevant explanatory variables. The size of the market is in most of the regressions a relevant variable to help explain the private capital flows. In relation to the liberalization indicator, its coefficient is positive and significant in all regressions, which shows the importance of the liberalization process on private capital flows. This result demonstrates that omitting the liberalization process does indeed affect estimations.

Regarding the magnitude, the liberalization indicator for other private capital flows appears slightly above in relation to the indicator for FDI flows, when estimating using OLS with pooled data. However, estimations using panel techniques show a greater magnitude of the liberalization indicator for the FDI flows, indicating the relatively larger importance of liberalization in the flow of this type of capital.

### *Estimations per groups of countries*

Table 7 shows the analysis of the determinants of private capital flows for three groups of countries. In the case of developed nations, the liberalization indicator, GDP per worker and inflation rate are all significant in regression (2). In the estimation using the fixed-effects model, liberalization and GDP per worker have positive and significant coefficients and the infrastructure indicator is significant, yet has a negative sign. In the two-stage fixed-effects estimation, the liberalization indicator and the GDP per worker remain positive and significant, while the infrastructure indicator does not appear with a significant coefficient.

For developing nations, in regression (2) the liberalization indicator, GDP per worker and the education of the workforce are all relevant in determining private capital flows. In the random-effects model, in addition to the above variables, we also see the infrastructure indicator. In the estimation using the two-stage random-effects model all variables but the GDP per worker are shown significant and have the expected sign. For Latin America, in regression (2) we have the same explanatory variables found for developing nations. In regressions (3) and (7) however education is no longer found, and only the liberalization indicator and the size of the market are positive and significant.

Table 7. Groups of countries: Determinants in total private capital flow, 1970-2000

| Total private capital flow | Pool | With liberalization | | | Two stages – with liberalization | | | |
|---|---|---|---|---|---|---|---|---|
| | | Pool | Fixed effects | Random effects | Pool | Pool | Fixed effects | Random effects |
| | (1) | (2) | (3) | (4) | | (5) | (6) | (7) |
| **Developed nations** | | | | | | | | |
| CAPOPEN | | 1.8697*** | 2.2171*** | 2.4575*** | | 1.8780*** | 2.3147*** | 2.5747*** |
| | | (0.4659) | (0.5552) | (0.4901) | | (0.4785) | (0.5875) | (0.5166) |
| GDP per worker – ln(*y*) | 1.1748*** | 1.2570*** | 4.3727*** | 2.1962*** | | 0.6555 | 4.6462*** | 2.1291** |
| | (0.3275) | (0.3077) | (0.7169) | (0.4511) | | (0.5622) | (1.7128) | (1.0401) |
| Infrastructure – ln(*IDI*) | 0.4431 | 0.1570 | -0.6509* | 0.0255 | | 0.4135 | -0.7670 | 0.0055 |
| | (0.2954) | (0.2860) | (0.3680) | (0.3114) | | (0.3808) | (0.6513) | (0.4735) |
| Inflation – ln($\pi$) | -0.5545*** | -0.3201*** | -0.0785 | -0.1293 | | 0.4379*** | -0.0690 | -0.1315 |
| | (0.1263) | (0.1321) | (0.0996) | (0.1039) | | (0.1598) | (0.1073) | (0.1083) |
| Education – *(u)* | -0.1008* | -0.0819 | -0.1333 | -0.0765 | | -0.0797 | -0.1542 | -0.0553 |
| | (0.0599) | (0.0564) | (0.1083) | (0.0788) | | (0.0577) | (0.1457) | (0.0961) |
| No. of observations | 115 | 115 | 115 | 115 | | 113 | 113 | 113 |
| Adjusted $R^2$ | 0.552 | 0.606 | 0.791 | 0.610 | | 0.600 | 0.790 | 0.616 |
| Hausman test | | | | 16.80 | | | | 38.92 |
| **Developing nations** | | | | | | | | |
| CAPOPEN | | 1.6522*** | 0.6338 | 1.1505*** | | 1.5309*** | 0.3599 | 0.9271** |
| | | (0.3574) | (0.5210) | (0.4113) | | (0.3736) | (0.5668) | (0.4548) |
| GDP per worker – ln(*y*) | 0.9447*** | 1.0148*** | 0.7597* | 0.9490*** | | 0.7014** | -0.1192 | 0.6448 |
| | (0.1475) | (0.1395) | (0.4091) | (0.1712) | | (0.3387) | (0.8350) | (0.4190) |
| Infrastructure – ln(*IDI*) | 0.3388*** | 0.1707 | 0.3500* | 0.2372* | | 0.3561 | 0.5605** | 0.3621* |
| | (0.1232) | (0.1214) | (0.2007) | (0.1343) | | (0.2166) | (0.2635) | (0.1996) |
| Inflation – ln($\pi$) | -0.0969* | -0.0288 | -0.0152 | -0.0105 | | -0.0133 | -0.0670 | -0.0073 |
| | (0.0556) | (0.0543) | (0.0741) | (0.0585) | | (0.0577) | (0.0894) | (0.0597) |
| Education – *(u)* | 0.1776*** | 0.1529*** | 0.1407 | 0.1563** | | 0.1757*** | 0.1035 | 0.1739** |
| | (0.0578) | (0.0546) | (0.1384) | (0.0761) | | (0.0592) | (0.1447) | (0.0827) |
| No. of observations | 161 | 161 | 161 | 161 | | 160 | 160 | 160 |
| Adjusted $R^2$ | 0.683 | 0.719 | 0.354 | 0.724 | | 0.711 | 0.324 | 0.716 |
| Hausman test | | | | 4.22 | | | | 3.95 |
| **Latin America** | | | | | | | | |
| CAPOPEN | | 1.2385*** | 1.5290*** | 1.3700*** | | 1.2432*** | 1.3464** | 1.2994*** |
| | | (0.3762) | (0.5098) | (0.4261) | | (0.3963) | (0.5892) | (0.4627) |
| GDP per worker – ln(*y*) | 0.7352*** | 0.8248*** | 0.8584* | 0.9553*** | | 0.9786** | -1.1854 | 0.9135** |
| | (0.1652) | (0.1595) | (0.4988) | (0.1989) | | (0.3843) | (1.4022) | (0.4515) |
| Infrastructure – ln(*IDI*) | 0.2823* | 0.1517 | 0.2764 | 0.1109 | | 0.0879 | 0.5348** | 0.1258 |
| | (0.1428) | (0.1415) | (0.1951) | (0.1510) | | (0.2132) | (0.2662) | (0.1839) |
| Inflation – ln($\pi$) | -0.1902*** | -0.1107 | -0.0144 | -0.0448 | | -0.1168** | -0.1270 | -0.0457 |
| | (0.0537) | (0.0565) | (0.0665) | (0.0568) | | (0.0581) | (0.1044) | (0.0574) |
| Education – *(u)* | 0.2144*** | 0.1811*** | -0.1828 | 0.0874 | | 0.1726** | -0.3399* | 0.0947 |
| | (0.0686) | (0.0660) | (0.1446) | (0.0875) | | (0.0702) | (0.1878) | (0.0922) |
| No. of observations | 99 | 99 | 99 | 99 | | 98 | 98 | 98 |
| Adjusted $R^2$ | 0.600 | 0.638 | 0.323 | 0.640 | | 0.637 | 0.151 | 0.646 |
| Hausman test | | | | 13.46 | | | | 9.15 |

Note: The number in parentheses represent standard deviation of the estimators, significant at 1% (***), at 5% (**) and at 10% (*). In the adjusted $R^2$, we considered the intra-group value in the fixed-effects model and the total value in the random-effects model.

These results detail the findings for the aggregated sample of countries. The liberalization of the capital account is an important factor for all groups of countries. The size of the market, while not significant for developing nations in the two-stage estimation, has a positive and significant coefficient for all other regressions. As pointed out previously, this demonstrates that there is a problem of simultaneous determination between the GDP and capital flows, mainly in the group of developing nations. Lastly, it should be pointed out that infrastructure conditions, as found in the literature, and education of the workforce are significant only for the whose set of developing nations.

A noteworthy aspect is that, in the final two-stage estimations for the total private capital flows, the liberalization indicator for developed nations has a coefficient quite above that found for developing nations. Even in the case of Latin America, whose coefficient is above the set of all developing countries, liberalization seems to have had a lesser effect than that found in developed countries.

Table 8 presents the determinants for foreign direct investment (FDI). For developed nations, regression (2) shows that the liberalization indicator, inflation rate and education have significant coefficients. In the estimation using the fixed-effects model, the liberalization indicator and the inflation rate are significant and have the expected sign. In the two-stage random-effects estimation, the infrastructure indicator is not significant. In this estimation, the liberalization indicator and the GDP per worker remain positive and significant, while the inflation rate has a negative and significant coefficient.

In the case of developing nations, regression (2) shows that all model variables, except education, are significant and have the expected sign. In the random-effects model this result remains unchanged. In the two-stage random-effects estimation the GDP per worker is no longer significant and only the inflation rate and the liberalization and infrastructure indicators remain significant. For Latin America regressions (2), (4) and (7) show that only liberalization and infrastructure indicators are relevant in determining FDI flow.

Table 8. Groups of countries: Determinants of FDI flow, 1970-2000

| **Foreign direct investment flow (FDI)** | | With liberalization | | | | Two stages – with liberalization | | |
|---|---|---|---|---|---|---|---|---|
| | Pool | Pool | Fixed effects | Random effects | Pool | Pool | Fixed effects | Random effects |
| | (1) | (2) | (3) | (4) | | (5) | (6) | (7) |
| **Developed nations** | | | | | | | | |
| CAPOPEN | | 1.7508*** | 1.5606** | 1.9685*** | | 1.7085*** | 1.3460* | 1.7831*** |
| | | (0.5686) | (0.6601) | (0.6089) | | (0.5944) | (0.6999) | (0.6440) |
| GDP per worker – ln(*y*) | 0.0111 | 0.0958 | 5.0058*** | 1.9058*** | | -1.0493 | 5.8478*** | 2.3940* |
| | (0.3974) | (0.3836) | (0.8495) | (0.5857) | | (0.7395) | (2.0334) | (1.4351) |
| Infrastructure – ln(*IDI*) | 0.7314** | 0.4584 | -1.0902** | -0.0851 | | 1.0336** | -1.1902 | -0.1346 |
| | (0.3585) | (0.3564) | (0.4394) | (0.3925) | | (0.5021) | (0.7785) | (0.6263) |
| Inflation – ln($\pi$) | -0.8061*** | -0.5867*** | -0.3819*** | -0.4196*** | | -0.7922*** | -0.3548*** | -0.4128*** |
| | (0.1499) | (0.1610) | (0.1181) | (0.1261) | | (0.2002) | (0.1276) | (0.1303) |
| Education – *(u)* | 0.0973 | 0.1157* | 0.0189 | 0.1213 | | 0.1094 | -0.0438 | 0.1124 |
| | (0.0715) | (0.0691) | (0.1289) | (0.1007) | | (0.0719) | (0.1731) | (0.1278) |
| No. of observations | 113 | 113 | 113 | 113 | | 111 | 111 | 111 |
| Adjusted $R^2$ | 0.537 | 0.570 | 0.763 | 0.539 | | 0.548 | 0.794 | 0.525 |
| Hausman test | | | | 28.80 | | | | 7.40 |
| **Developing nations** | | | | | | | | |
| CAPOPEN | | 1.5314*** | 1.6165** | 1.6482*** | | 1.4989*** | 1.4637* | 1.5099*** |
| | | (0.4605) | (0.7269) | (0.5459) | | (0.4771) | (0.7808) | (0.5750) |
| GDP per worker – ln(*y*) | 0.5824*** | 0.6646*** | 1.2697** | 0.6766*** | | 0.9089** | 0.4216 | 0.5425 |
| | (0.1892) | (0.1846) | (0.5758) | (0.2235) | | (0.4315) | (1.1624) | (0.5075) |
| Infrastructure – ln(*IDI*) | 0.8148*** | 0.6553*** | 0.7172*** | 0.7280*** | | 0.5303** | 0.8914*** | 0.7802*** |
| | (0.1514) | (0.1541) | (0.2700) | (0.1742) | | (0.2614) | (0.3446) | (0.2556) |
| Inflation – ln($\pi$) | -0.2041*** | -0.1343* | -0.1728 | -0.1604** | | -0.1524** | -0.2274* | -0.1523* |
| | (0.0719) | (0.0726) | (0.1074) | (0.0815) | | (0.0769) | (0.1244) | (0.0819) |
| Education – *(u)* | -0.0890 | -0.1073 | -0.0941 | -0.1153 | | -0.1210 | -0.1113 | -0.1013 |
| | (0.0715) | (0.0694) | (0.1937) | (0.0982) | | (0.0746) | (0.1972) | (0.1007) |
| No. of observations | 150 | 150 | 150 | 150 | | 149 | 149 | 149 |
| Adjusted $R^2$ | 0.531 | 0.562 | 0.473 | 0.576 | | 0.563 | 0.462 | 0.578 |
| Hausman test | | | | 4.95 | | | | 2.52 |
| **Latin America** | | | | | | | | |
| CAPOPEN | | 1.0425* | 1.8306** | 1.2436** | | 0.9820* | 1.8266** | 1.0769* |
| | | (0.5310) | (0.8472) | (0.6068) | | (0.5604) | (0.9337) | (0.6406) |
| GDP per worker – ln(*y*) | 0.1277 | 0.2069 | 1.1352 | 0.2700 | | 0.3105 | -1.6836 | 0.1457 |
| | (0.2303) | (0.2303) | (0.8409) | (0.2670) | | (0.5972) | (2.9027) | (0.6033) |
| Infrastructure – ln(*IDI*) | 0.9604*** | 0.8549*** | 0.7307** | 0.8279*** | | 0.8252*** | 1.0364** | 0.8812*** |
| | (0.1898) | (0.1944) | (0.3098) | (0.2113) | | (0.3019) | (0.4538) | (0.2702) |
| Inflation – ln($\pi$) | -0.1689** | -0.0975 | -0.1338 | -0.1277 | | -0.1067 | -0.2782 | -0.1221 |
| | (0.0776) | (0.0847) | (0.1142) | (0.0886) | | (0.0915) | (0.1848) | (0.0893) |
| Education – *(u)* | 0.0076 | -0.0179 | -0.1008 | -0.0416 | | -0.0207 | -0.2886 | -0.0264 |
| | (0.0912) | (0.0907) | (0.2294) | (0.1147) | | (0.0960) | (0.3073) | (0.1180) |
| No. of observations | 95 | 95 | 95 | 95 | | 94 | 94 | 94 |
| Adjusted $R^2$ | 0.425 | 0.442 | 0.451 | 0.469 | | 0.448 | 0.363 | 0.474 |
| Hausman test | | | | 4.91 | | | | 2.67 |

Note: The number in parentheses represent standard deviation of the estimators, significant at 1% (***), at 5% (**) and at 10% (*). In the adjusted $R^2$, we considered the intra-group value in the fixed-effects model and the total value in the random-effects model.

The results for developing nations help identify why market size is not significant in two-stage estimation for the whole sample of countries. A possible explanation could lie in the importance of FDI for companies whose output is targeted to foreign markets. Macroeconomic stability conditions, represented by the inflation rate, arise as an important variable, both for developed nations as well as for developing ones. In the case of the infrastructure indicator, it is not relevant for developed nations. To a large extent this is due to the fact that these countries already enjoy sound infrastructure and consequently this particular variable does not highlight considerable differences in these nations. Finally, it should be pointed out that liberalization affects positively and significantly FDI of all groups of countries.

It is important to note that in the case of the FDI flows the effect of liberalization for developed nations is slightly above, but closer, that of, the effect for developing countries. This means that in the case of FDI flow, liberalization has similar effects for both developed and developing countries.

Table 9 brings the determinants for other private capital flows. For developed nations, in regression (2) the liberalization indicator and the GDP per worker are significant, beyond education, but this with opposite signs. In regressions (3) and (6), only the liberalization indicator and the GDP per worker are significant. For developing nations the liberalization indicator, the GDP per worker and education are all significant in regression (2). In regressions (3) and (7) only the GDP per worker and infrastructure indicator are significant. In the case of Latin America, in equation (2), the liberalization index, GDP per worker, inflation rate and education are all relevant and have the expected sign. In regressions (3) and (7) only the liberalization indicator and the GDP per worker are significant.

These results once again show the importance of good infrastructure in developing nations, now as a luring aspect to other private capital flows. This fact could in part be associated to a parallel historical process of infrastructure privatization in most of those countries. The size of the market is an important variable for all groups of countries. Liberalization is not relevant in the final estimations for the group of developing nations, although it is important for Latin America.[20]

[20] In this regard please see Bandeira and Garcia (2002).

Table 9. Groups of countries: Determinants of other private capital flows, 1970-2000

| **Other private capital flows** | | With liberalization | | | | Two stages – with liberalization | | |
|---|---|---|---|---|---|---|---|---|
| | Pool | Pool | Fixed effects | Random effects | Pool | Pool | Fixed effects | Random effects |
| | (1) | (2) | (3) | (4) | | (5) | (6) | (7) |
| **Developed nations** | | | | | | | | |
| CAPOPEN | | 2.0513*** | 2.4207*** | 2.6661*** | | 2.0360*** | 2.5487*** | 2.8067*** |
| | | (0.4952) | (0.6335) | (0.5331) | | (0.5123) | (0.6703) | (0.5597) |
| GDP per worker – ln(*y*) | 1.4338*** | 1.5330*** | 4.2526*** | 2.2695*** | | 0.8501 | 4.2748** | 1.7220* |
| | (0.3573) | (0.3341) | (0.8152) | (0.4784) | | (0.6374) | (1.9471) | (1.0039) |
| Infrastructure – ln(*IDI*) | 0.4916 | 0.1717 | -0.5625 | 0.0555 | | 0.4938 | -0.6125 | 0.1927 |
| | (0.3224) | (0.3104) | (0.4217) | (0.3430) | | (0.4328) | (0.7455) | (0.5010) |
| Inflation – ln($\pi$) | -0.4987*** | -0.2416* | -0.0043 | -0.0616 | | -0.3683** | -0.0012 | -0.0894 |
| | (0.1348) | (0.1402) | (0.1134) | (0.1148) | | (0.1726) | (0.1222) | (0.1237) |
| Education – *(u)* | -0.1852*** | -0.1637*** | -0.1662 | -0.1405* | | -0.1653*** | -0.1709 | -0.1059 |
| | (0.0643) | (0.0602) | (0.1237) | (0.0844) | | (0.0620) | (0.1657) | (0.0955) |
| No. of observations | 113 | 113 | 113 | 113 | | 111 | 111 | 111 |
| Adjusted $R^2$ | 0.520 | 0.582 | 0.737 | 0.590 | | 0.572 | 0.736 | 0.593 |
| Hausman test | | | | 150.58 | | | | 20.52 |
| **Developing nations** | | | | | | | | |
| CAPOPEN | | 1.2007*** | 0.4698 | 0.7769* | | 1.0959*** | 0.1574 | 0.5440 |
| | | (0.3552) | (0.4892) | (0.4071) | | (0.3718) | (0.5461) | (0.4515) |
| GDP per worker – ln(*y*) | 1.0344*** | 1.0989*** | 1.3715*** | 1.1613*** | | 0.8675** | 0.0714 | 0.8030* |
| | (0.1461) | (0.1424) | (0.3875) | (0.1736) | | (0.3363) | (0.8130) | (0.4167) |
| Infrastructure – ln(*IDI*) | 0.2498** | 0.1248 | 0.3637** | 0.1925 | | 0.2534 | 0.6353*** | 0.3297* |
| | (0.1169) | (0.1188) | (0.1817) | (0.1302) | | (0.2037) | (0.2410) | (0.1829) |
| Inflation – ln($\pi$) | -0.1241** | -0.0694 | 0.0278 | -0.0027 | | -0.0558 | -0.0473 | 0.0031 |
| | (0.0555) | (0.0560) | (0.0723) | (0.0599) | | (0.0599) | (0.0870) | (0.0612) |
| Education – *(u)* | 0.1765*** | 0.1621*** | -0.1066 | 0.0793 | | 0.1798*** | -0.1270 | 0.0927 |
| | (0.0552) | (0.0535) | (0.1304) | (0.0779) | | (0.0581) | (0.1379) | (0.0862) |
| No. of observations | 150 | 150 | 150 | 150 | | 149 | 149 | 149 |
| Adjusted $R^2$ | 0.691 | 0.712 | 0.335 | 0.706 | | 0.707 | 0.269 | 0.705 |
| Hausman test | | | | 19.05 | | | | 7.47 |
| **Latin America** | | | | | | | | |
| CAPOPEN | | 1.1407*** | 0.9959* | 1.0925** | | 1.1533** | 0.9566 | 1.0412** |
| | | (0.4218) | (0.5498) | (0.4719) | | (0.4485) | (0.6144) | (0.5119) |
| GDP per worker – ln(*y*) | 0.9853*** | 1.0721*** | 1.0200* | 1.1017*** | | 1.2402** | -0.9725 | 1.0695** |
| | (0.1863) | (0.1829) | (0.5457) | (0.2171) | | (0.4780) | (1.9102) | (0.4988) |
| Infrastructure – ln(*IDI*) | 0.0895 | -0.0259 | 0.2185 | -0.0277 | | -0.0908 | 0.4384 | 0.0056 |
| | (0.1535) | (0.1544) | (0.2011) | (0.1622) | | (0.2417) | (0.2986) | (0.1890) |
| Inflation – ln($\pi$) | -0.2174*** | -0.1392** | 0.0082 | -0.0331 | | -0.1509** | -0.0912 | -0.0178 |
| | (0.0628) | (0.0672) | (0.0741) | (0.0662) | | (0.0733) | (0.1216) | (0.0664) |
| Education – *(u)* | 0.2534*** | 0.2254*** | -0.2057 | 0.1148 | | 0.2171** | -0.3368* | 0.0802 |
| | (0.0738) | (0.0720) | (0.1488) | (0.0946) | | (0.0768) | (0.2022) | (0.1037) |
| No. of observations | 95 | 95 | 95 | 95 | | 94 | 94 | 94 |
| Adjusted $R^2$ | 0.559 | 0.588 | 0.196 | 0.583 | | 0.584 | 0.043 | 0.571 |
| Hausman test | | | | 70.36 | | | | 9.05 |

Note: The number in parentheses represent standard deviation of the estimators, significant at 1% (***), at 5% (**) and at 10% (*). In the adjusted $R^2$ , we considered the intra-group value in the fixed-effects model and the total value in the random-effects model.

In relation to the magnitude of the liberalization indicator, this is quite higher in developed nations, particularly when compared to Latin America, say. On the other hand, when the same groups of countries are compared in Tables 8 and 9, a difference arises between the group of developed countries and that of the developing and Latin American ones. In the case of the last group, the effect of liberalization has greater impact on FDI than on other private capital flows, in line with the results found for the total private capital flow. In the case of developed nations, liberalization has a much greater effect on other private capital flows than on FDI flow.

In spite of some peculiarities, the set of estimations mostly confirms the results found in the literature. In first place, the size of the market, represented by the GDP per worker, played a major role in most equations. Second, infrastructure is of greater importance in the estimations for developing nations. In regard however to liberalization, estimates show more robust results: except for other private capital flows for developing nations, the liberalization process does indeed matter in explaining international capital flows. Please note that its influence is even more consistent than the size of the market, presented by Lim (2001) as the most important variable found in the literature that studies capital flow determinants. Considering that liberalization and capital flow affect economic growth, as argued by Garcia and Santana (2004), this discrepancy in the results can be explained to a large extent by omitting liberalization in the estimations, or by not dealing with the aspect of simultaneous determination of capital flows and economic growth.

Regarding the magnitude of the indicator, the results show that for developed nations the effects of liberalization tend to be greater than those found in developing and Latin American ones. This happens especially because of other private capital flows, in which the effect of liberalization is quite higher for developed countries. This could be reflecting in the development of the financial markets in these economies. In the case of FDI flow, the impact of liberalization is similar for all groups of countries.

## *5 Conclusions*

The 90s saw a substantial rise in private capital flows and the consolidation of the liberalization process, all of which triggered a series of studies highlighting the role of liberalization in the capital flows. Such studies however carry methodological problems regarding the liberalization indicator. Some authors resort to dummy variables, which are not up to the task of properly representing the degree of liberalization, quite distinct among the different economies. Other

authors, more interested in the effects of liberalization on economic growth, prefer to use the capital flows as a liberalization measure. Estimations made in this article allow to infer that capital flows as a measure of liberalization are not suitable indicators of the liberalization process, although they are highly correlated. This happens because even without changes in the degree of liberalization of an economy, capital flows can rise because of other factors, such as improving macroeconomic conditions of the beneficiary country.

This article has also analyzed the determinants of private capital flows, with particular emphasis on the role of liberalization. The problem presented by the measure of liberalization was successfully addressed by building a liberalization indicator, based on government policy measures, and measuring the neutrality of the government in regard to the nation's economic transactions with other countries. The liberalization indicator built here seems to have properly captured the historical process under study, because it allowed pinpointing the process of developing nations raising economic barriers in the early 80s, following the debt crisis, and the greater liberalization after the second half of the same decade. Estimations for capital flow determinants for the sample of 51 countries from 1970 to 2000 reveals the importance of capital account liberalization to increase the capital flows. These findings counter the literature's inconclusive results, presented by Lim (2001). Liberalization has similar effects on FDI flow, for all groups of countries analyzed. In the case of other private capital flows, liberalization has a greater impact on developed nations.

Finally, it should be said that the results of this article provide a warning in regard to the simultaneity problem existing between capital flow determination and economic growth. As discussed, estimates change considerably when the GDP per worker is instrumentalized. For this reason and for its intrinsic characteristics, the liberalization indicator suggested here is valuable as an instrument variable of capital flows and can help pinpoint more precisely the effects of capital mobility on economic growth, as analyzed by Garcia and Santana (2004).

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## *Appendix 1: Rating criteria used in the liberalization indicator*

In the methodology propose by Quinn (1997), the total indicator falls within an interval that ranges from 0 to 14 points, divided into three blocks:

i) Acceptance of Article VIII and other terms of commitment that ease the establishment of more liberal economic measures, based on international agreements, with a rating from 0 to 2;

ii) Current transactions (0 and 8), subdivided into trade transactions, such as exports (0-2) and imports (0-2), and income transfer, whether payments (0-2) or receipts (0-2);

iii) Capital transactions (0 and 4), involving ingress (0-2) and egress of assets (0-2)

In the first group, acceptance of Article VIII gives the country a rating of 1.0. If the country is part of a free-trade agreement area or trade union, the rating receives an additional 0.5. If the country belongs to a common market or economic union, the additional rating is 1.0. Regarding the other groups, two aspects must be highlighted. In first place, the rating does not consider restrictions imposed for geopolitical reasons, or of safety, health or environmental nature. Second, the country's rating will be null if it explicitly bans the trade of goods or services, or the flow of capital. In the case of the capital account, for example, this can take place during, say, a moratorium, with the blocking of all outflows, to remunerate investments or financial capital.

In relation to the other ratings, while the general idea is the same, there are specific aspects among the different groups, according to the transactions involved. In the case of the flow of goods, the rating will be 0.5 if the government has restrictive approval, something which can occur when i) the government imposes quotas to import and/or export a number of goods, ii) some kinds of goods are simply banned from import or export, with the government alleging that local similar products exist, if this is the case for various categories, iii) foreign trade by private or public companies is limited, and iv) other similar limitations exist.

In this group a rating will reach 1.0 point when government approval is practically assured and the above restrictions are not generalized but limited to some types of goods. The requirement that export revenues be surrendered to the government is a sign that this account will be rated no more than 1.0. In the event various foreign-exchange rates exist, the requirement to hand export revenues over to the government can mean an additional cost of transaction, and the rating will drop to 0.5.

Still within this group, the rating will reach 1.5 point when such restrictions are tax based and do not depend on direct government approval. According to the intention of the law, whether restrictive or supervisory, the rating in this level can remain the same, even if the government occasionally interferes in the flow of trade, in aspects such as i) specific surtaxes for some goods, ii) taxes for products similar to those produced in the country, iii) need for advance deposits, iv) need to remit revenues back home, v) requirement to negotiate with minimum prices, in the case of exports, and iv) requirement for a given type of operation financing. The rating will drop to 1.0 when some restrictions are even more strict, as is the case of a generalized surtax, costly advance deposit, in terms of anticipation and of value, and of the need to remit profits back home when multiple foreign-exchange rates exist. The rating will probably reach 2.0 points if the law does not contain any restrictive aspects or if they are very far in between, and consequently do not restrict the proper flow of trade between economies.

In the case of the trade of services and still within the realm of current transactions, the rating will be around 0.5 point if the government provides any restrictive interference to approve a transaction. This can take place when i) quantitative limits are set to remit profits and/or interest, ii) some prohibitive categories are in place for some flows of income, and iii) other similar restrictions are set. The rating will reach 1.0 point when government approval is just about automatic. This takes place when i) time restrictions exist for income remittal, such as demanding one year before a given amount can be remitted, ii) the government requires some revenues to be turned over to it, iii) restrictions exist regarding the use of the assets obtained, and iv) other similar restrictions exist. Similarly to what happens with the transactions of goods, the rating will reach 1.5 point in transactions involving income when restrictions are determined by taxation and do not depend on direct government approval, whether on time or quantity terms. In the spe-

cific case of travel or private money transfers, this rating can be maintained, even if some quotas are in place in regard to the values that the person can dispose. However, the rating will drop to 1.0 when transactions are subject to unusually high taxing. On the other hand, the rating will reach 2.0 when likewise legislation does not have any restrictive elements or if they are infrequent. In the specific case of travel or private money transfers, this rating can remain, even if the transaction amounts are taxed.

In the case of the third group, transactions involve inflows (IN) and outflows (OUT) of capital, whether productive capital, in the form of foreign direct investment (FDI), or financial capital, in the form of loans or portfolio flows. Just like in the accounts of the second group, the rating will be determined according to the nature of the legislation, and the whole set of legislative rules must be analyzed. The rating will be about 0.5 point when any of the following exist: i) FDI is banned in various sectors, ii) country residents cannot invest abroad (OUT), iii) quantitative and time restrictions are imposed to amortize the capital invested in the country (OUT), iv) ownership of local companies is banned to non residents (IN), v) country residents cannot invest in portfolios abroad, whether in equities or bonds (OUT), vi) some types of loans cannot be secured abroad, whether because of the type of loan or the tenure (IN), and vii) non-residents are not allowed to secure loans (OUT).

The rating will reach 1.0 point when the above limitations are not preventive in nature. This will take place when any of the following exist: i) any FDI in the country must be approved beforehand (IN), ii) previous restrictions in place for the remuneration of production capital, such as remittances of profit or financial capital, namely interest, iii) FDI is restricted in some industries (IN), iv) country residents are subject to restrictions in foreign investment, whether FDI or portfolio application, such restrictions applying to the type of investment or agents, such as investment funds (OUT), v) time limitations to amortize capital invested in the country (OUT), vi) limitations regarding some types of funding, as is the case of not allowing loans with tenures shorter than one year (IN), and vii) some limits are set regarding the ownership of local property (IN).

The rating will reach 1.5 when transactions do not require approval to be carried out but are still subject to occasional restrictions. This can happen for example in the case of limiting liability exposure in foreign currency in relation to assets (IN) or when foreign financial institutions are subject to limitations OUT). The rating will reach 2.0 points when the flow of capital is practically unrestricted, allowing the agents to freely move their capital in search of the best investment opportunities.

## *Appendix 2: Infrastructure development indicator*

Infrastructure plays an essential role in the return of investments, consequently affecting economic growth. The impact of this sector is significant because it provides essential resources for many other sectors along the production chain. This means that any improvements in infrastructure will be felt by many other industries. Some studies, such as those of Munnel (1992) and Gramlich (1994), point out the importance of infrastructure in this aspect.

The concept of economic infrastructure refers to the stock of fixed capital with reduced mobility and high sunk costs, indivisibility and product-capital relation, in addition to high dispersion of consumption. This definition includes the electricity, telecommunications and transport infrastructures, as well as the whole urban infrastructure. The low mobility of this fixed capital, in particular because a non-grid supply is not feasible, gives infrastructure a characteristic of a specific factor of a country or region.

This specific factor can be measured using the Infrastructure Development Index (IDI), according to the methodology suggested by Sanchez-Robles (1998). The IDI was inspired in the Human Development Index (HDI) and uses a similar methodology. The IDI works with a weighted average of indices relative to each of the components or variables ($j$) used. The index relative to the component $j$ is obtained by normalizing the series, which range from $0$ to $1$.

$$Index_j = (value_j - value_{min}) / (value_{max} - value_{min})$$

Sanchez-Robles (1998) suggest the use of the amount of electricity produced the number of fixed telephone lines, the size of the road network and the size of the rail grid. These series must be considered

on a per-capita basis and aim to allow a comparison between countries based on the actual infrastructure available to their inhabitants.

In the sample used in this article, comprised of 51 countries from 1970 to 2000, the basis found in the World Development Indicators, published by the World Bank (2003), presented serious problems in regard to the availability of the data, mainly for roads, which were available generally only for the 90s, and rail, which were even nonexistent for some countries. In order to raise the number of observations within the sample, the only series considered in this study were those of electricity (kWh) and the number of fixed telephone lines (per 1000 inhabitants)[22].

These two series were standardized and led to the Index of each sector *j*. First, the value per habitant for each of the series was found. Next the aforementioned normalization took place. For some countries, an absence of data for 1999 led to a conservative assumption that the 2000 value had remained unchanged from the previous year.

After the *j* Indices for each sector were computed, the next step was to compute the IDI by taking the average of the above indices. This was done by attributing to each *j* Index a weight according to its component score coefficient, following the procedure suggested by Sanchez-Robles (1998). This weighing process aims to maximize the variance of the linear combination of the series. The component score coefficients, which weigh the IDI expression, were obtained from the first component, which explains 88% of the variance.

$$IDI_{it} = 0{,}532.(Index_{ELECTRICITY})_{it} + 0{,}532.(Index_{TELEPHONE})_{it}$$

The final data are presented in Table 14. Except for 1970, all other observations represent the average of the last five years, including that of the observation. Consequently, the value presented for 1975 corresponds to the average between 1971 and 1975. This is also true for the subsequent periods.

The data show improvements in the infrastructure of all countries in the sample during the period analyzed, in particular when the end situation is compared to the initial situation (last column). Generally speaking, developed countries were those which had the most significant improvements.

The data further show that a positive average development took place in infrastructure conditions. When we compare points where the sample is complete, we see that the indicator has an initial score of 0.1418, in 1980, and grows to 0.2879, in 2000. A high dispersion among the countries can also be seen, as witnessed by the rising standard deviation, from 0.1643, in 1980, to 0.2468, in 2000. This confirms the assumption that the most significant improvements in infrastructure conditions took place in the more developed nations.

[22] The definitions detailed in the *World Development Indicators 2002*, published by the World Bank (2003) are the following:

- Electricity produced (kWh) – This is measured at station terminals and cover all sources of energy used by power plants (hydroelectric, coal, oil, gas and nuclear power); the series further includes power generated by solar, geothermal, wind and tide power sources.
- Number of fixed telephone lines (per 1,000 inhabitants) – This is the total number of telephone lines connected to consumer telephone sets; lines are counted whether they are in operation or not.

Table 10. Infrastructure development index, 1970-2000

| País | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | Média | $(I_{2000}-I_{1970})$ |
|---|---|---|---|---|---|---|---|---|---|
| Argentina | | 0,0661 | 0,0694 | 0,0861 | 0,0989 | 0,1236 | 0,1822 | 0,1044 | 0,1161 |
| Austrália | 0,2268 | 0,2839 | 0,3238 | 0,3974 | 0,4706 | 0,5242 | 0,5654 | 0,3989 | 0,3387 |
| Áustria | 0,1679 | 0,2301 | 0,2769 | 0,3490 | 0,4059 | 0,4499 | 0,4819 | 0,3374 | 0,3139 |
| Bélgica | 0,1595 | 0,2146 | 0,2560 | 0,3070 | 0,3819 | 0,4507 | 0,5065 | 0,3252 | 0,3470 |
| Bolívia | | | 0,0226 | 0,0236 | 0,0237 | 0,0294 | 0,0475 | 0,0294 | 0,0249 |
| Brasil | | 0,0272 | 0,0402 | 0,0578 | 0,0701 | 0,0848 | 0,1300 | 0,0683 | 0,1029 |
| Chile | | 0,0355 | 0,0396 | 0,0471 | 0,0608 | 0,1079 | 0,1844 | 0,0792 | 0,1490 |
| Colômbia | | 0,0336 | 0,0387 | 0,0492 | 0,0642 | 0,0810 | 0,1275 | 0,0657 | 0,0939 |
| Costa Rica | | 0,0433 | 0,0565 | 0,0756 | 0,0853 | 0,1126 | 0,1727 | 0,0910 | 0,1294 |
| Dinamarca | 0,2597 | 0,3130 | 0,3740 | 0,4294 | 0,4943 | 0,5599 | 0,6371 | 0,4382 | 0,3774 |
| República Dominicana | | | 0,0233 | 0,0246 | 0,0347 | 0,0609 | 0,0839 | 0,0455 | 0,0606 |
| Ecuador | | 0,0206 | 0,0247 | 0,0299 | 0,0384 | 0,0513 | 0,0738 | 0,0398 | 0,0533 |
| Egito | | 0,0105 | 0,0126 | 0,0191 | 0,0314 | 0,0437 | 0,0667 | 0,0307 | 0,0562 |
| El Salvador | | 0,0121 | 0,0154 | 0,0178 | 0,0219 | 0,0350 | 0,0631 | 0,0275 | 0,0510 |
| Finlândia | 0,2245 | 0,3124 | 0,3806 | 0,4709 | 0,5629 | 0,6221 | 0,6545 | 0,4611 | 0,4300 |
| França | 0,1140 | 0,1628 | 0,2436 | 0,3776 | 0,4660 | 0,5437 | 0,5852 | 0,3561 | 0,4711 |
| Gana | | 0,0085 | 0,0092 | 0,0067 | 0,0074 | 0,0080 | 0,0101 | 0,0083 | 0,0015 |
| Grécia | 0,0935 | 0,1685 | 0,1972 | 0,2491 | 0,3222 | 0,4010 | 0,4625 | 0,2706 | 0,3690 |
| Guatemala | | 0,0078 | 0,0110 | 0,0131 | 0,0162 | 0,0225 | 0,0406 | 0,0185 | 0,0329 |
| Honduras | | 0,0063 | 0,0078 | 0,0111 | 0,0167 | 0,0231 | 0,0379 | 0,0172 | 0,0316 |
| Hong Kong | | 0,1697 | 0,2061 | 0,2736 | 0,3750 | 0,4681 | 0,4972 | 0,3316 | 0,3275 |
| Índia | | 0,0030 | 0,0038 | 0,0053 | 0,0080 | 0,0131 | 0,0248 | 0,0097 | 0,0218 |
| Indonésia | | 0,0004 | 0,0009 | 0,0026 | 0,0052 | 0,0116 | 0,0254 | 0,0077 | 0,0249 |
| Irlanda | 0,0933 | 0,1188 | 0,1441 | 0,1867 | 0,2461 | 0,3252 | 0,4126 | 0,2181 | 0,3192 |
| Itália | 0,1269 | 0,1753 | 0,2064 | 0,2595 | 0,3228 | 0,3814 | 0,4138 | 0,2694 | 0,2869 |
| Jamaica | | 0,0336 | 0,0341 | 0,0355 | 0,0409 | 0,0893 | 0,1736 | 0,0678 | 0,1400 |
| Japão | 0,1777 | 0,2893 | 0,3248 | 0,3573 | 0,4151 | 0,4833 | 0,5479 | 0,3708 | 0,3702 |
| Coréia do Sul | | 0,0311 | 0,0523 | 0,1106 | 0,2156 | 0,3377 | 0,4216 | 0,1948 | 0,3906 |
| Malásia | | 0,0175 | 0,0260 | 0,0498 | 0,0747 | 0,1266 | 0,1924 | 0,0812 | 0,1748 |
| México | | 0,0330 | 0,0415 | 0,0538 | 0,0650 | 0,0885 | 0,1118 | 0,0656 | 0,0788 |
| Holanda | 0,1809 | 0,2514 | 0,3044 | 0,3576 | 0,4082 | 0,4597 | 0,5307 | 0,3561 | 0,3499 |
| Nova Zelândia | 0,3093 | 0,3571 | 0,3859 | 0,4296 | 0,4776 | 0,5074 | 0,5435 | 0,4301 | 0,2342 |
| Nicarágua | | 0,0123 | 0,0140 | 0,0139 | 0,0148 | 0,0184 | 0,0280 | 0,0169 | 0,0157 |
| Noruega | 0,4175 | 0,5246 | 0,5642 | 0,7223 | 0,8336 | 0,8975 | 0,8853 | 0,6921 | 0,4678 |
| Paquistão | | 0,0033 | 0,0041 | 0,0058 | 0,0091 | 0,0157 | 0,0226 | 0,0101 | 0,0193 |
| Panamá | | | 0,0625 | 0,0728 | 0,0832 | 0,0987 | 0,1339 | 0,0902 | 0,0714 |
| Paragüai | | 0,0110 | 0,0128 | 0,0207 | 0,1108 | 0,1553 | 0,2135 | 0,0874 | 0,2025 |
| Peru | | 0,0194 | 0,0212 | 0,0242 | 0,0283 | 0,0344 | 0,0592 | 0,0311 | 0,0398 |
| Filipinas | | 0,0096 | 0,0111 | 0,0130 | 0,0135 | 0,0172 | 0,0335 | 0,0163 | 0,0239 |
| Portugal | 0,0614 | 0,0862 | 0,0988 | 0,1258 | 0,1862 | 0,2953 | 0,3718 | 0,1751 | 0,3104 |
| África do Sul | | 0,0878 | 0,0965 | 0,1242 | 0,1442 | 0,1561 | 0,1746 | 0,1306 | 0,0868 |
| Espanha | 0,0912 | 0,1386 | 0,1719 | 0,2182 | 0,2727 | 0,3410 | 0,3894 | 0,2319 | 0,2982 |
| Suécia | 0,4672 | 0,5580 | 0,6123 | 0,6975 | 0,8003 | 0,8084 | 0,8163 | 0,6800 | 0,3491 |
| Suiça | 0,3291 | 0,4061 | 0,4360 | 0,5005 | 0,5573 | 0,6088 | 0,6661 | 0,5006 | 0,3370 |
| Síria | | 0,0163 | 0,0211 | 0,0395 | 0,0447 | 0,0526 | 0,0905 | 0,0441 | 0,0742 |
| Tailândia | | 0,0066 | 0,0089 | 0,0133 | 0,0247 | 0,0500 | 0,0880 | 0,0319 | 0,0814 |
| Tunísia | | 0,0118 | 0,0161 | 0,0248 | 0,0350 | 0,0492 | 0,0748 | 0,0353 | 0,0629 |
| Grã-Bretanha | 0,2032 | 0,2607 | 0,3038 | 0,3497 | 0,4019 | 0,4484 | 0,5178 | 0,3551 | 0,3146 |
| Estados Unidos | 0,3929 | 0,4450 | 0,4811 | 0,5421 | 0,5992 | 0,6648 | 0,7397 | 0,5521 | 0,3468 |
| Urugüai | | 0,0635 | 0,0719 | 0,1009 | 0,1255 | 0,1676 | 0,2237 | 0,1255 | 0,1602 |
| Venezuela | | 0,0551 | 0,0688 | 0,0934 | 0,1114 | 0,1322 | 0,1453 | 0,1010 | 0,0901 |
| Média | 0,2156 | 0,1282 | 0,1418 | 0,1739 | 0,2103 | 0,2478 | 0,2879 | 0,1867 | |
| Desvio Padrão | 0,1190 | 0,1504 | 0,1643 | 0,1942 | 0,2224 | 0,2399 | 0,2468 | 0,1872 | |

Source: World Development Indicators 2002. Authors' calculations.