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Human Capital and FDI Inflows to Developing Countries: New Empirical Evidence

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Summary. — Despite the dramatic increase in total foreign direct investment (FDI) flows to developing countries in the last few years, the bulk of the inflows has been directed to only a limited number of countries. It has been argued that developing countries might enhance their attractiveness as locations for FDI by pursuing policies that raise the level of local skills and build up human resource capabilities. Nevertheless, the empirical evidence in the literature in support of this recommendation for a large sample of developing countries is scant. This paper evaluates this argument in the light of the evolution in the structural characteristics of FDI and empirically tests the hypothesis that the level of human capital in host countries may affect the geographical distribution of FDI. The empirical findings are: (a) human capital is a statistically significant determinant of FDI inflows; (b) human capital is one of the most important determinants; and (c) its importance has become increasingly greater through time. © 2001 Elsevier Science Ltd. All rights reserved.

Key words — FDI, human capital, crosscountry, developing countries

If you think that education is expensive, try ignorance

From a sticker on a car parked outside Georgetown University.

reduction in the flows of official and other private capital. In an environment with more vigorous capital flows, FDI is a means to balance loan and equity capital in private foreign capital inflows. FDI is also less volatile than other types of capital flows (Chuhan, Perez-Quiros, & Popper, 1996).

FDI is not only a source of finance and employment. For developing country governments, FDI can also be a medium for acquiring skills, technology, organizational and managerial practices and access to markets. Moreover, the less developed a country is, the greater are usually the expectations it places on FDI to alleviate its resource and skills constraints. But, foreign investors are attracted to locations that offer appropriate combinations of locational advantages. Although total FDI inflows have

1. INTRODUCTION

Since the early 1980s developing countries have significantly eased restrictions on foreign direct investment (FDI) inflows and the operations of transnational corporations (TNCs). This trend has become even more widespread during the 1990s. In fact, despite the absence of a multilateral framework for FDI, “unilateral, bilateral and regional efforts towards the liberalization of national FDI frameworks have led to a remarkable level of *de facto* convergence of government policy approaches towards FDI among countries from all regions” (UNCTAD, 1994, p. 286).

For developing countries, FDI became especially important as a source of funding in the wake of the debt crisis, given the significant

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spiralled in recent years, the bulk of the inflows has been directed to only a limited number of countries.

This raises the issue of whether it is possible to identify a set of policies that might enhance the attractiveness of developing countries as locations for FDI. A necessary requirement is, therefore, for policy makers to be aware of the evolution in the structural characteristics of FDI and to fully understand the changing needs of TNCs in the light of their complex global integration strategies.¹

In this context, this paper investigates the importance of human capital as a resource that can attract FDI to developing countries. Section 2 presents the growing quantitative relevance of FDI for these countries. Section 3 analyzes changes in the composition of FDI and in the strategies pursued by TNCs. Section 4 investigates whether the empirical evidence supports the view that human capital has a statistically significant influence on FDI inflows. Concluding comments are given in Section 5.

2. FDI FLOWS TO DEVELOPING COUNTRIES

Private capital flows in the form of FDI have soared in recent years. From a yearly average of \$50 billion in 1980–84 FDI inflows jumped to \$300 billion in 1994–96. Developing countries received about 40% of global FDI inflows in 1994–96, compared to 25% in 1980–84.

Within the group of developing countries, the distribution of FDI flows varies widely both across regional groupings and individual countries, however, every developing region saw an increase in inflows. China has been the largest developing country recipient of FDI since 1992. With \$35 billion of FDI per year during 1993–96—equivalent to 35% of FDI flows to developing countries and 13% of global FDI inflows—China is the second largest recipient in the world behind the United States.

With \$68 billion on average in annual inflows during 1994–96, South, East and Southeast Asia received two-thirds of the developing-country total inflows over the same period. Excluding China, their share was 30% of the total.

Investment flows into Latin America and the Caribbean increased to a record level of \$39

billion per year during 1994–96. This amounts to 30% of all developing country inflows. This share is declining, however, from the peak of 39% in 1986. The investment stock in South, East and Southeast Asia surpassed that in Latin America in 1988 and, since then, the disparity has widened.

The absolute level of FDI flows into Africa has increased from an annual average of \$800 million during 1975–80 to an annual average of \$4.3 billion during 1994–96. This is more than a fivefold increase, compared with a 4.7 times increase in Latin America during the same period. Africa's share of developing-country inflows was 4.1% in 1994–96, the lowest share since the early 1980s. On average, Africa's share of developing-country inflows has more than halved, from 11% during 1986–90. While FDI flows into Africa have a small size and account for only a small share of flows into developing countries, their relative importance is quite high: in relation to gross fixed capital formation during 1994–96, FDI flows accounted for 7.8%. In 1996 Africa's FDI stock was 16.6% of the continent's GDP.

The increase in the share of developing countries in FDI inflows has been accompanied by a dramatic diversification in the composition of the major FDI recipients. This may reflect the existence of a wide variety of location-specific advantages over and above natural resources. Oil-producing countries are no longer important hosts. They accounted for a half of FDI flows to developing countries during 1979–81, compared to one-fifth during 1995–96.

3. FDI CHARACTERISTICS AND HUMAN CAPITAL AS A LOCATION-SPECIFIC ADVANTAGE

The rapid growth of FDI has been accompanied by significant changes in its sectoral composition as well as the relative importance of its locational determinants. Broadly speaking, until the 1950s, FDI was concentrated in the primary sector and resource-based manufacturing. The availability of natural resources was the most important host-country determinant of FDI (McKern, 1996; UNCTAD, 1998).

The relative importance of this factor has declined since the 1960s as FDI flowed into the manufacturing sector of developing countries to enter markets sheltered from international

competition (*tariff-jumping* FDI). Market size and its growth became increasingly important as determinants of the geographical distribution of FDI. (UNCTAD, 1998).

During the 1980s, FDI inflows shifted toward services and technology-intensive manufacturing. In 1990, the share of services in the world stock of FDI was close to 50%. Their share in annual flows was almost 60%. During 1980–90, the share of capital- and technology-intensive industries in FDI rose faster in developing than developed countries, accounting in 1990 for more than 60% of developing countries' inward stock of FDI, compared to only about 40% in developed countries (UNCTAD, 1993).

The traditional determinants of FDI still account for a large share of worldwide FDI inflows. For example, UNCTAD (1993) reports that the availability of natural resources—typically for exports to the world market—remains the principal determinant for natural-resource-seeking FDI. Similarly, access to local markets remains a key factor for nontradable services that must be produced where and when they are consumed.²

With respect to the cost of labor as a location-specific advantage of developing countries, Pfeffermann and Madarassy (1992) argue that, as a result of new technological advances and the concomitant shift of FDI toward more capital-, knowledge- and skill-intensive industries, the presence of a well-educated pool of labor has become increasingly attractive for TNCs relative to low labor costs by themselves.

This shift has intensified with the globalization process, which has led to new strategies by TNCs to enhance their competitiveness. That is, firms organize themselves functionally so that activities such as finance, research and development (R&D), accounting, training, parts production, distribution, etc. are carried out by affiliates in locations best suited to each particular activity (UNCTAD, 1994). FDI can thus be regarded as a means for TNCs to access factors of production, particularly created assets,³ in order to rationalize production internationally (Dunning & Wymbs, 1999; Malecki, 1997; UNCTAD, 1998).

The boundaries between different types of FDI—whether market-, trade-, resource- or efficiency-seeking—become less evident as all FDI is seen as part of an overall strategy of enhancing competitiveness. This strategy therefore makes it increasingly difficult to point to a single locational determinant. Instead,

TNCs may be attracted to countries that offer adequate *combinations* of locational determinants such as conditions for efficient operations, high quality resources/assets, and access to markets (Dunning, 1998; Siebert, 1999).

4. HUMAN CAPITAL AND FDI: THE EMPIRICAL EVIDENCE

The hypothesis that human capital in host countries is a determinant of foreign investment in developing countries has been embodied in the theoretical literature. For example, Lucas (1990) conjectures that lack of human capital discouraged foreign investment in less-developed countries. Zhang and Markusen (1999) present a model where the availability of skilled labor in the host country is a direct requirement of TNCs and affects the volume of FDI inflows. Dunning (1988) maintains that the skill and education level of labor can influence both the volume of FDI inflows and the activities that TNCs undertake in a country.⁴

In spite of what appears as consensus on this hypothesis, the empirical evidence in its support is often only anecdotal. While a few studies have presented some evidence for certain countries—see, for instance, Dasgupta, Mody, and Sinha (1996) on China, India, Indonesia, Malaysia, Philippines, Thailand and Vietnam; Iyanda and Bello (1976) on Nigeria; Kumar (1990) on India; Nataranjan and Miang (1992) on Southeast Asia; Sibunruang and Brimble (1988) on Thailand; Yong (1988) on Malaysia—studies covering a large sample of developing countries are rare and their findings are by and large inconclusive. Three major cross-country studies that consider human capital as a possible determinant of FDI in developing countries are Root and Ahmed (1979), Schneider and Frey (1985) and Narula (1996).

Root and Ahmed find that none of the variables they use as proxies for human capital and skilled labor⁵ is a significant determinant of FDI inflows for the 58 developing countries considered.⁶ It should be noted, however, that the sample period for their study was 1966–70: it may be the case that at that time human capital was not such an important location-specific advantage.

In a cross-section of 54 developing countries for the years 1976, 1979 and 1980, Schneider and Frey find that their human capital variable,⁷ though significant in some cases, is never

significant in their chosen model as an explanation of FDI inflows.⁸

Narula investigates the determinants of the stock of inward investment in pooled regressions of 22 developing countries for four time periods, namely, 1975, 1979, 1984 and 1988. He finds that, while the coefficient of the proxy for technological capability⁹ is highly significant but has the wrong (negative) sign, the coefficient of the proxy for human skills¹⁰ is positive but insignificant.¹¹ Narula shows that country-level economic structure provides a better explanation for the extent of inward direct investment activity for developing countries. These results contrast with those obtained for 18 industrialized countries, where technological capability and human skills are highly significant and correctly signed. Narula argues that the inward investment into industrialized countries is increasingly aimed at seeking complementary created assets. The presence of human capital plays an increasingly important role as countries move along their development path.

Another study which provides some empirical support for the hypothesis that the level of human capital in host countries may affect the geographical distribution of foreign investment is that by Hanson (1996). He shows, however, that, for a sample of 105 developing countries, political stability and the security of property rights¹² may have been more important determinants of FDI stock than human capital.¹³

It may be worth pointing out two aspects of this study. First, the cross-sections consider the accumulated stock of FDI as of 1967. One could repeat the remark made earlier that the availability of human capital may have been of limited importance in explaining foreign investment in developing countries in that period. Second, in his study, Hanson does not consider the influence of a whole set of other determinants of FDI, but rather uses the human capital variable as the only regressor while controlling for differences in the colonial status of the recipient countries.

It is against this background that the present study seeks to assess the importance of human capital as a locational advantage for developing countries.

(a) *The econometric approach*

This empirical investigation is based on the following regression equation:

$$FDI_{it} = \alpha HK_{it} + \beta' CV_{it} + \lambda + \varepsilon_{it}, \quad (1)$$

where the dependent variable, FDI, is net FDI inflows expressed as a percentage of GDP;¹⁴ HK is a measure of human capital; CV is a vector of control variables, i.e. a set of FDI determinants other than human capital; λ is a common fixed effect term and ε is a white-noise error term. The dependent variable is FDI inflows rather than stock because data on capital stock are not comprehensive and are expressed in book values without any adjustment for inflation and exchange rate variations. As argued by Root and Ahmed (1979) among others, data on FDI inflows are less vulnerable to this "book-value bias." The choice of control variables has been guided by previous empirical work on FDI.

The analysis employs panel estimation. Although it would be possible to use a cross-country regression, the chosen method saves a large number of degrees of freedom. This is all the more important when, as in this case, several explanatory variables must be used to characterize the multiple determinants of FDI inflows.

The use of the time-series dimension, however, introduces the problem that since FDI inflows vary widely from year to year—with disinvestments or large repatriation of earnings in one year followed by positive investment flows the next—the large fluctuations in FDI may obscure the effect of human capital, as well as other determinants, on the inflows. The analysis in this paper uses panels based on three-year averages in an attempt to reduce the problem of random fluctuations in the data while, at the same time, exploiting the time-series variation in the data. Thus, in the above equation, the subscript i refers to countries; the subscript t denotes a three-year period.

(b) *Selection of explanatory variables*

High levels of education are regarded as the most important element in human resource development (see, for example, OECD, 1998; UNCTAD, 1994; World Bank, 1999). Educational policies that raise the supply and quality of human capital can substantially improve a country's locational advantages. Efficient education systems may result in a labor force that is literate, numerate and skilled in the use of modern production facilities and techniques. In this respect, it has been argued that "the most critical manpower requirement tends to be for

people with a secondary education who can be managers, administrators, professional technicians, or sub-professional technical personnel” (Meier, 1995, p. 315).

In this paper we use three variables for a country’s human capital. One is the secondary school enrollment ratio as in Root and Ahmed (1979) and Schneider and Frey (1985). This can be rationalized as a reflection of a flow of investment in human capital. Levine and Renelt (1992) note in their review article that the use of this variable is also customary in the empirical literature on growth, where it has been calculated either as an average over the sample period, as in Mankiw, Romer, and Weil (1992), or at some initial period, as in Barro (1991).

Despite its widespread use, there are limitations to school enrollment data as a measure of human capital (see, for example, Gemmill, 1996; Temple, 1999). In particular, in the context of this paper, one would ideally want to employ a measure of the stock of human capital rather than its flow. Fortunately, such data are now available. Nehru, Swanson, and Dubey (1995) have prepared and made available a new database on human capital stock, which is particularly suited to our study.¹⁵ Thus, as a measure of the education stock we take two variables. One is the number of accumulated years of secondary education present in the working age population. To make sure that our variable also captures high level technical and managerial skills, the other human capital variable includes tertiary education and is defined as the number of accumulated years of secondary and tertiary education in the working age population.

The growth of the domestic market in host countries is typically found to be a major determinant of FDI flows to developing countries (Root & Ahmed, 1979; Schneider & Frey, 1985; Torrasi, 1985; UNCTAD, 1998, 1999; UNCTAD-DTCL, 1993; UNCTC, 1992). While the size of local markets should reach a certain threshold for local production to be efficient and profitable, continued expansion of FDI requires that market growth prospects be favourable. This ensures long-term commitment by foreign investors as rapid economic growth leads to increases in income and consumer demand for goods and services.

Knickerbocker (1973) provides an additional explanation, based on the concept of oligopolistic reaction, for the importance of market growth as a determinant of FDI.¹⁶ Noting that US enterprises have tended to match each

other’s FDI, he finds that “checkmating” investment takes place most actively under high growth conditions. Rapid growth justifies this type of investment since it gives hope that scale advantages—which have been forgone when making the investment—may be possible in the future. Following many empirical studies—for example, see Gastanaga, Nugent, and Pashamova (1998), Knickerbocker (1973), Lim (1983), Root and Ahmed (1979), Ryckeghem (1998), Singh and Jun (1995), and Torrasi (1985)—we use the rate of growth of GDP¹⁷ as a proxy for the growth of market size in host countries.¹⁸

It is a standard hypothesis that the cost of labor in many developing countries may be an important consideration for labor-intensive, efficiency-seeking FDI since, for a given level of productivity, labor typically costs less than in developed countries. Although some studies—see, for instance, Flamm (1984), Lucas (1993), Schneider and Frey (1985), and Wheeler and Mody (1992)—find a wage cost variable to be a significant determinant of FDI flows, the empirical results from a large number of studies are not in general unequivocal—see, for instance, Kravis and Lipsey (1982), and Wei (1997a,b). One possible explanation for the ambiguous results is that, if labor costs are a proxy for skills, FDI may flow to high wage areas because of high skill requirements. UNCTAD (1999) reports some evidence in support of this hypothesis.

This emphasizes the difficulty in finding a satisfactory measurement of the relevant labor cost variable. First, the available data on wages may be a poor reflection of the wage rates offered by TNCs. Second, the wage cost should be weighted by the productivity of labor. Third, this efficiency wage should be compared to that of relevant competitors.

Following the literature, we employ two types of alternative measures of the cost of labor. The first is a relative wage cost measure, similar in concept to Lansbury, Pain, and Smidkova (1996), for example, and especially Riedel (1975). In the present paper, the chosen wage differential is the deviation of efficiency wages (defined as the average wage per worker divided by labor productivity, or average output per worker) in country *i* from average efficiency wages for all countries.¹⁹ The second type of measure represents the cost of labor in each country as, for example, in Flamm (1984), Lucas (1993), Schneider and Frey (1985), Shamsuddin (1994), Singh and Jun (1995), and

Wheeler and Mody (1992). Two variables are selected here for this type of measure: one is the efficiency wage; the other is the product wage (nominal wage divided by GDP deflator).

Another variable used in this paper is the growth rate of the labor force. This variable measures the availability of labor—which is regarded in Dunning (1973) and UNCTAD (1994) as being particularly important for labor-intensive, efficiency-seeking FDI—rather than the cost of labor. Nevertheless, it may be taken as a broad proxy for the cost of labor under the assumption that a natural consequence of the abundance of labor will be its low price. Availability in this sense implies not only abundance but also low cost relative to productivity.

Developing countries have significantly liberalized their trade regimes. Open economies encourage more confidence and foreign investment since, even in countries characterized by the small size of their domestic markets, TNCs can reap economies of scale and scope. This is further boosted by the increasing participation of developing countries in regional integration schemes. As is common practice, openness is measured in this paper by the ratio of total trade to GDP; see also Haufbauer, Lakdawalla, and Malani (1994), Ryckeghem (1998) and UNCTAD (1999) as examples of the use of this variable in empirical literature on FDI.

Financial liberalization is an important reform to sustain capital inflows to developing countries (for example, see Haque, Mathieson, & Sharma, 1997; Schadler, Carkovic, Bennett, & Kahn, 1993). The variable chosen in this paper as a proxy for the depth of the financial sector is the share of domestic credit to the private sector in GDP.²⁰ In the empirical FDI literature this variable has also been used in Root and Ahmed (1979) and, expressed as a rate of growth, in Arguelles (1986).

Since a necessary precondition for financial liberalization is macroeconomic stability (see for instance Fry, 1997) and successful inflation stabilizations are associated with fiscal adjustment and an increased private sector's share of domestic credit (Easterly & Schmidt-Hebbel, 1993; Schadler *et al.*, 1995), it seems to us that this variable could also be seen as an indirect proxy for macroeconomic stability²¹—which is another important factor in the location decision of TNCs in developing countries (Bird, 1999; UNCTAD, 1994).²²

Energy is a critical factor of production and a fundamental requirement for the implementa-

tion of effective industrial strategies. Dunning (1988), for example, argues that it might be in the foreign investors' interest as part of a global strategy to utilize their firm-specific advantages together with at least some factor inputs—such as cheaper energy sources—to minimize costs. Dependable energy availability is a major infrastructure concern for foreign investors (UNCTAD, 1998). Survey studies confirm that this is one of the main factors that influence foreign investment location decisions (see, for example, Area Development, 1998; Business International Corporation, 1970). Econometric evidence relative to developing countries also shows that availability of energy is robustly correlated with FDI (Shamsuddin, 1994; Wilhelms, 1998). The variable selected in this paper to measure energy availability is net energy imports (energy use less energy production) as a percentage of energy use.

The estimated regression includes a time trend to proxy unobserved components. One example of these could be business facilitation measures, such as promotion efforts, the provision of incentives to foreign investors, the reduction of the "hassle costs" of doing business in a host country (e.g., reducing or eliminating corruption and improving administrative efficiency), and the provision of amenities that contribute to the quality of life of expatriate personnel. Business facilitation measures have an important role in the presence of other locational advantages but will rarely be decisive determinants of FDI inflows (Brunetti, Kisunko, & Weder, 1997a; Moran, 1999; UNCTAD, 1998).

Another example of unobserved components could be a combination of supply-side factors in TNCs' home countries, i.e. factor endowments, technological capabilities, economic conditions, etc. These give rise to firm-specific and internalization advantages that affect the timing, sectoral composition and geographical distribution of FDI (Dunning, 1979).

The estimated regressions include the lagged change in the dependent variable. The presence of this variable can be rationalized in various ways. First, past FDI inflows embody information on operating conditions and the general quality of the business climate in a host country. This information shapes average perceptions about a country, leading potential investors to view particular locations favourably (Kinoshita & Mody, 1997).

Second, as shown by Johanson and Wiedersheim Paul (1993), there is evidence that

investors tend to favor familiar countries, and regard territories they do not know as risky. The lack of knowledge is thus strongly associated with the fear of negative possibilities.

Third, some TNCs stagger their investments in newly opened markets in order to test the ground before committing the full amount of capital funds (Pfeffermann & Madarassy, 1992). Thus, FDI flows are likely to require time to adjust to desired levels, depending on the specific constraints faced by a TNC.

(c) *Other variables*

The economic literature suggests that, in addition to the variables selected above, there may be other factors that influence TNC's location decisions.

Certain political and economic characteristics of host countries could be among these factors. The new literature on economic growth highlights that democracy, by constraining the power of autocratic regimes, encourages investment and accelerates growth (see the surveys by Przewoski & Limongi, 1993; Sirowy & Inkeles, 1990). On the other hand, democracy does not always generate stability and predictability of rules. We tested the role of democracy as a determinant of FDI.

To measure democracy we used the indices produced by Freedom House, namely the index of political rights, the index of civil liberties and the index of democracy, which is a combination of the two (Freedom House, 1980–1994). The inclusion of these variables was not very successful, although some of the results might be interpreted as suggesting the existence of an inverted *U*-shaped relationship between FDI and democracy as in Barro (1996, 2000).²³

Risk could be an important deterrent to investment, both domestic and foreign. Fear of political instability, risk of policy reversal and fear of government action could make investment excessively risky (Collier & Pattillo, 2000). To test the role of country risk we used the index published by Euromoney.²⁴ But, this variable turned out to be statistically insignificant in our regressions. Other studies too found that the empirical evidence that democracy, political instability, or political and economic risk affect FDI significantly is not unambiguous (Lansbury *et al.*, 1996; Levis, 1979; Singh & Jun, 1995; UNCTAD, 1998; Wheeler & Mody, 1992).

On the one hand, a possible explanation for this lack of significance could be that a certain political or economic event is associated with

different degrees of risk depending on the countries of origin of FDI since they provide different guarantees against political risk (Agarwal, 1980; Lizondo, 1992). Second, it may also be argued that, while country risk is an important consideration, the decision concerning the selection of a plant location is likely to be based on many other factors (Brunetti, Kisunko, & Weder, 1997b; Edwards, 1991; UNCTC, 1992).

On the other hand, it may be argued that, while democracy and country risk are important, there may be serious weaknesses in the selected indicators. For example, they only measure particular features of broader characteristics and the weights with which these features are combined into an index are arbitrary. Moreover, the scores for the indicators are often based on subjective assessment. With respect to the indices of democracy, the relative country ratings are comparative and, therefore, their evolution over time may not be particularly meaningful.

Another factor that is often cited to explain TNC's location decisions is the availability of natural resources. As possible proxies for this aspect we used exports of metals and minerals as a percentage of merchandise exports but none was significant.²⁵ This result may reflect in part the decreasing relevance of natural resources as a location-specific advantage since the 1960s—a process that has already been mentioned in Sections 2 and 3. In this respect it should be recalled that our data sample starts in 1980. Part of the explanation for the lack of significance of natural resource availability may also be that the sample of countries excludes major oil producers.

Yet more variables, such as cultural variables, the characteristics of legal systems, the extent of urbanization, the degree of corruption, etc. could be suggested as possible explanatory variables of FDI. There is, however, no consensus in the literature on FDI about the importance of these factors. In the context of the present study, which does not aim to identify and contrast all possible determinants of FDI but only to assess the importance of human capital as one of the determinants, we believe that the chosen control variables represent the most relevant set of factors that emerge from the literature on FDI.

(d) *Estimation*

The data cover the period 1980–94.²⁶ Time periods are defined as nonoverlapping

three-year averages. The sample includes 36 developing countries from Africa, Asia and Latin America.²⁷

Eqn. (1) was initially estimated by using ordinary least squares (OLS). But, since the null hypothesis of homoskedasticity was rejected at the 1% level, the White correction was adopted to obtain heteroskedasticity-consistent estimation.

Table 1 reports the results of regressions that investigate whether human capital is a significant determinant of FDI inflows in developing countries. The main difference across regressions simply consists in the choice of variables representing the cost/availability of labor. This presentation allows one to contrast the relative significance of the human capital and labor cost variables.

The coefficient of secondary school enrollment (ENROL) is significant at the 10% confidence level in regressions (1)–(3) and at 1% in regression (4). It can be noted that, when significance is only at the 10% level, the coefficients of variables measuring different

specifications of wage costs are all insignificant and with the wrong sign. On the other hand, when the growth rate of the labor force is used—as in regression (4)—then its coefficient is significant at the 1% level, is correctly signed, and the coefficient of the human capital variable is also significant at the 1% level.

The other control variables perform well. The coefficients of trade openness and shortage of energy are always significant at the 1% level. The coefficient of the lagged change in the FDI to GDP ratio is always significant at 5%. The growth of the domestic market—represented by the growth rate of GDP—is significant at 5% in regressions (1), (2), and (4) and at 10% in regression (3). The coefficient of the percentage of credit to the private sector is only significant—at the 10% level—in regression (4), which is overall the preferred regression. Of the control variables, only the time trend is never significant.²⁸

As argued in section “Selection of explanatory variables”, a measure of the stock of human capital may be more appropriate than a

Table 1. *Secondary enrollment and other determinants of FDI inflows^a*

Dependent variable: FDI	(1)	(2)	(3)	(4)
ENROL	0.011 (1.82)*	0.011 (1.82)*	9.10E-03 (1.69)*	0.013 (2.80)***
TRADE	0.017 (3.76)***	0.017 (3.77)***	0.016 (3.69)***	0.013 (3.53)***
GRGDP	0.105 (1.98)**	0.105 (1.97)**	0.103 (1.85)*	0.101 (1.97)**
CREPS	5.40E-03 (0.74)	5.42E-03 (0.75)	6.26E-03 (0.87)	0.010 (1.76)*
ENERGY	-2.47E-03 (-3.06)***	-2.47E-03 (-3.06)***	-2.64E-03 (-3.02)***	-2.48E-03 (-3.14)***
Δ FDI ₋₁	0.451 (2.25)**	0.451 (2.25)**	0.449 (2.29)**	0.447 (2.31)**
TIME	0.062 (0.66)	0.068 (0.69)	0.068 (0.72)	0.108 (1.36)
EFFWAGE1	0.411 (0.42)			
EFFWAGE2		0.388 (0.40)		
WAGE			4.82E-04 (0.43)	
GRLABF				0.415 (2.52)***
Constant	-1.094 (-2.21)**	-1.246 (-1.84)*	-1.047 (-2.05)**	-2.443 (-3.73)***
\bar{R}^2	0.538	0.538	0.514	0.533

^a Estimates are heteroskedasticity-consistent (White correction). *t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

flow measure. Thus, regressions (1)–(4) have been re-run by replacing the secondary school enrollment variable with stock measures of human capital, such as the number of accumulated years of secondary (SEC) and secondary plus tertiary (SEC&TER) education in the working age population.

The results are remarkably similar to those in Table 1. As in Table 1, the regressions with the rate of growth of the labor force—analogueous to regression (4) in Table 1—outperform the others, regardless of the measure of human capital used. For economy of space only these preferred regressions are reported. Columns (1) and (2) in Table 2 show the results when SEC or SEC&TER is used. For ease of comparison, Column (3) repeats the results obtained with the secondary school enrollment ratio from Column (4) in Table 1.

The regressions with a more satisfactory measure of human capital confirm the finding concerning the importance of human capital in

attracting FDI: like with ENROL, the coefficients of SEC and SEC&TER are both significant at the 1% confidence level. Moreover, the control variables have all now statistically significant coefficients.

Although the results concerning the importance of human capital as a determinant of FDI inflows appear robust, one might wonder whether the estimated model is unduly restrictive. This can be seen by generalizing Eqn. (1) as follows:

$$FDI_{it} = \alpha HK_{it} + \beta' CV_{it} + \lambda_i + \varepsilon_{it}. \tag{2}$$

This differs from Eqn. (1) in that the individual effect term λ_i , though constant across time, is now modeled as specific to the individual country i , rather than being identical across countries as in Eqn. (1). Eqn. (2) is the fixed effects model, where differences between countries, being fixed across time, can be viewed as parametric shifts of the regression function.

An alternative to the fixed effects model is the random effects model, where there is a common constant and the error term has a component that represents the extent to which the intercept of the i th country differs from the overall intercept, that is, country differences are stochastic. Given the nature of our data sample, however, the random effects model is not easily justifiable.²⁹ The model was tried but was strongly rejected by the Hausman test in favor of the fixed effects model.³⁰

The fixed effect approach is usually implemented by including country-specific dummies among the regressors in order to account for missing country-specific measures. Naturally, from a purely practical standpoint, this approach is very costly in terms of degrees of freedom lost when the number of countries is much larger than the number of time periods.

Moreover, from a theoretical point of view, one may dispute whether the strategy of including country dummies is appropriate to the objective of the empirical investigation conducted in this section. Country dummies would remove important crosscountry variation, which is precisely what one wants to capture through the explanatory variables, leaving only within-country variation. This point is forcefully made by Lansbury *et al.* (1996), Singh and Jun (1995), and Wheeler and Mody (1992).

Despite these serious reservations, the fixed effect model was estimated but the results were poor. The Variance Inflation Factor pointed to

Table 2. *Regressions with alternative human capital variables^a*

Dependent variable:	(1)	(2)	(3)
FDI			
SEC	0.552 (2.58)***		
SEC&TER		0.400 (2.88)***	
ENROL			0.013 (2.80)***
TRADE	8.78E-03 (2.42)***	9.60E-03 (2.54)***	0.013 (3.53)***
GRGDP	0.104 (2.84)***	0.108 (2.89)***	0.101 (1.97)**
CREPS	9.86E-03 (1.92)*	9.12E-03 (1.80)*	0.010 (1.76)*
ENERGY	-1.79E-03 (-2.95)***	-1.77E-03 (-2.96)***	-2.48E-03 (-3.14)***
ΔFDI_{-1}	0.331 (2.47)**	0.330 (2.33)**	0.447 (2.31)**
TIME	0.164 (2.71)***	0.155 (2.55)***	0.108 (1.36)
GRLABF	0.562 (4.05)***	0.519 (4.04)***	0.415 (2.52)***
Constant	-2.681 (-4.24)***	-2.549 (-4.33)***	-2.443 (-3.73)***
\bar{R}^2	0.490	0.490	0.533

^a Estimates are heteroskedasticity-consistent (White correction). *t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.

severe multicollinearity³¹ and, in fact, a number of estimated parameters became insignificant. This outcome suggests that country-specific dummies may have picked up crosscountry variation that in previous runs had been captured by the selected explanatory variables. Alternatively, groups of country-specific dummies may be correlated reflecting regional patterns, for example.

Thus, following Singh and Jun (1995), a better approach may be to include regional dummies to control for regional-specific factors. In their words, "regional differences may exist because FDI flows are known to follow certain discernible characteristics (e.g., "triad pattern").³² The regional dummies may also capture some economies of agglomeration" (p. 9).

The fixed effects model with region specific dummies can be generalized further by including period-specific effects as follows:

$$FDI_{it} = \alpha HK_{it} + \beta' CV_{it} + \lambda_i + \gamma_t + \varepsilon_{it}, \quad (3)$$

where γ_t are time-specific effects.³³ This regression is implemented by including $T - 1$ period dummy variables, where T is the number of three-year periods.

Overall, the inclusion of dummy variables, be it region-specific or period-specific, makes very little difference to the results obtained for Eqn. (1). The results are reported in Appendix B. The regional dummies are never significant and, of the period dummies, only the dummy for 1992–94 appears significant in the regressions with SEC and SEC&TER. There seems, therefore, to be no evidence that the model of Eqn. (1) is overly restrictive.

In any case, the important result is that, regardless of the generality of the model, the coefficients of variables used as proxies for human capital are always significant, often at the 1% level.

Having ascertained that human capital is an important determinant of FDI inflows, it is worth investigating the relative contribution of the explanatory variables in attracting FDI. The estimated beta coefficients of the regressions in Table 2, which are unit-free measures, are reported in Table 3.

Human capital is one of the most important determinants of FDI inflows. Trade openness, the growth rate of market size and past changes in FDI inflows appear to be the strongest factors in attracting FDI. On the other hand, the beta coefficient of the labor force growth rate is higher than that of stock measures of human

Table 3. *Relative contribution of explanatory variables in attracting FDI inflows (estimated beta coefficients)^a*

	(1)	(2)	(3)
SEC	0.206		
SEC&TER		0.195	
ENROL			0.188
TRADE	0.238	0.261	0.318
GRGDP	0.250	0.260	0.216
CREPS	0.168	0.156	0.145
ENERGY	-0.190	-0.187	-0.203
ΔFDI_{-1}	0.237	0.236	0.311
TIME	0.154	0.146	0.091
GRLABF	0.272	0.252	0.176

^aThe beta coefficient of an explanatory variable is equal to the product of the estimated coefficient and the ratio of the standard deviation of the explanatory variable to the standard deviation of the dependent variable. Data sources and definitions of variables are in Appendix A.

capital but lower with the flow measure. The shortage of energy has smaller beta coefficients than SEC and SEC&TER but larger than ENROL.

All the results presented so far clearly highlight the importance of human capital as a determinant of FDI inflows. A final interesting question addressed in this paper is whether one can discern a trend in the importance of human capital across time. To investigate this issue, the regressions in Table 2 were re-run for sample periods of increasing sizes. More precisely, the regressions were run for 1983–88, 1983–91 and 1983–94, maintaining time periods as three-year averages.

The results, reported in Table 4, are suggestive of an increasing importance of human capital through time. The estimated coefficients of the variables used as proxies for human capital as well as their t -ratios increase in magnitude across the consecutive sample

Table 4. *Human capital as a determinant of FDI through time^a*

	1983–88	1983–91	1983–94
SEC	0.286 (0.98)	0.307 (1.15)	0.552 (2.58)***
SEC&TER	0.230 (1.07)	0.228 (1.25)	0.400 (2.88)***
ENROL	3.89E-03 (0.65)	7.46E-03 (1.81)*	0.013 (2.80)***

^aEstimates are heteroskedasticity-consistent (White correction). t -values are in parentheses. Data sources and definitions of variables are in Appendix A.

*Significance at the 10% level
***Significance at the 1% level.

periods. It can be concluded that human capital plays an increasingly important role over time in attracting FDI. From a certain point of view, the results presented in this paper may be seen as complementing and extending those in Narula (1996). Leaving aside the differences in the objectives and the methodologies of the two studies, the respective results indicate that for a sample period up to the end of the 1980s the presence of human capital may not have been a particularly important determinant of foreign investment in developing countries.³⁴ This paper suggests that, however, as the characteristics of FDI evolve in response to the acceleration in the globalization process in the 1990s, human capital has become an important location-specific advantage of developing countries.

As explained at the beginning of section "Estimation", the results reported in Tables 1–4 are those of the White estimator. Although this seems the preferred procedure in the econometric literature, the issue of how best to deal with heteroskedasticity is far from being settled. A possible alternative to the White heteroskedasticity-consistent estimator is a Weighted Least Squares Estimator. Accordingly, the dependent variable and all explanatory variables have been weighted by the size of the labor force in each country. Given the focus of the paper on the importance of human capital, the choice of these weights seems preferable to more general weights, such as population for example.³⁵

The results of the weighted least squares regressions confirm and in fact strengthen those from the White estimator.³⁶ All proxies for human capital, be it stock or flow measures, are significant at the 1% confidence level. As to the relative importance of locational advantages, only trade openness and labor availability/cost consistently have larger beta coefficients than the human capital variables. The dynamic analysis shows that the estimated coefficients of the human capital variables increase in size as more recent periods are added to the sample period of the regressions and, in fact, they all become significant earlier than in the regressions with the White heteroskedasticity-consistent estimator.

5. CONCLUSIONS

Developing country governments are pursuing policies to attract FDI. In line with

several other studies, the empirical results in this paper confirm the importance of many of the usual determinants of FDI in developing countries. More specifically, the growth of domestic markets, a stable macroeconomic environment, liberalization policies, the availability of energy and a generally supportive business environment are significant explanations for FDI inflows. The availability/cost of labor is also a relevant factor. The contribution of this paper, however, is in highlighting the important role of human capital in regressions involving a large sample of developing countries. In this respect, the empirical results are novel and have wide-ranging policy implications.

As a result of the adoption by TNCs of complex global integration strategies, a significant factor in influencing locational decisions is the presence of sophisticated, created assets in host countries. It is thus crucial—especially in a context of increasing competition for FDI—that developing countries formulate policies that improve local skills and build up their human resource capabilities (World Bank, 2000). This is necessary to raise not only the volume but also the quality and sophistication of the FDI that a country can attract.

Countries that rely exclusively on low-cost low-skill labor or natural resources to attract FDI will find it difficult to induce FDI into high value-added industries and may suffer slower economic growth. Lall (1998) argues that, given minimum levels of skills and infrastructure, low labor costs may now matter only in a handful of low-technology activities, such as low-end garments, since semiconductors have become highly automated and capital intensive.

Empirical analyses should always end with a word of caution. Although the econometric results appear robust to different specifications, it remains the case that the variables that have been used for human capital are only rather distant proxies for the quality of labor, which is what one would ideally like to measure. Moreover, as often in econometrics, it is extremely difficult to attach causal meaning to correlations among variables since omitted variables may distort the true relationship between dependent and explanatory variables. Finally, the empirical analysis has proceeded at a rather aggregate level. A more disaggregated analysis, e.g., at sectoral level, may yield important insights. The research agenda is long.

NOTES

1. A complex integration strategy refers to a TNC's ability to locate various functional activities wherever they can be done best to fulfill the firm's overall strategy. See UNCTAD (1993, 1996).
2. The relative importance of different location-specific determinants of FDI depends on several aspects of the investment itself: for example, its motive (e.g., resource-seeking, market-seeking, trade-seeking FDI, etc.), its type (e.g., new or sequential FDI), the sector (e.g., services or manufacturing) and the size of investors (small or large TNCs). Moreover, the relative importance of different determinants also changes as the domestic and the international economic environment evolve over time.
3. "Created assets can be tangible, like the stock of financial and physical assets such as the communication infrastructure or marketing networks, or intangible. The list of intangible assets is long but they have a common denominator: knowledge" (UNCTAD, 1998, p. 114).
4. Dunning (1988) argues that, subject to the constraints imposed by the nature of an industry, TNCs adjust the factor-intensity of both product and process technologies to local conditions (e.g., more labor-intensive production in markets where labor is relatively less expensive, and scaled down product quality or production processes where markets are small and economies of scale impossible). Moreover, Dunning and Narula (1995) suggest that the relationship between the type of investment and the skill level of the labor force may operate both across countries and within individual countries over time.
5. The variables they use are literacy, school enrollment and the availability of technical and professional workers.
6. Countries in the sample are classified into three groups as unattractive, moderately attractive, and highly attractive for FDI. Root and Ahmed (1979) employ multiple discriminant analysis rather than multiple regression on the basis that the former is better suited to handle investment flows and certain explanatory variables that are measured with categorical rather than continuous variables.
7. They use secondary education as a proxy for skilled workforce.
8. The main objective of their study is to compare three types of models, namely, a pure-economic model, a pure-political model and a "politico-economic" model, which encompasses the other two. The human capital variable is classified as an economic variable. It is significant at 5% in the pure-economic model but is never significant in the preferred "politico-economic" model.
9. The number of patents granted in the host country as a ratio of the number of students at the tertiary level is used as an indicator of a country's technological capability.
10. The ratio of total enrollment of students at the tertiary level to total population is used as an indicator of human skills and competence. This variable is also interpreted as reflecting the existence of infrastructural facilities.
11. In the context of his study, which compares industrialized with developing countries, Narula rationalizes these results by arguing that, since much of LDCs' inward FDI is aimed at exploiting natural-asset-based advantages through resource-seeking investment, the lack of created assets and infrastructure in host countries is offset by the relatively low cost of unskilled labor and primary commodities. "The results would suggest that inward FDI into developing countries occurs *because of* (emphasis in the text) the low level of created assets" (p. 64).
12. The role of these unobservable factors is assessed by separating countries that were previously colonies from the rest of the countries. While ex-colonies were regarded as open economies appealing to the foreign investor, independent countries were seen as involving risks of political and institutional nature. The fact that the human capital variable turns out significant in the group of ex-colonies but not in the other countries is interpreted by Hanson as evidence of the greater importance of political and institutional factors compared to education and training.
13. As a proxy for human capital Hanson uses the adult literacy rate. This has been squared to capture the idea of educational externalities.
14. A relative measure of FDI is employed to control for any large-country effects. The expression "net" FDI inflows does not mean that FDI outflows are subtracted out. See Appendix A for the precise definition of this variable.
15. An alternative database on human capital stock is by Barro and Lee. Unlike the Nehru, Swanson and

Dubey database, where data are available annually, the data set by Barro and Lee is only at five-year intervals. As explained in section “Estimation”, we adopt panel estimation with time periods represented by three-year averages. Mechanical extrapolation of data to fill in the missing years in the Barro–Lee data set would certainly introduce errors. There are other differences between the two databases, since their data sources are different. The question whether estimates from census-based surveys used by Barro and Lee or estimates based on UNESCO enrollment data as in Nehru, Swanson and Dubey are superior has not yet been settled. It is encouraging, however, that the correlation coefficient between the two databases exceeded 80% even before Barro and Lee introduced changes in their methodology that brought it closer to the methodology followed by Nehru, Swanson and Dubey.

16. Oligopolistic reaction denotes an interactive kind of corporate behavior by which rival firms counter one another’s move by making similar moves.

17. The choice of GDP-related explanatory variables may raise a technical problem since the dependent variable is also expressed relative to GDP. Alternative variables—such as, for example, the rate of growth of private consumption and domestic absorption—were used here to reflect the importance of markets but regressions with the GDP growth rate outperformed the others.

18. Some empirical studies point to the size of domestic markets in host countries as one of the determinants of FDI inflows (Petrochilas, 1989; Schneider & Frey, 1985; Torrisi, 1985; UNCTAD, 1998). In our regressions, however, the inclusion of variables to represent market size was successful neither as a replacement nor in conjunction with the growth of market size. This finding is common to many other empirical studies (see, for example, Lunn, 1980; UNCTAD, 1998; UNCTC, 1992).

19. One anonymous referee pointed out that the deviation of efficiency wages in country i from average efficiency wages for all countries may not be a good indicator of relative wage costs because it is affected by industry structure in each country.

20. Financial repression always restricts the private sector’s share of domestic credit. Alternative variables for financial liberalization/financial sector depth—such as the ratio of M2 or saving to GDP—were tried but did not produce satisfactory results.

21. More conventional variables for macroeconomic instability—such as inflation or the budget deficit to

GDP ratio—were not successful. This could partly be due to the negative correlation mentioned in the text between macroeconomic instability and the share of domestic credit to the private sector.

22. Bird and Rowlands (1997) investigate whether the implementation of economic programs supported by the International Monetary Fund and the World Bank has a catalytic effect for private capital inflows. For the effect of structural adjustment programs on economic growth, export performance and industrialization, respectively, see Noorbakhsh and Paloni (2001, 1998, 1999). For the effect of these programs on human development, see Noorbakhsh (1999).

23. Barro’s analysis (1996, 2000) is in the context of growth and domestic investment. He argues that these initially rise with democracy, reach a peak and subsequently decline as the pressure to enact redistributions of income tend to compromise property rights and reduce the incentives for people to work and invest. We tested whether this argument could be extended to FDI. The index of democracy and its square turned out significant—at 10% and 5% level, respectively—only in one case, that is, when the secondary enrollment ratio was used as the human capital variable. (These results are available from the authors on request.) With stock measures of human capital, variables for democracy were all insignificant. Since in any case the democracy variables change none of the results concerning the significance of the human capital variables or the other control variables, we excluded them from the regressions reported in this paper.

24. This is one of the best-known country-risk indices. It assesses risk on the basis of various economic, credit and political indicators. It also contains an assessment of institutional factors that, in the context of research on economic growth, have been shown to have great significance (Knack & Keefer, 1995).

25. Lim (1983) uses the same proxy in his study on FDI in developing countries.

26. The sample period of estimation is 1983–94 due to the inclusion of a lagged explanatory variable.

27. The following countries are in the sample: Bolivia, Botswana, Brazil, Cameroon, Central African Republic, Chile, Colombia, Costa Rica, Côte d’Ivoire, Ecuador, Egypt, El Salvador, Gambia, Ghana, Guatemala, Honduras, India, Kenya, Madagascar, Malaysia, Mauritius, Mexico, Morocco, Niger, Pakistan, Panama, Peru, Philippines, Senegal, Sri Lanka, Thailand, Trinidad and Tobago, Tunisia, Turkey, Uruguay, and Zambia.

China has been excluded from the sample due to its strong dominance of FDI inflows into developing countries, which has been achieved in a relatively short period of time, and the fact that there may be special circumstances for the boom of FDI into China, such as its particular political system, the process of economic restructuring and other political considerations in a domestic market of vast size (see UNCTAD, 1994). Moreover, concerns have been raised about the reported magnitude of FDI inflows into China. World Bank (1996) reports that the overestimation may be more than 25% of annual FDI flows.

28. Regressions (1)–(4) were also run without the time trend. Its exclusion, however, made very little difference to the results. We decided to report the results with the time trend, first, because there are good theoretical reasons for including the time trend and, second, for ease of comparison with the regressions including stock measures of human capital—reported in Table 2—where the time trend is always significant.

29. The econometric literature suggests that the random effects model may be appropriate if the sampled cross-sectional units are small relative to the size of the population. On the other hand, if—as in this paper—the number of countries in the data set represent a large sample of the population, the use of the fixed effects model may be more appropriate (for a detailed treatment of the fixed and random effects models see, among others, Baltagi, 1995; Greene, 1997; Kennedy, 1998). To our knowledge, the empirical literature on the determinants of FDI has on the whole avoided the use of the random effect model.

30. The random effects model is based on the assumption that the stochastic country differences are uncorrelated with the other regressors. This assumption can be tested by means of the Hausman test, which can be seen as a test for the random effects model vs. the fixed effects model. The null hypothesis of no correlation was strongly rejected regardless of the particular human capital variable included in the regression. The values of the test statistic, which is chi-squared distributed, were 64.1, 27.2, 18.2 with ENROL, SEC, SEC&TER, respectively. These values are all significant at the 1% level.

31. The Variance Inflation Factor (VIF) has been used as an indicator of multicollinearity. This is based on

auxiliary regressions of each explanatory variable included in the original regression on the remaining explanatory variables. The R -square from these regressions (R_j^2) is used to calculate the VIF for each regressor, defined as $VIF_j = 1/(1 - R_j^2)$. A value of VIF greater than 10 may reflect the presence of multicollinearity. In our runs, the inclusion of country dummies caused the VIF of energy shortage, trade openness, all measures of human capital as well as many country dummies to shoot up to well over 10. For the measures of human capital, the VIF increased to about 40 and above.

32. The “triad” is defined as the United States, the European Community and Japan. These countries account for about four-fifths of outward stocks and flows of FDI. The “triad pattern” denotes the clustering of host countries in a region around a single triad member. It has been argued that this pattern may reflect the strategies of TNCs in the triad to build up regionally integrated core networks of affiliates (UNCTC, 1991).

33. In practice, Eqn. (2) with a time trend and Eqn. (3) are similar, the only difference being in the treatment of time periods. While with time dummies all periods are given the same weight but their coefficients are allowed to vary, the time trend assigns increasingly greater weights to more recent periods.

34. It should be noted that the dependent variable in the two studies is different. In Narula (1996) the dependent variable is the stock of FDI, while in this paper it is FDI inflows.

35. Greene (1997) notes that, although it is not generally possible to be certain about the nature of the heteroskedasticity in a regression model, the choice of an appropriate set of weights need not be a major problem: the weighted least squares estimator is consistent regardless of the weights used, as long as the weights are uncorrelated with the disturbances. In our case, the correlation coefficients between the size of the labor force in each country and the residuals from the weighted least squares regressions are extremely small: 0.017, 0.028, -0.001 in the regression with SEC, SEC&TER and ENROL, respectively.

36. The results of the weighted least squares regressions are available from the authors on request.

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APPENDIX A. SOURCES AND DEFINITION OF VARIABLES

FDI	Net foreign direct investment inflows as a percentage of GDP. Net inflows are defined as the sum of (net) equity capital, reinvestment of earnings, other long-term capital and short-term capital as shown in the balance of payments.	EFFWAGE2	Efficiency wage in country <i>i</i> . Efficiency wage is defined as: average wage per worker divided by labor productivity. Labor productivity is average output per worker.
ΔFDI_{-1}	Change in the FDI to GDP ratio in period $t - 1$.	WAGE	Product wage rate, defined as nominal wage divided by GDP deflator.
ENROL	Secondary school enrollment ratio, defined as total secondary enrollment divided by the population of the relevant age group.	GRLABF	Growth rate of labor force.
TRADE	Total trade to GDP ratio.		
GRGDP	Growth rate of real GDP.		
CREPS	Credit to private sector as a percentage of GDP.		
ENERGY	Net energy imports (energy use less energy production) as a percentage of energy use.		
TIME	Time trend.	SEC	Accumulated number of years of secondary education in the working age population.
EFFWAGE1	Relative efficiency wage rate: deviation of efficiency wage in country <i>i</i> from average efficiency wages. For the definition of efficiency wage see EFFWAGE2.	SEC&TER	Accumulated number of years of secondary and tertiary education in the working age population.

Data for the above variables, with the exception of the wage variables, are extracted/computed from the World Bank's World Development Indicators CD-Rom. Wage data have been extracted from UNIDO's Industrial Development Report (1996, 1997).

Data for SEC and SEC&TER, calculated by Nehru, Swanson and Dubay, are available from the World Bank Web site. These two series have been updated by us.

AFRICA 1 for African countries; 0 otherwise.
 LATINAM 1 for Latin American countries; 0 otherwise.
 1986-88 1 for the 1986-88 period; 0 otherwise.
 1989-91 1 for the 1989-91 period; 0 otherwise.
 1992-94 1 for the 1992-94 period; 0 otherwise.

APPENDIX B

Table 5. Regressions with regional and time dummies^a

Dependent variable: FDI	(1)	(2)	(3)	(4)	(5)	(6)
SEC	0.601 (2.34)**	0.595 (2.29)**				
SEC&TER			0.455 (2.57)***	0.450 (2.52)***		
ENROL					0.011 (1.96)**	0.011 (1.92)*
TRADE	8.40E-03 (2.01)**	8.50E-03 (2.07)**	8.84E-03 (2.05)**	8.94E-03 (2.10)**	0.014 (3.30)***	0.014 (3.23)***
GRGDP	0.106 (2.89)***	0.110 (2.85)***	0.109 (2.97)***	0.114 (2.92)***	0.099 (1.91)*	0.100 (1.93)*
CREPS	0.010 (1.82)*	9.60E-03 (1.73)*	0.010 (1.81)*	9.52E-03 (1.73)*	8.74E-03 (1.39)	8.25E-03 (1.27)
ENERGY	-1.77E-03 (-2.94)***	-1.80E-03 (-3.08)***	-1.72E-03 (-2.88)***	-1.75E-03 (-3.02)***	-2.57E-03 (-3.11)***	-2.61E-03 (-3.16)***
ΔFDI_{-1}	0.335 (2.41)**	0.322 (2.20)**	0.334 (2.31)**	0.321 (2.12)**	0.439 (2.23)**	0.437 (2.20)**
TIME	0.158 (2.55)***		0.150 (2.38)**		0.107 (1.31)	
GRLABF	0.563 (3.82)***	0.569 (3.86)***	0.541 (3.84)***	0.546 (3.88)***	0.375 (2.03)**	0.375 (2.00)**
AFRICA	0.127 (0.48)	0.124 (0.47)	0.126 (0.47)	0.123 (0.46)	-0.151 (-0.45)	-0.172 (-0.50)
LATINAM	0.108 (0.52)	0.108 (0.52)	0.013 (0.06)	0.014 (0.07)	0.065 (0.21)	0.064 (0.20)
1986-88		-7.31E-03 (-0.03)		-0.015 (-0.06)		0.359 (1.19)
1989-91		0.199 (0.97)		0.186 (0.90)		0.089 (0.38)
1992-94		0.462 (2.39)**		0.434 (2.22)**		0.361 (1.39)
Constant	-2.793 (-4.45)***	-2.414 (-4.02)***	-2.688 (-4.63)***	-2.328 (-4.24)***	-2.193 (-3.28)***	-1.93 (-3.05)***
\bar{R}^2	0.482	0.476	0.483	0.477	0.526	0.518

^a Estimates are heteroskedasticity-consistent (White correction). *t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

* Significance at the 10% level.

** Significance at the 5% level.

*** Significance at the 1% level.