

**Low wages or skilled labour?  
Prospects for foreign direct investment in developing countries**

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**Abstract**

Most developing countries consider foreign direct investment (FDI) as an invaluable source for filling the resource gaps that hinder their development programmes. Moreover, FDI can also be a medium for acquiring skills, technology, organizational and managerial practices and access to markets. However, although total FDI inflows have 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 government policies that might enhance the attractiveness of developing countries as locations for FDI. The first part of the paper analyses the evolution in the structural characteristics of FDI and discusses the changing needs of transnational corporations (TNCs). The empirical section of the paper investigates the relevance of human capital in attracting FDI to developing countries. The empirical findings are: (i) human capital is a statistically significant determinant of FDI inflows; (ii) human capital is one of the most important determinants; and (iii) its importance has become increasingly greater through time. This has wide-ranging policy implications.

## **1. Introduction**

Since the early 1980s developing countries have significantly eased restrictions on Foreign Direct Investment (FDI) flows 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 capital has become especially important as a consequence of the reduction in the flows of other official and private capital since the debt crisis. FDI is also a means to balance loan and equity capital in private foreign capital inflows.

However, 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. On the other hand, foreign investors are attracted to locations that offer a combination of locational advantages. Although total FDI inflows have 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 government 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 global integration strategies.

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 analyses changes in the composition of FDI and in the strategies pursued by TNCs. This section also discusses the mutual relationships between human capital and FDI. Section 4 investigates whether the empirical evidence supports the view that human capital has a statistically significant influence on FDI inflows. Concluding comments are in the final section.

## **2. The growth of FDI into 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. Between 1980 and 1996, worldwide FDI stock – a measure of the globalization of production - increased from \$480 billion to \$3.2 trillion and doubled as a percentage of world GDP to 9 percent.

Developing countries received about 40 percent of global FDI inflows in 1994-96, compared with 25 percent in 1980-84. The developing countries' share of the worldwide FDI inward stock increased over the past ten years, to reach 30 percent by 1996.

Thus, although developed countries received a record \$195 billion in FDI flows in 1996, there has been a steady decline in their share of global inflows since 1989 due to the increasing attractiveness of developing countries.

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 percent of FDI flows to developing countries and 13 percent of global FDI inflows - China is the second largest recipient in the world behind the United States.<sup>1</sup>

With \$68 billion on average in annual inflows during 1994-96, South, East and South-East Asia received two-thirds of the developing-country total in that year. Excluding China, they received \$32 billion and their share was 30 percent 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 percent of all developing country inflows. This share is declining, however, from the peak of 39 percent in 1986. The investment stock in South, East and South-East Asia surpassed that in Latin America in 1988 and, since then, the disparity has widened.

The absolute level of FDI flows into Africa is low but has increased from an annual average of \$800 million during 1975-1980 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 for Latin America during the same period.

However, Africa is the only developing region where inflows dropped in 1996 compared with 1995. Africa's share of developing-country inflows was 4.1 percent 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 percent during 1986-1990.<sup>2</sup> Nevertheless, the decline in the share of both Africa and Latin America and the Caribbean in total developing-country inflows is partly the result of the rise in China's share. Excluding China, during 1994-96 Africa's share becomes 5.8 percent and that of Latin America and the Caribbean 42.6 percent.

The 48 least developed countries (32 of them in Sub-Saharan Africa)<sup>3</sup> have captured very little of the increase in FDI flows into developing countries during the 1990s. Although their annual average FDI inflows almost tripled between the periods 1986-1990 and 1991-1996, their share of developing-country inflows declined from 2.1 percent to 1.8 percent.<sup>4</sup>

While FDI flows into Africa or the least developed countries 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 1994-1996, FDI flows accounted for 7.8 percent in Africa and as much as 10 percent in eight least developed countries. In 1996 Africa's FDI stock was 16.6 percent 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. These countries accounted for a half of FDI flows to developing countries during 1979-1981, compared to one-fifth during 1995-1996.

In Africa, while flows continue to be concentrated in a few host countries (Nigeria and Egypt accounted for over a half of FDI into Africa during the first half of the 1990s), other countries are beginning to receive sizeable inflows. Morocco, for example has replaced Cameroon as one of the five largest recipients. Moreover, the share of the five largest recipients in all investment flows into Africa dropped from 93 percent during 1981-85 to 78 percent during 1991-96. In Latin America and the Caribbean, in 1991-96, eight countries received average annual inflows of over \$1 billion, compared with only two countries in 1990.

FDI flows have gone through periods of expansion and contraction during which the share of developing countries has not moved consistently in the same direction. For example, FDI recessions took place in 1975-77 and 1991-93. The developing-country share fell during the former but rose during the latter.

Periods of FDI booms were 1979-81, 1986-90 and the period after 1995. The first one saw an increase in the developing-country share, although this was mainly the result of petroleum investments in oil producing countries. During the 1986-90 period, FDI flows into the developed countries grew faster than those to the developing countries. By contrast, the more recent FDI boom is characterized by an increase in the developing-country share of global inflows and diversification of recipients.

A fitting observation for the conclusion of this section is that the evolution of certain countries' or regions' shares in world FDI flows may not be fully indicative of the importance of FDI in those countries or regions. For example, during the same period when Africa's share in global FDI flows declined, FDI stock in the continent as a percentage of GDP almost trebled, from 6 percent in 1985 to 16.6 percent in 1996. More generally, therefore, together with the share of the region or the country in world FDI flows, the growth rate of FDI also matters.

### **3. FDI characteristics and the importance of human capital**

The rapid growth of FDI has been accompanied by very 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.<sup>5</sup>

The relative importance of this factor as a determinant of FDI declined in the 1960s and 1970s. FDI flowed into the manufacturing sector of developing countries to enter markets sheltered from international competition by high tariffs or quotas (*tariff-jumping* FDI). Market size and its growth became increasingly important as determinants of the geographical pattern of FDI.<sup>6</sup>

During the 1980s, FDI flows shifted towards services and technology-intensive manufacturing. In 1990, the share of services in the world stock of FDI was close to 50 percent. Their share in annual flows was almost 60 percent. Between 1980 and 1990, the share of capital- and technology-intensive industries in FDI rose faster in developing than developed countries, accounting in 1990 for more than 12 percent of developing countries' inward stock of manufacturing FDI, compared with only 7 percent in developed countries.<sup>7</sup>

Nevertheless, despite these general trends, UNCTAD (1993) reports that (i) the availability of natural resources is still an important determinant of inward FDI in a number of developing countries, for example in Sub-Saharan Africa; and (ii) in developing countries, it is still manufacturing that has the largest inward stock of FDI.

In general, the availability of low-cost unskilled labour was a prominent location-specific determinant of FDI in developing countries.<sup>8</sup> The gradual move of FDI away from labour-intensive, low-cost, low-skill manufacturing towards more capital-, knowledge- and skill-intensive industries reflects new technological advances that have reduced the labour content of production and increased the knowledge content. Thus, for multinational corporations, the presence of a well-educated pool of labour has become increasingly attractive relative to low labour costs by themselves (Pfeffermann and Madarassy, 1992).

As a result of improvements in human resources, more and more developing countries compete in attracting FDI by offering locational advantages that go beyond low-cost labour, such as competitive combinations of wages, skills and productivity.

The globalization process – which has been driven by improvements in technology, openness to trade, FDI and technology flows, together with the ensuing competitive pressures - has led to more sophisticated strategies by TNCs to enhance their global competitiveness. Firms split up the production process into various specific activities (such as finance, R&D, accounting, training, parts production, distribution) that are carried out by affiliates in locations best suited to each particular activity.

Foreign direct investment is no longer simply a means to access foreign markets for expanding sales, but also a means to access factors of production, particularly created assets,<sup>9</sup> in order to rationalize production internationally. As a result, locational decisions are now more likely to be influenced by the presence of sophisticated, created assets, including human resources with innovatory capabilities and marketing, planning and management skills, rather than by plentiful supplies of low-cost labour or natural resources.

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 the general strategy of enhancing competitiveness. This strategy therefore makes it increasingly difficult to point to a single locational determinant. Instead, TNCs that pursue integrated international production strategies may be attracted by countries that offer an adequate *combination* of locational determinants such as conditions for efficient operations, high-quality resources/assets, and access to markets.



In spite of a shift in the relative importance of different economic determinants, the traditional determinants related to large markets, trade barriers and non-tradable services are still at work, and account for a large share of worldwide FDI flows. For example, 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 non-tradable services that must be produced when and where they are consumed. Thus, a number of firms (especially with new technologies and products) still invest abroad merely as a means of reaching markets and to exploit their proprietary technology in foreign markets, as it was the standard strategy in the 1960s and 1970s.

Nevertheless, there is a growing range of goods and (tradable) services for which FDI is seen as a means of increasing competitiveness. It is for projects in this range that countries compete in the world FDI market by offering combinations of the principal locational determinants that can best contribute to the competitiveness of the corporate system as a whole.

Technology, innovatory capabilities and skills are key sources of competitive strength for firms and countries. A crucial factor for enhancing the competitiveness of firms is innovation through research and development (R&D) in new or improved products/processes.

Although R&D activities have traditionally been located in the home country, the availability in developing countries (for example, India and Singapore) of a large pool of scientifically and technically trained manpower - as well as its substantially lower cost<sup>10</sup> - has contributed to a dispersion of R&D.<sup>11</sup>

TNCs are an important medium for the transfer of technology and related skills to developing countries. The nature of, and degree to which, technology is

transferred to affiliates depend, among other factors, upon the skills and managerial know-how that can be mustered in an affiliate.

Despite the increasing dispersion of R&D activities, most affiliates of TNCs are only involved in production operations. For these, the transfer of production technology takes place through imports of machinery, intermediate and final products, as well as services. The transfer of technology is accompanied by the transfer of skills necessary for utilizing technologies or participating in technological development.<sup>12</sup>

Apart from trade or licensing, local firms in the host country gain access to foreign technology through spillovers and externalities. Several channels are possible. In those cases where R&D activities are undertaken in the host country, foreign affiliation may lead to the emergence of local entrepreneurs by licensing the know-how and technologies for commercialization of by-products (Reddy, 1993).

Even where foreign affiliates do not undertake any R&D, they may stimulate productivity growth of indigenous firms by exposing them to competition, provided that the host country has the technological capabilities to adapt the foreign technology to local conditions and improve it. This is more likely to be the case among those developing countries that are more industrially mature and have invested more in human capital.<sup>13</sup>

Evidence from many developing countries suggests that spillovers and externalities contribute to the diffusion of skills and know-how in host countries (see, for instance, the studies by Katz, 1987, on Latin America; Blomström, 1989, on Mexico; Yoshihara, 1988, and Hill, 1993, on South-East Asia; Gershenberg, 1987, on Kenya; Shelp, 1984, on the Philippines).

The relationships between human capital and the production activities of TNCs are complex. On the one hand, TNCs tend to be attracted to those locations that

offer them access to the created assets that they need. To put it in another way, the skill and education level of a population determines, to a considerable extent, the volume of FDI inflows and activities that TNCs undertake in a country.

A country seeking to attract FDI must at least meet TNC expectations with regard to a minimal educational and competence level within the labour force. If a country seeks investment in sophisticated activities or higher value-adding functions, its human resources must possess the necessary specialist skills.

Empirical evidence suggests that, subject to constraints imposed by the nature of an industry, TNCs tend to adjust the factor-intensity of both product and process technologies to local conditions, (e.g., more labour intensive production in markets where labour is relatively less expensive, and scaled down product quality or production processes where markets are small and economies of scale impossible).<sup>14</sup> The relationship between the type of investment and the skill level of the labour force operates both across countries and within individual countries over time.<sup>15</sup>

On the other hand, TNCs can make a considerable contribution to human resource development, particularly in developing countries, mainly through their activities as providers in the areas of both education and training. In formal education, the role of TNCs is largely confined to direct or indirect investment in the provision of tertiary-level education, especially in business management.

However, the most significant effect of TNCs on the development of human resources stems from the training and other learning opportunities they provide to their staff in various forms. Such training may be valuable for workers in developing countries in which opportunities for acquiring vocational, technical and management skills are limited.<sup>16</sup>

Training and other forms of learning provided by TNCs are directed towards all categories of workers, although the main focus is on managerial and technical personnel. In general, many TNCs pursue mixed human resource management policies, in the sense that human resource management is centralized for senior executives and decentralized, i.e. country-based, for other employees such as production workers (Evans and Lorange, 1990). Labour is no longer seen as a factor whose cost has to be minimized but as a resource whose potential has to be maximized. Indeed, the distinction between blue-collar and white-collar workers is already becoming blurred in some industries, as growing emphasis is being placed on knowledge workers. Another implication is that the recruitment of production workers will be more selective, and recruitment standards generally higher, as basic education becomes a pre-requisite for workers – so that they can take full advantage of training.

In addition, TNCs provide opportunities for informal learning through contacts with experts and through the creation of a business culture conducive to economic growth and development. TNCs are also major innovators and disseminators of organizational and managerial practices (OMPs) and as such they can have a significant impact on the competitiveness of enterprises by improving the organizational and managerial capabilities of firms or other institutions in the economy. TNCs may also prove to be more effective in motivating managers.<sup>17</sup>

One of the most significant channels through which TNCs contribute to human resource development consists in the relationships they establish with local suppliers through the provision of information (on markets, investment plans, competitors), technical assistance (product design, production processes, overall quality management, staff development), financial assistance (soft loans, pre-financing of investment, prepayment of orders) and managerial assistance. It is an empirical

observation that local sourcing tends to be much lower in the early years of establishment and may increase over time.

The final observation to conclude this section is that, through FDI, host economies may have the opportunity to achieve technological upgrading, skills development, and improved organizational and managerial practices. However, whether these prospects turn into reality depends quite considerably on the extent to which indigenous human resource capabilities – particularly education, as the most important element in human resource development - are built up in those economies (De Mello, 1997).

The interaction between a country's skill and education levels and the training activities of TNCs can result in a virtuous circle, where the domestic availability of skills contributes to attracting FDI and is in turn upgraded by the employment and training opportunities that TNCs provide. This strengthens a country's locational advantage for obtaining further investments.

#### **4. Human capital as a resource that may attract FDI**

##### *4.1. The econometric approach*

Having reviewed the complex interrelationships that are expected to exist between FDI and human capital, the objective of this section is to investigate empirically whether a developing country's skill and education levels have a statistically significant impact in attracting FDI. This question has of course important policy implications for developing countries' governments.

This empirical investigation is based on the following regression equation:

$$FDI_{it} = aHK_{it} + b'CV_{it} + I + e_{it} \quad (1)$$

where the dependent variable,  $FDI$ , is net FDI inflows expressed as a percentage of GDP;<sup>18</sup>  $HK$  is a measure of human capital;  $CV$  is a vector of control variables, i.e. a set of FDI determinants that are not related to human resources;  $I$  is a common fixed effect term and  $e$  is a white-noise error term.

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 flows 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 attempts to reduce the problem of random fluctuations in the data while, at the same time, exploiting the time-series variation in the data by using panels based on three-year averages. Thus, in the above equation, the subscript  $i$  refers to a given country; the subscript  $t$  denotes a three-year period.

#### *4.2. Selection of explanatory variables*

*a.* It has already been argued above that high levels of education are the most important element in human resource development. 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 labour 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 the secondary school enrolment ratio is employed as a proxy for the level of human capital. The use of this variable is 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). (Also see the review by Levine and Renelt, 1992).

It may be noted, however, that school enrolment is a measure of a *flow*, while the concept of human capital would require a measure of *stock*. Thus, following Nehru, Swanson, and Dubey (1995), two alternative measures of human capital are adopted in this paper: the education stock is represented by the number of accumulated years of secondary and secondary *plus* tertiary education present in the working age population.

*b.* The choice of control variables has been guided by previous empirical work on FDI. A major determinant of FDI inflows to developing countries is the growth of the domestic market in host countries (Root and Ahmed, 1979; Schneider and Frey, 1985; UNCTC, 1992; UNCTAD-DTCI, 1993). Rapid economic growth leads to increases in income and consumer demand for goods and services that help attract FDI. Favourable market growth prospects can assure a long-term commitment by foreign investors.

Moreover, considering the oligopolistic environment in which FDI decisions are taken, market growth is also likely to be a good indicator of the intensity of oligopolistic reactions. Checkmating investment would take place more actively under high growth conditions, since rapidly growing markets offer oligopolists “their best

chance of improving their lot relative to their rivals” (Knickerbocker, 1973, p. 166). The rate of growth of GDP<sup>19</sup> is used here as a proxy for the growth of market size in host countries.<sup>20</sup>

c. It is a standard hypothesis that the cost of labour in many developing countries may exert a positive influence on labour-intensive, efficiency-seeking FDI since, for a given level of productivity, labour typically costs less than in developed countries. Although some studies seem to find a wage cost variable to be a significant determinant of FDI flows (see, for instance, Flamm, 1984; Schneider and Frey, 1985; Lucas, 1993; and Wheeler and Mody, 1992), the empirical results from a large number of studies are not in general unequivocal (see for instance Kravis and Lipsey, 1982; Wei, 1997a, and 1997b).

One important obstacle in studies testing the hypothesis that low labour costs may be a locational determinant of FDI inflows consists in the lack of a satisfactory measurement of the labour 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 labour. Third, this efficiency wage should be compared to that of relevant competitors.

In this paper, alternative variables are used to measure the cost of labour. The first measures the deviation of efficiency wages (defined as the average wage per worker divided by labour productivity, or average output per worker) in country *i* from average efficiency wages for all countries. The second variable measures efficiency wages in country *i* only. The third variable measures the product wage (nominal wage divided by GDP deflator).

Another variable used in this paper is the growth rate of the labour force. This variable measures the availability of labour – which must also be an important



consideration for labour-intensive, efficiency-seeking FDI (UNCTAD, 1994) – rather than the cost of labour. Nevertheless, it may be taken as a broad proxy for the cost of labour under the assumption that a natural consequence of the abundance of labour will be its low price.<sup>21</sup> Availability in this sense implies not only abundance but also low cost relative to productivity.

*d.* 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 common practice, openness is measured in this paper by the ratio of total trade to GDP.<sup>22</sup>

*e.* The implementation of sound domestic macroeconomic reforms is an important factor in the location decision of TNCs in developing countries. Macroeconomic instability, in the form of budget deficits and high inflation rates, has severely adverse consequences for all types of investment, domestic as well as foreign. Moreover, a macroeconomically unstable environment will be characterized by financial repression, since this is a means for the government to fund its deficit relatively cheaply.

On the other hand, the proper environment to nurture structural reforms is one that is macroeconomic stable. Financial liberalization, including the deepening of local equity markets, is seen as an important reform to sustain FDI inflows to developing countries. The variable chosen in this paper as a proxy for financial liberalization/macroeconomic stability is domestic credit to the private sector as a percentage of GDP.

*f.* Energy is a critical factor of production and a fundamental requirement for the implementation of effective industrial strategies. Dunning (1988) argued 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 – like cheaper energy sources – to minimize costs. The availability (shortage) of energy is therefore an important resource to determine a country's locational advantage. The variable used in this paper is the shortage of energy and is measured by net energy imports (energy use less energy production) as a percentage of energy use.

*g.* 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 can only play a supportive role and will rarely be decisive determinants of FDI inflows.

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).

*h.* 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 and Mody, 1997; Pfeffermann and Madarassy, 1992).

Second, as shown by Johanson and Wiedersheim-Paul (1993), there is evidence that investors tend to favour 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. Thus, FDI flows are likely to require time to adjust to desired levels, depending on the specific constraints faced by a TNC.

#### *4.3. Estimation*

The data cover the period 1980 to 1994.<sup>23</sup> Time periods are defined as non-overlapping three-year averages. The sample includes thirty-six developing countries from Africa, Asia and Latin America.<sup>24</sup>

Equation (1) was initially estimated by using OLS. However, since the null hypothesis of homoscedasticity was rejected at the 1 percent level, the White correction was adopted to obtain heteroscedasticity-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 labour.

**Table 1. Secondary enrolment and other determinants of FDI inflows***Dependent variable: FDI*

	(1)	(2)	(3)	(4)
<i>ENROL</i>	0.011 (1.82)†	0.011 (1.82)†	9.10E-03 (1.69)†	0.013 (2.80)**
<i>TRADE</i>	0.017 (3.76)**	0.017 (3.77)**	0.016 (3.69)**	0.013 (3.53)**
<i>GRGDP</i>	0.105 (1.98)*	0.105 (1.97)*	0.103 (1.85)†	0.101 (1.97)*
<i>CREPS</i>	5.40E-03 (0.74)	5.42E-03 (0.75)	6.26E-03 (0.87)	0.010 (1.76)†
<i>ENERGY</i>	-2.47E-03 (-3.06)**	-2.47E-03 (-3.06)**	-2.64E-03 (-3.02)**	-2.48E-03 (-3.14)**
<i>DFDI<sub>t-1</sub></i>	0.451 (2.25)*	0.451 (2.25)*	0.449 (2.29)*	0.447 (2.31)*
<i>TIME</i>	0.062 (0.66)	0.068 (0.69)	0.068 (0.72)	0.108 (1.36)
<i>EFFWAGE1</i>	0.411 (0.42)			
<i>EFFWAGE2</i>		0.388 (0.40)		
<i>WAGE</i>			4.82E-04 (0.43)	
<i>GRLABF</i>				0.415 (2.52)**
<i>Constant</i>	-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

Estimates are heteroscedasticity-consistent (White correction).

*t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

\*\* Significance at the 1 percent level.

\* Significance at the 5 percent level.

† Significance at the 10 percent level.

Overall, the results show that human capital is an important determinant of FDI inflows: the coefficient of secondary school enrolment (*ENROL*) is significant at the 10 percent confidence level in regressions (1)-(3) and at 1 percent in regression (4).

The importance of some control variables is also confirmed. The coefficients of trade openness and shortage of energy are always significant at the 1 percent level.

The coefficient of the lagged change in the dependent variable is always significant at 5 percent. The growth of the domestic market - represented by the growth rate of GDP – is significant at 5 percent in regressions (1), (2), and (4) and at 10 percent in regression (3).

The results relative to other variables are less robust. The coefficients of variables directly measuring different specifications of wage costs - regressions (1) to (3) – are all insignificant and with the wrong sign. On the other hand, the coefficient of the growth rate of the labour force, included in regression (4), is significant at the 1 percent level and correctly signed. It may be noted that, when this variable is used, the significance of human capital increases substantially. The coefficient of the percentage of credit to the private sector – the variable used as a proxy for macroeconomic stability – is only significant in regression (4) at the 8 percent confidence level. Finally, the time trend, which has been included to proxy unobserved components, is never significant.<sup>25</sup>

As argued in Section 4.2. above, the relevant measure of human capital should measure a stock, not a flow. Thus, Regressions (1) to (4) have been re-run by replacing the secondary school enrolment 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 labour force – analogous 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 enrolment ratio from Column (4) in Table 1.

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

*Dependent variable: FDI*

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

Estimates are heteroscedasticity-consistent (White correction).

*t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

\*\* Significance at the 1 percent level.

\* Significance at the 5 percent level.

† Significance at the 10 percent level.

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 percent confidence level. The statistical significance of all the other variables is also

confirmed. Moreover, the coefficients of the time trend and the rate of growth of GDP are now significant at 1 percent.

Although the results concerning the significance of human capital – as well as other factors – as determinants of FDI inflows appear robust, one might wonder whether the estimated model is unduly restrictive. This can be seen by generalizing Equation (1) as follows:

$$FDI_{it} = \mathbf{a}HK_{it} + \mathbf{b}'CV_{it} + I_i + \mathbf{e}_{it} \quad (2)$$

This differs from Equation (1) in that the individual effect term  $I_i$ , though constant across time, is now modelled as specific to the individual country  $i$ , rather than being identical across countries as in Equation (1). Equation (2) is the fixed effects model, where differences between countries, being fixed across time, can be viewed as parametric shifts of the regression function.<sup>26</sup>

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 cross-country variation, which is precisely what one wants to capture through the explanatory variables, leaving only within-country variation. This point was forcefully made by Lansbury, Pain and Smidkova (1996); Mody and Wheeler (1992); Singh and Jun (1995).

Despite these serious reservations, the fixed effect model was estimated but the results were poor. The Variance Inflation Factor pointed to severe multicollinearity<sup>27</sup> and, in fact, a number of estimated parameters became insignificant. This outcome suggests that country-specific dummies may have picked up cross-country 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”).<sup>28</sup> The regional dummies may also capture some economies of agglomeration” (p. 9).

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

$$FDI_{it} = \mathbf{a}HK_{it} + \mathbf{b}'CV_{it} + I_i + \mathbf{g}_t + \mathbf{e}_{it} \quad (3)$$

$\mathbf{g}_t$  are time-specific effects.<sup>29</sup> This regression is implemented by including T-1 dummy variables.<sup>30</sup>

Overall, the inclusion of dummy variables, be it region-specific or period-specific, makes very little difference to the results obtained by running Equation (1). The results are reported in Appendix B. The regional dummies are never significant and, of the period dummies, only the dummy for the 1992-94 period appears significant in the regressions with *SEC* and *SEC&TER*. There seems, therefore, to be no evidence that the model of Equation (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 percent 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, that are unit-free measures, are reported in Table 3.

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

	(1)	(2)	(3)
<i>SEC</i>	0.206		
<i>SEC&amp;TER</i>		0.195	
<i>ENROL</i>			0.188
<i>TRADE</i>	0.238	0.261	0.318
<i>GRGDP</i>	0.250	0.260	0.216
<i>CREPS</i>	0.168	0.156	0.145
<i>ENERGY</i>	-0.190	-0.187	-0.203
<i>DFDI<sub>t</sub></i>	0.237	0.236	0.311
<i>TIME</i>	0.154	0.146	0.091
<i>GRLABF</i>	0.272	0.252	0.176

*Notes:* The 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.

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 labour force growth rate is higher than that of stock measures of human capital but lower with the flow measure. The availability 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 size. 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 periods. It can be concluded that human capital plays an increasingly important role over time in attracting FDI.

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

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

Estimates are heteroscedasticity-consistent (White correction).

*t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

\*\* Significance at the 1 percent level.

\* Significance at the 5 percent level.

† Significance at the 10 percent level.

As explained at the beginning of Section 4.3., 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 heteroscedasticity is far from being settled. A possible alternative to the White heteroscedasticity-consistent estimator is a Weighted Least Squares Estimator. Accordingly, the dependent variable and all explanatory variables have been weighted by the size of the labour 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.<sup>31</sup>

The results of the weighted least squares regressions are reported in Appendix C. The main findings from the White estimator are all confirmed and, if anything, they come out more strongly. As can be seen in Table C.1., all proxies for human capital, be it stock or flow measures, are significant at the 1 percent confidence level.

Table C.2. puts further emphasis on the importance of human capital in attracting FDI. Only trade openness and labour availability/cost consistently have larger beta coefficients than the human capital variables. In Column (3), however, the beta coefficients of the growth rate of GDP and the percentage of credit to the private sector are also larger than that of the secondary enrolment ratio.

Table C.3. clearly shows that the importance of human capital has become increasingly greater through time. Both the estimated coefficients of the human capital variables and their *t*-ratios increase in size as more recent periods are added to the sample period of the regressions.

## 5. Conclusions

For a variety of reasons – including the recognition of the potential contribution that TNCs can make to economic development - 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 determinants of FDI in developing countries. More specifically, it is shown that the growth of domestic markets and the availability of energy can attract FDI. Government policies that create a stable macroeconomic environment and liberalization policies – especially of trade – are also taken into account by TNCs, together with a generally supportive business environment. The availability/cost of labour remains an important factor in developing countries. This paper, however, stresses the role of human capital.

If developing countries are to succeed in attracting FDI, their governments must be fully aware of the extent of structural changes in the characteristics of FDI. FDI is shifting towards knowledge-and skill-intensive manufacturing – as well as services. This trend, that is taking place not only across broadly classified industries but also within the same industries, is likely to become stronger over time. The competitive advantage of low labour costs may become less relevant as a locational determinant of export-oriented FDI. Given minimum levels of skills and infrastructure, low labour costs may still matter, but only in a handful of low-technology activities. The main industry still seeking cheap labour is low-end garments, since semiconductors have become highly automated and capital intensive (Lall, 1998).

As a result of these changes, which reflect a more general trend by TNCs towards global integration strategies, locational decisions are now more likely to be influenced by the presence of sophisticated, created assets, including human resources

with innovatory capabilities and marketing, planning and management skills, rather than by plentiful supplies of low-cost labour or natural resources.

Countries that rely exclusively on the latter to attract FDI will fail to induce higher value-added FDI and will suffer slower economic growth. At present, only a limited number of developing countries attract sizeable shares of FDI, particularly in areas that are technologically sophisticated. Other countries are already pursuing policies to upgrade their economies and attract TNCs in the newer growth industries.

It is thus crucial – especially in a context of increasing competition for FDI – that developing countries formulate policies that can raise the level of local skills and build up their human resource capabilities. This is necessary to raise not only the volume but also the quality and sophistication of the FDI that a country could attract. Moreover, the operations of TNCs have the potential to considerably enhance host countries' human capital. This opens the prospect of a virtuous circle whereby an economy that is successful in attracting TNCs sees a consequent upgrading of skills in its labour force and thus manages to strengthen its locational advantage for obtaining further investments.

In this new setting, the wealth of natural resources need not be a pre-requisite for FDI. Even countries that do not possess natural resources can still attract FDI by creating assets that are in demand by TNCs. This requires the presence of highly skilled and creative individuals. These human resources are now perhaps the key competitive asset for firms as well as for countries. The important point is that, compared to natural resources, these new types of resources can be created by host countries and influenced by governments. Governments can do much to increase the locational advantage of their countries in this respect.

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 labour, 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.

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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, re-investment of earnings, other long-term capital and short-term capital as shown in the balance of payments.
$\Delta FDI_1$	Change in the FDI to GDP ratio in period $t-1$ .
ENROL	Secondary school enrolment ratio, defined as total secondary enrolment divided by the population of the relevant age group.
SEC	Accumulated number of years of secondary education in the working age population.
SEC&TER	Accumulated number of years of secondary and tertiary education in the working age population.
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.
EFFWAGE1	Relative efficiency wage rate: deviation of efficiency wage in country $i$ from average efficiency wages. For the definition of efficiency wage see EFFWAGE2.
EFFWAGE2	Efficiency wage in country $i$ . Efficiency wage is defined as: average wage per worker divided by labour productivity. Labour productivity is average output per worker.
WAGE	Product wage rate, defined as nominal wage divided by GDP deflator.
GRLABF	Growth rate of labour force.
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.

Data for the above variables, with the exception of the wage variables, SEC and SEC&TER are extracted/computed from the World Bank's World Development Indicators: 1997 CD-Rom. Wage data has been extracted from UNIDO's Industrial Development Report (1996 and 1997). Data for SEC and SEC&TER, calculated by Nehru, Swanson and Dubay, are available on the World Bank Web site. These two series have been updated by ourselves following the methodology described in Nehru, Swanson, and Dubay (1995).

## APPENDIX B.

### Regressions with regional and time dummies

Dependent variable: FDI

	(1)	(2)	(3)	(4)	(5)	(6)
<i>SEC</i>	0.601 (2.34)*	0.595 (2.29)*				
<i>SEC&amp;TER</i>			0.455 (2.57)**	0.450 (2.52)**		
<i>ENROL</i>					0.011 (1.96)*	0.011 (1.92)†
<i>TRADE</i>	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)**
<i>GRGDP</i>	0.106 (2.89)**	0.110 (2.85)**	0.109 (2.97)**	0.114 (2.92)**	0.099 (1.91)†	0.100 (1.93)†
<i>CREPS</i>	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)
<i>ENERGY</i>	-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)**
<i>DFDI<sub>1</sub></i>	0.335 (2.41)*	0.322 (2.20)*	0.334 (2.31)*	0.321 (2.12)*	0.439 (2.23)*	0.437 (2.20)*
<i>TIME</i>	0.158 (2.55)**		0.150 (2.38)*		0.107 (1.31)	
<i>GRLABF</i>	0.563 (3.82)**	0.569 (3.86)**	0.541 (3.84)**	0.546 (3.88)**	0.375 (2.03)*	0.375 (2.00)*
<i>AFRICA</i>	0.127 (0.48)	0.124 (0.47)	0.126 (0.47)	0.123 (0.46)	-0.151 (-0.45)	-0.172 (-0.50)
<i>LATINAM</i>	0.108 (0.52)	0.108 (0.52)	0.013 (0.06)	0.014 (0.07)	0.065 (0.21)	0.064 (0.20)
<i>1986-88</i>		-7.31E-03 (-0.03)		-0.015 (-0.06)		0.359 (1.19)
<i>1989-91</i>		0.199 (0.97)		0.186 (0.90)		0.089 (0.38)
<i>1992-94</i>		0.462 (2.39)*		0.434 (2.22)*		0.361 (1.39)
<i>Constant</i>	-2.793 (-4.45)**	-2.414 (-4.02)**	-2.688 (-4.63)**	-2.328 (-4.24)**	-2.193 (-3.278)**	-1.93 (-3.05)**
$\bar{R}^2$	0.482	0.476	0.483	0.477	0.526	0.518

Estimates are heteroscedasticity-consistent (White correction).

*t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

\*\* Significance at the 1 percent level.

\* Significance at the 5 percent level.

† Significance at the 10 percent level.

## APPENDIX C – Weighted Least Squares Estimation

**Table C.1. Regressions with alternative human capital variables**

*Dependent variable: FDI*

	(1)	(2)	(3)
<i>SEC</i>	0.682 (3.67)**		
<i>SEC&amp;TER</i>		0.500 (3.76)**	
<i>ENROL</i>			0.017 (4.87)**
<i>TRADE</i>	0.014 (5.07)**	0.015 (5.53)**	0.017 (6.62)**
<i>GRGDP</i>	0.073 (2.81)**	0.081 (3.19)**	0.105 (5.02)**
<i>CREPS</i>	0.012 (2.94)**	0.010 (2.61)**	0.015 (5.42)**
<i>ENERGY</i>	-1.95E-03 (-3.12)**	-1.97E-03 (-3.16)**	-2.12E-03 (-3.07)**
<i>DFDL<sub>1</sub></i>	0.272 (2.96)**	0.270 (2.95)**	0.145 (1.67)†
<i>TIME</i>	0.116 (1.94)*	0.108 (1.78)†	0.041 (1.11)
<i>GRLABF</i>	0.601 (4.63)**	0.540 (4.33)**	0.571 (5.67)**
<i>Constant</i>	-2.988 (-5.96)**	-2.786 (-5.80)**	-3.170 (-8.40)**
$\bar{R}^2$	0.594	0.597	0.786

All variables have been weighted by total labour force.

*t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

\*\* Significance at the 1 percent level.

\* Significance at the 5 percent level.

† Significance at the 10 percent level.

**Table C.2. Relative contribution of explanatory variables in attracting FDI inflows (Estimated beta coefficients)**

	(1)	(4)	(7)
<i>SEC</i>	0.249		
<i>SEC&amp;TER</i>		0.240	
<i>ENROL</i>			0.257
<i>TRADE</i>	0.366	0.388	0.425
<i>GRGDP</i>	0.182	0.204	0.276
<i>CREPS</i>	0.216	0.186	0.305
<i>ENERGY</i>	-0.183	-0.184	-0.149
<i>DFDL<sub>t</sub></i>	0.179	0.178	0.087
<i>TIME</i>	0.119	0.110	0.057
<i>GRLABF</i>	0.327	0.294	0.360

*Notes:* The 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.

**Table C.3. Human capital as a determinant of FDI through time**

	<i>1983-88</i>	<i>1983-91</i>	<i>1983-94</i>
<i>SEC</i>	0.286 (1.01)	0.501 (2.14)*	0.682 (3.67)**
<i>SEC&amp;TER</i>	0.230 (1.11)	0.384 (2.30)*	0.500 (3.76)**
<i>ENROL</i>	7.39E-03 (1.16)	0.016 (4.20)**	0.017 (4.87)**

All variables have been weighted by total labour force.

*t*-values are in parentheses. Data sources and definitions of variables are in Appendix A.

\*\* Significance at the 1 percent level.

\* Significance at the 5 percent level.

† Significance at the 10 percent level.

## Notes

<sup>1</sup> The country's success in attracting FDI has been attributed mostly to its large and growing domestic market, its macroeconomic reforms and its measures to promote investment in provinces other than those in the coastal areas (UNCTAD, 1994)

<sup>2</sup> Political unrest, armed conflict, low domestic investment levels and frequent changes in economic policies that affect business calculations of expected risks and returns have contributed to this relative decline. (UNCTAD, 1994)

<sup>3</sup> UNCTAD (1998) classifies as least developed the following countries: Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Western Samoa, Sao Tome and Principe, Sierra Leone, Solomon Islands, Somalia, Sudan, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen, Zambia.

<sup>4</sup> Typically, the least developed countries suffer from a variety of drawbacks - not all of them readily amenable to policy reforms - that discourage FDI. The small size of their domestic market (in terms of both population size and per capita incomes), poor infrastructural facilities, adverse climatic conditions, remote geographical or land-locked positions (in some cases) and political instability are all negative factors. In the case of Sub-Saharan African countries, these problems are combined with an alarming process of industrial contraction (Noorbakhsh and Paloni, 1999).

<sup>5</sup> However, the availability of natural resources is a determinant of FDI only if the resource-rich country lack the capital required for resource exploitation or the necessary technical skills.

<sup>6</sup> Market access was the predominant motive for investing in the manufacturing sector of developed countries between the two world wars (UNCTAD, 1998). It is also noticeable that, in general, foreign sources of funds for domestic investment in developing countries have encouraged the growth of the export sector (Noorbakhsh and Paloni, 1998).

<sup>7</sup> The expansion of capital- and technology-intensive industries is particularly significant in the newly industrialized economies (Hong Kong, Korea, Singapore, Taiwan, and Thailand) where these industries grew at 18 percent annually between 1975-90.

<sup>8</sup> 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 or market-seeking FDI), 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 may also change as the domestic or international economic environment evolves over time.

<sup>9</sup> "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).

<sup>10</sup> For example, the total cost of carrying out R&D in India, with R&D personnel possessing qualifications equivalent to those of their counterparts in developed countries, is estimated to be one-tenth of that in developed countries (Granstrand, Håkanson and Sjölander, 1992).

<sup>11</sup> The dispersion of R&D by TNCs has also been encouraged by liberalization of FDI regimes, the strengthening of intellectual property rights and some pro-active policies such as the establishment of science parks.

<sup>12</sup> The principal modes of skill transfer are the use of expatriate employees and, most importantly, training of local employees.

<sup>13</sup> Where the host economy is less developed, competition from foreign affiliates may cause indigenous firms to fail rather than benefit through technological linkages (Blomström and Kokko, 1997).

<sup>14</sup> This can be vividly illustrated by the experience of South-East Asian countries. Transnational corporations were drawn to Singapore by the high skill level of the labour force as well as the quality of infrastructure and incentives offered. When they expanded operations to Malaysia or Thailand, they tended to allocate relatively low-skill and labour-intensive operations to those countries, retaining higher skill, more technical operations in Singapore and also using Singapore staff and Singapore operations for the training of staff in the other countries. However, over time, foreign affiliates in Malaysia and Thailand tended to become more sophisticated. In any case, it should be pointed out that, across industries, the capacity of TNCs to adjust their technologies to factor conditions varies. For example, TNCs in resource-based industries and high-technology industries are less able to adjust their technological and capital intensity levels than many other manufacturing industries, for

which a wider range of possible technological and capital intensity levels are economically viable (Dunning, 1994).

<sup>15</sup> An example of this is based on the experience of Singapore. TNCs that established operations there in the 1960s, when there was a large pool of unemployed workers, were labour-intensive and in low-technology industries, matching the low skills of the labour force of that period. The companies that began operations in the 1970s were more capital-intensive and in higher-technology industries, and those established in the 1980s were mainly in high-technology areas.

<sup>16</sup> For an account of the evolution of views and concepts in human resource management in developing countries, see Analoui (1998, 1999).

<sup>17</sup> In many developing countries there is a high proportion of managers of indigenous firms that have received their training from TNCs (Behrman and Wallander, 1976; Gerschenberg, 1987; Katz, 1987).

<sup>18</sup> 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.

<sup>19</sup> The choice of GDP-related explanatory variables may raise a technical problem since the dependent variable is also expressed relative to GDP. Alternative variables were used here to reflect the importance of markets but regressions with the GDP growth rate seemed to outperform the others.

<sup>20</sup> Several empirical studies point to the size of domestic markets in host countries, rather than their growth, as one of the determinants of FDI inflows (Torrise, 1985; Schneider and Frey, 1985; Petrochilas, 1989; Wheeler and Mody, 1992). It is argued that large domestic markets provide investment opportunities for market-seeking FDI and encourage efficiency-seeking investments. National markets are also important for many service TNCs, since most services are nontradable and, therefore, the only way to deliver them to foreign markets is through an establishment abroad. In our regressions, the inclusion of variables to represent market size was not successful.

<sup>21</sup> This hypothesis may not hold in the presence of governments' interventions to raise the price of labour through minimum wage laws or high social insurance taxes, or if distance or poor infrastructure make labour inaccessible.

<sup>22</sup> In the absence of a better variable for which data is widely available, it can be argued that the total trade ratio may also be a proxy, albeit distant, for the liberalization of FDI regimes. Developing countries have accompanied the liberalization of trade policies with the liberalization of FDI policies. Indeed, the two sets of policies may be interrelated and affect each other. "TNCs pursuing integrated international production strategies will avoid locating activities in countries in which they fear a possible loss of freedom to operate internationally. Preference would be given to locations that are open and well connected to the global economy, and characterized by stability, transparency, predictability, and coherent policies that recognize the importance of strong complementarities between trade and FDI" (UNCTAD, 1994).

<sup>23</sup> The sample period of estimation is 1983-1994 due to the inclusion of a lagged explanatory variable.

<sup>24</sup> The following countries are in the sample: Bolivia, Botswana, Brazil, Cameroon, Central African Republic, Chile, Colombia, Costa Rica, Cote 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, 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 over-estimation may be more than 25 percent of annual FDI flows.

<sup>25</sup> 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, firstly, because there are good theoretical reasons for including the time trend and, secondly, for ease of comparison with the regressions including stock measures of human capital – reported in Table 2 - where the time trend is always significant.

<sup>26</sup> An alternative to the fixed effects model is the random effects model, where country differences are assumed to be stochastic. In other words, individual specific constant terms are viewed as randomly distributed across countries (see Baltagi (1995), Green (1997), and Kennedy (1998) among others for detailed expositions of the fixed and random effects models). It has been suggested



that the random effects model may be more 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 justified. To our knowledge, the empirical literature on the determinants of FDI has on the whole avoided the use of the random effect model.

<sup>27</sup> 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.

<sup>28</sup> 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).

<sup>29</sup> In practice, Equation (2) with a time trend and Equation (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.

<sup>30</sup> As with country/region dummies, one of the time dummies must be dropped to avoid perfect collinearity. As normal practice, the initial period was dropped. The estimated effects should be interpreted as comparisons to a reference region or period.

<sup>31</sup> Green (1997) notes that, although it is not generally possible to be certain about the nature of the heteroscedasticity 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 labour force in each country and the residuals from the regressions reported in Table C.1. – analogous to those in Table 2 – are extremely small: 0.017 in the regression with *SEC* (Column 1); 0.028 in the regression with *SEC&TER* (Column 2); -0.001 in the regression with *ENROL* (Column 3).