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by

Peter Nunnenkamp and Julius Spatz

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FDI and economic growth in developing economies: how relevant are host-economy and industry characteristics?

Peter Nunnenkamp and Julius Spatz*

It is surprisingly hard to come by conclusive evidence supporting the widely held view that developing countries should draw on foreign direct investment to spur economic development. Virtually all empirical studies on the subject have found the impact of foreign direct investment on growth to be ambiguous because of the highly aggregated data they have used. These aggregations have blurred the differences between resource-seeking, market-seeking and efficiency-seeking foreign direct investment, and have ignored the compatibility of the different types of foreign direct investment with economic conditions prevailing in individual host economies. Analyzing foreign-direct-investment stocks in major sectors and specific manufacturing industries in a large number of developing economies originating from the United States, this article concludes that the positive growth effects of foreign direct investment are not guaranteed automatically. Host-economy and industry characteristics, as well as the interaction between such characteristics affect largely the growth impact of foreign direct investment in developing economies.

Keywords: foreign direct investment, resource-seeking, market-seeking and efficiency-seeking FDI, host-economy characteristics, industry characteristics, economic growth effects

JEL classification: F21

* Research fellows, Kiel Institute for World Economics, Kiel, Germany. E-mail: nunnenkamp@ifw.uni-kiel.de. The authors are grateful to Rolf J. Langhammer and several anonymous referees for many helpful comments and suggestions on earlier drafts of this article. They would also like to thank Christiane Gebühr and Michaela Rank for their excellent research assistance. The usual disclaimer applies.

Introduction

Various international organizations and foreign advisors recommend developing countries to rely primarily on foreign direct investment (FDI) as a source of external finance. They argue that, for several reasons, FDI stimulates economic growth more than other types of capital inflows. In particular, FDI is supposed to be less volatile, and to offer not just capital but also access to modern technology and know-how.

However, it is surprisingly hard to come by empirical evidence supporting this policy advice. Some studies find a positive relationship between FDI inflows and economic growth in host economies. Yet, the link between FDI inflows and growth is far from being firmly established once endogeneity problems and the heterogeneity of host economies are taken into account. Moreover, if FDI stocks are considered instead of FDI inflows, previous studies typically fail to establish positive growth effects. Accordingly, Richard Caves reckons that "the relationship between a LDC's stock of foreign investment and its subsequent economic growth is a matter on which we totally lack trustworthy conclusions" (Caves, 1996, p. 237).

This article focuses on the question whether results on the growth impact of FDI are ambiguous because previous studies did not differentiate between different types of FDI and their suitability under different host-economy conditions. Typically, the sectoral composition of FDI is ignored in the empirical literature, even though the growth impact of FDI is likely to depend on industry characteristics.

This article first surveys the relevant literature and discusses why host-economy and industry characteristics may matter for the growth impact of FDI. Subsequently, the empirical approach adopted, and the data used, in this article are described. The empirical analysis is based on FDI stocks in a large number of developing host economies originating from the United States. After discussing the relevance of host-economy and industry characteristics, these two sets of characteristics are combined in order to assess their interaction in shaping the growth impact

of FDI. The last section summarizes the main findings and offers some conclusions.

Where do we stand?

The standard procedure to test the impact of FDI on economic growth in developing economies is to perform cross-country analyses in which the lagged growth rate of gross domestic product (GDP) per capita is related to the FDI-to-GDP ratio. The results of such empirical studies are mixed and depend on the explanatory FDI variable used. The estimated coefficients for the impact of FDI on economic growth range from significantly positive in the case of FDI flows (Ram and Zhang, 2002), over insignificant if only the exogenous component of FDI flows is used (Carkovic and Levine, 2002), to significantly negative in the case of FDI stocks (Dutt, 1997).

A growing strand of the literature attributes the lack of robust results to the fact that the growth impact of FDI depends on the characteristics of the developing economy in which FDI takes place. It is argued that the host countries' capacity to absorb FDI productively is linked to their GDP per capita. Host economies with a better endowment of human capital are supposed to benefit more from FDI-induced technology transfers, as spillovers from foreign affiliates to local enterprises are more likely. Openness to trade is considered important as transnational corporations (TNCs) are said to pursue increasingly complex integration strategies that require the unrestricted imports of intermediate goods at all stages of the production process (UNCTAD, 1998, pp. 111–116). The extent to which TNCs transfer modern technology and know-how to their foreign affiliates may depend on host countries' institutional development, which captures factors such as the rule of law, the degree of corruption, the quality of public management, the protection against property rights infringements and discretionary government interference.

The empirical picture seems to become clearer once host-economy characteristics are taken into account. Magnus Blomström, Robert Lipsey and Mario Zejan (1994) found that

the positive impact of FDI on economic growth is confined to higher-income developing countries. According to Luiz De Mello (1997), the larger the technological gap between the host and the home country of FDI, the smaller the impact of FDI on economic growth. Eduardo Borensztein, José De Gregorio and Jong-Wha Lee (1998) have found that FDI enhances growth only in economies with a sufficiently qualified labour force.[1] V.N. Balasubramanyam, Mohammed Salisu and David Sapsford (1996) stressed that openness to trade is essential for reaping positive growth effects of FDI. Regression analysis by Laura Alfaro *et al.* (2001) has suggested that FDI is associated with faster growth only in host economies with comparatively well developed financial markets.

In one way or another, these studies corroborate the hypothesis that developing economies must offer a supportive business environment and must have reached a minimum level of economic development before they can capture the growth-enhancing effects of FDI (OECD, 2002, p. 28). However, as these results are based on FDI flows which are not corrected for potential endogeneity biases (i.e. higher economic growth causing higher FDI flows), the finding that host-economy characteristics matter for the growth effects of FDI may also be sensitive to the choice of the explanatory FDI variable. As a matter of fact, Maria Carkovic and Ross Levine (2002) found that the exogenous component of FDI flows does not exert a significant independent influence on the growth rate of GDP per capita even if non-linearities caused by host-economy characteristics are considered. To our knowledge, comparable empirical studies using FDI stocks as an explanatory variable do not exist. Amitava Dutt (1997) has used FDI stocks, as this article does in the following sections, and assesses their impact on lagged GDP growth, but host-country conditions have not been taken into account by that author.

Against this backdrop, it seems that the favourable perception of FDI among policymakers in developing countries

[1] This evidence is contested by a recent study by Ram and Zhang (2002).

and foreign advisors may easily be exaggerated. However, before coming to such a verdict, one should address another important shortcoming of almost all previous cross-country studies, namely the use of overall inward FDI positions as an explanatory variable. As it will be argued in the following, such highly aggregated data cannot capture important aspects of the relationship between FDI and economic growth. This is why a differentiation is made between sectors as well as between specific manufacturing industries in which FDI takes place.

Industry characteristics such as technology intensity, factor requirements, linkages to local and foreign markets, and the degree of vertical integration of foreign affiliates are likely to shape the growth impact of FDI in various ways. Industry characteristics may influence (a) the extent to which FDI supplements ("crowds in") or displaces ("crowds out") local investment, (b) the amount of technology and know-how transferred from parent companies to foreign affiliates, (c) the compatibility of technology transfers to the host countries' factor endowment and, hence, the degree to which local suppliers, competitors and buyers can benefit through spillovers, (d) the amount of foreign exchange earnings generated through FDI-induced exports or lost through the repatriation of funds, (e) the extent to which foreign affiliates foster competition in host economies by breaking up oligopolistic market structures, or stifle competition through their market power, and (f) the degree to which the locational competition for FDI increases or decreases distortions in host countries' economic policies.

These factors are closely linked to the different motives for FDI in developing economies. For instance, resource-seeking FDI in the primary sector tends to involve a large up-front transfer of capital, technology and know-how, and to generate high foreign exchange earnings. On the other hand, resource-seeking FDI is often concentrated in enclaves dominated by foreign affiliates with few linkages to the local product and labour markets. Furthermore, its macroeconomic benefits can easily be embezzled or squandered by corrupt local elites. Rather than enhancing economic growth, resource-seeking FDI in the

primary sector might lead the country into some kind of "Dutch Disease".

By contrast, efficiency-seeking FDI in some parts of manufacturing draws on the relative factor endowment and the local assets of host economies (UNCTAD, 1998, chapter IV). This type of FDI is more likely to bring in technology and know-how that is compatible to the host countries' level of development, and to enable local suppliers and competitors to benefit from spillovers through adaptation and imitation. Additionally, the world market orientation of efficiency-seeking FDI should generate foreign-exchange earnings for host economies. As a result, one would expect a relatively strong growth impact of FDI in industries that attract efficiency-seeking FDI.

Market-seeking FDI in services and other parts of manufacturing can benefit host countries' consumers by introducing new products and services, by modernizing local production and marketing and by increasing the level of competition in the host economies. However, fiercer competition may also lead to the crowding out of local competitors, especially if foreign affiliates command superior market power. Moreover, in the long run, the host countries' balance of payments is likely to deteriorate through the repatriation of funds since market-seeking FDI often does not generate export revenues, especially if the protection of local markets discriminates against exports. Hence, the growth impact of this type of FDI should be weaker than the growth impact of efficiency-seeking FDI.

Finally, it has been argued that the growth effects of FDI depend on the interaction between industry and host-economy characteristics. Two opposing hypotheses are advanced in the literature. Building upon a standard Heckscher-Ohlin model structure and augmenting it by international technology flows, Kiyoshi Kojima (1973) reckoned that FDI in developing countries will be more growth-enhancing if it is undertaken in more labour-intensive and less technology-intensive industries. In these industries, the technological differences between foreign

affiliates and local enterprises are considered relatively small. Therefore, technological spillovers to local enterprises should be more likely.[2] By contrast, Dutt (1997) developed a Keynesian model with international transfers of capital and technology (but without local technological spillovers), from which he concluded that the impact of FDI on economic growth in developing countries should be greater if the inflow of FDI goes into technologically advanced industries. The rationale behind this proposition is that an increase in the capital stock in technologically less advanced industries lowers the export prices of developing host economies and, thus, leads to a deterioration of their terms of trade.

A first attempt to discriminate empirically between the two hypotheses was undertaken by Dutt (1997). In contrast to the theoretical models, he found no difference in the growth impact of FDI between high-technology and low-technology industries. However, Dutt's empirical analysis is flawed in three respects. First, Dutt does not distinguish between resource-seeking FDI in the primary sector and FDI in manufacturing. In addition to six manufacturing industries, his high-technology group includes "coal and petroleum products". Second, Dutt's industry classification ignores that, irrespective of the technology intensity, the growth impact of FDI in manufacturing should differ depending on whether FDI is efficiency-seeking or market-seeking. Third, the classification of "metals" as a high-technology industry is in conflict with the industry characteristics portrayed below.

Data and approach

A cross-country analysis of the role of industry characteristics and their interaction with host-country characteristics in shaping the growth impact of FDI requires sectorally disaggregated FDI data for a large number of host economies. For the foreign affiliates of United States TNCs,

[2] This proposition is consistent with the above cited empirical evidence by De Mello (1997).

such data are provided in the online data base of the Bureau of Economic Analysis (BEA, 2003). Comparable data are not available for other home countries. Hence, the United States outward FDI position in a host economy is used as a proxy for its total inward FDI position.

It is for several reasons that this article follows Dutt (1997) and prefers FDI stocks to FDI flows. First, stock data are available for a large number of developing host economies. Second, industry-specific flows are frequently not disclosed for confidentiality reasons; this applies especially to relatively small host economies in which FDI inflows in a particular industry are often confined to one single project. Third, it is mainly FDI flows that suffer from potential endogeneity biases.[3] This is evident from the literature on the determinants of FDI, which typically considers economic growth of host countries to be a major driving force of FDI inflows. Short lags for growth rates do not help much to remove endogeneity biases, as TNCs tend to base their decisions on anticipated growth in coming periods.[4] While it cannot be ruled out that FDI stocks are affected in this way, too, the problem of endogeneity is reduced considerably since FDI stocks comprise engagements undertaken long before the period for which economic growth rates are calculated here (i.e. 1991–2000). Finally, growth enhancing spillovers should not only emerge from recent FDI inflows but also from FDI established much earlier.

FDI stocks are considered in relative terms in the following, in order to control for the size of host economies. *Ceteris paribus*, larger economies host typically higher FDI stocks. However, the growth effects of FDI should depend on its relative importance in the host economy, rather than its

[3] Dutt stresses that "the likelihood that FDI flows and growth during the relevant period are interdependent" (Dutt, 1997, p. 1932) as the major reason to analyze the growth effects of FDI with stock data.

[4] Note that econometric methods to detect endogeneity problems, e.g. Granger causality tests, are not applicable to the type of analysis described below. Furthermore, the time-series dimension of BEA (2003) data is not sufficient for Granger causality tests.

absolute size. The relative importance may be assessed by relating FDI to either the host country's GDP or its population. This article follows the mainstream of the relevant literature in that it applies the FDI-to-GDP ratio in the subsequent analysis.

By using FDI stock data for 1990, the initial year of the observation period, this analysis does not capture the significant increase of United States FDI during the 1990s.[5] This is the "price" paid for minimizing the afore-mentioned problem of endogeneity. If FDI stocks in more recent years, or changes in stocks during the 1990s were considered, the risk of reverse causation, i.e. a favourable growth performance resulting in more FDI, would increase substantially. At the same time, the loss of relevant information seems to be less than one might suspect. Part of the boom of United States FDI is reflected in the 1990 data already.[6] Moreover, the structure of United States FDI stocks in 2000 reveals fairly strong similarities to the structure prevailing ten years before:

- United States FDI stocks in the services sector, as defined above, increased by a factor of 2.6, but FDI stocks more than doubled in the manufacturing sector, too. Likewise, FDI growth varied somewhat within the manufacturing sector, but the ranking of industries in the outward FDI stocks of the United States was little affected.

- All developing regions participated in the boom of United States FDI during the 1990s. The ranking of the sample economies in this article with regard to the FDI-to-GDP ratio in 1990 was highly correlated with the corresponding ranking in 2000.[7]

[5] As pointed out by an anonymous referee, worldwide United States FDI stocks tripled from $431 billion in 1990 to $1,293 billion in 2000 (BEA 2003).

[6] The rise of worldwide United States FDI stocks in 1985-1990 (by a factor of 1.8) was even higher than in 1990-1995 (factor of 1.6), and only slightly lower than in 1995-2000 (factor of 1.85).

[7] The Spearman rank correlation coefficient is 0.73 and is significant at the 1% level.

Since this article focuses on the composition of FDI by sectors and industries as well as the distribution across developing host economies, rather than aggregated volumes, the use of 1990-data does not appear to pose serious limits to the analysis presented here.

The BEA (2003) online data base also offers information on FDI-related economic activities of the foreign affiliates of United States TNCs, which can be used to characterize the latter according to their technology intensity, factor requirements, linkages to local and foreign markets, and their degree of vertical integration with the parent company. Additionally, World Bank (2002) data on gross fixed capital formation, secondary school enrolment and GDP per capita are used, as well as the index on institutional development established by Daniel Kaufmann, Aart Kraay and Pablo Zoido-Lobatón (2002) and the index on openness to trade developed by Jeffrey Sachs and Andrew Warner (1995).[8]

The empirical analysis is carried out in several steps. It is started by evaluating the role of host-economy characteristics in shaping the growth impact of FDI. To this end, the host economies of United States outward FDI are classified into two groups (with favourable and unfavourable characteristics[9]) according to four alternative indicators: GDP per capita in 1990, secondary school enrolment in 1990, the Kaufmann *et al.* (2002) index on institutional development, and the Sachs and Warner (1995) index on openness to trade in 1990. Within each group, a further differentiation is made between host economies with zero or low, and higher, FDI stocks originating from the United States. Based on this classification, the median lagged growth rates of GDP per capita for each subgroup are calculated, and the links between the FDI-to-GDP ratio in 1990 and economic growth in 1991–2000 are explored. In order to get first hints on whether the results differ between resource-seeking, efficiency-

[8] The definitions and data sources of the variables are given in the annex.

[9] The analysis is restricted to two subgroups to maintain a sufficiently large number of observations in each subgroup.

seeking and market-seeking FDI, the analysis for United States FDI stocks in petroleum, manufacturing, and services is redone separately.[10]

The article proceeds by disaggregating the manufacturing sector into seven industries: food, chemicals, metals, machinery, electrical equipment, transport equipment, and others, for which the BEA (2003) online data base reports separate data. The manufacturing industries are characterized according to six indicators: (a) labour intensity, as given by the number of employees of United States affiliates per million dollars of value added, (b) human capital intensity, measured by the compensation in 1,000 dollars per person employed by the foreign affiliates of United States TNCs, (c) research-and-development (R&D) intensity, which indicates the R&D expenditures of United States foreign affiliates as a percentage of value added, (d) amount of technology transfers, as given by the royalties and license fees paid by United States foreign affiliates to their parent companies as a percentage of value added, (e) export orientation, measured by total exports of United States affiliates as a percentage of total sales, and (f) the degree of vertical integration, which reflects the sum of exports of United States affiliates to, and imports of United States affiliates from, their parent companies as a percentage of sales of the affiliates. For each manufacturing industry, the observations are classified into groups with zero or low, and higher, FDI-to-GDP ratios. The group-specific median growth rates of GDP per capita are then used to analyze whether the growth impact of FDI differs between manufacturing industries and how these

[10] Petroleum is used as a proxy for all primary-sector industries that receive resource-seeking FDI. This is because other primary-sector industries cannot be singled out from the BEA (2003) data base. Similar to the primary sector, BEA (2003) data do not allow for full coverage of the services sector. Some items (e.g. transportation and communication) are included in "other industries". Moreover, real estate and holding companies are subsumed under "finance". Hence, the sum of the following three items is considered to represent the services sector: "wholesale trade", "depository institutions" and "services". The latter include, *inter alia*, business services, hotels, health services, motion pictures, and engineering, architectural and surveying services.

differences are related to the above mentioned industry characteristics.

Finally, the interaction between industry and host-country characteristics is assessed. To this end, the analysis of the role of host-economy characteristics in shaping the growth impact of FDI for food, chemicals, metals, machinery and electrical equipment is repeated, and the results are linked to the characteristics of these manufacturing industries.

Empirical evidence

The relevance of host-economy characteristics

The sample economies of this analysis differ considerably with regard to all four host-country characteristics mentioned above.[11] For example, GDP per capita ranges from less than $1,000 in various African host economies to more than $15,000 in Hong Kong (China) and the United Arab Emirates. Secondary school enrolment, which proxies educational attainment, is below 10% in the United Republic of Tanzania and Niger and above 80% in several Asian and Latin American economies. Institutional development is rated extremely poor in the Democratic Republic of Congo, Algeria and Haiti, and exceptionally strong in Hong Kong (China) and Singapore. Moreover, for all characteristics, the two subgroups, with favourable and unfavourable characteristics, differ in two respects (table 1): first, the subgroups with favourable characteristics recorded substantially higher GDP per capita growth in 1991–2000. Second, these subgroups hosted substantially higher United States FDI stocks in 1990. The p-values given in table 1 reveal that most of the differences between the subgroups with favourable and unfavourable characteristics are statistically significant at least at the 10% level. Yet, the relevance of host-economy characteristics for individual countries' attractiveness for FDI varies considerably between sectors:

[11] See the annex for the list of sample economies.

- The host-economy characteristics considered here are irrelevant for FDI in the primary sector, which is proxied by United States FDI in the petroleum industry. Unsurprisingly, the availability of natural resources such as oil appears to be the dominant motive for undertaking resource-seeking FDI.
- Economies with unfavourable characteristics hardly received market-seeking FDI in the services sector. The difference in the FDI-to-GDP ratio to economies with favourable characteristics is most significant when locational attractiveness is measured by per-capita GDP.
- For FDI in the manufacturing sector, the difference in locational attractiveness between host economies with favourable and unfavourable characteristics ranges from 0.8% in the case of schooling to 1.2% in the case of

Table 1. Host economy characteristics, FDI stocks and economic growth,[a] 1990-2000

Host-economy characteristics		Economic growth[b] 1991-2000	FDI stock in 1990 (Per cent of GDP)[c]			
			Total	Petro-leum	Manu-facturing	Services
Per-capita GDP (PPP) in 1990	below median	0.8	0.97	0.41	0.19	0.04
	above median	2.0	2.67	0.45	1.22	0.44
	p-value	0.021	0.008	0.877	0.013	0.036
Schooling (1990)	below median	0.5	1.20	0.24	0.34	0.07
	above median	2.1	2.54	0.44	1.15	0.38
	p-value	0.002	0.055	0.364	0.063	0.116
Institutional development (1997/1998)	below median	0.6	1.28	0.53	0.32	0.04
	above median	2.1	2.67	0.39	1.30	0.41
	p-value	0.005	0.046	0.655	0.039	0.068
Openness (1990)	closed	0.6	1.68	0.50	0.45	0.06
	open	2.4	3.05	0.59	1.60	0.49
	p-value	0.001	0.018	0.773	0.088	0.108

Sources: BEA (2003); World Bank (2002); Kaufmann *et al.* (2002); Sachs and Warner (1995).

[a] For definitions and data sources of variables, see Appendix.

[b] Average of the annual growth rate of per-capita GDP for the respective subgroup of host economies.

[c] Average for the respective subgroup of host economies.

openness, with all differences being statistically significant. The wide margin in the case of openness may indicate that, as suggested by UNCTAD (1996, p. 97), efficiency-seeking FDI plays an increasingly important role in manufacturing, and openness is crucial for host economies to attract this type of FDI.

The relevant question, of course, is whether higher FDI stocks contributed to higher growth in developing host economies. In contrast to table 1, the subsequent comparisons between country subgroups refer to *median* economic growth rates. In this way, the impact of outliers is reduced in the calculations.[12] It turns out that higher total FDI stocks tend to be associated with lower subsequent growth in economies with unfavourable characteristics (table 2). This negative relation may be because FDI crowded out domestic investment, a phenomenon that Manuel Agosín and Ricardo Mayer (2000) observed in Latin America, in particular. Furthermore, FDI may have deteriorated the terms of trade (Dutt, 1997) and the balance of payments in host economies with unfavourable characteristics,[13] or the benefits of FDI may have been embezzled or squandered by corrupt local elites.

The picture is brighter for host economies with favourable characteristics. It is not surprising that the differences in median growth rates between host economies with higher total FDI stocks and those with lower total FDI stocks *within* the subset of attractive host economies are small compared to the differences in mean growth rates *between* attractive and less attractive host economies reported in table 1. Nevertheless, table

[12] Notable outliers include: China with an average annual growth of 9% in 1991–2000, and the Democratic Republic of Congo with –8% (see annex). The preference for median growth rates implies that p-values, as reported in table 1, are not applicable to subsequent growth comparisons.

[13] By drawing on the theoretical and empirical literature, Dutt argues that "because of high levels of profit repatriation (especially if one takes into account practices such as transfer pricing) new direct foreign [investment] inflows is in most periods less than capital outflows due to profit repatriation" (Dutt, 1998, pp. 165–166).

2 reveals a pronounced growth difference between high-FDI and low-FDI host economies if locational attractiveness is measured by schooling. This is consistent with the findings of Borensztein *et al.* (1998), suggesting that the availability of complementary human capital in the host economies is important for FDI to stimulate economic growth. Though smaller than in the case of schooling, the growth difference of 0.7% within the subgroup of host economies with a favourable institutional development is still considerable. It would take on average 41 years to double per-capita income for low-FDI host economies, but only 29 years for high-FDI host economies.

As concerns the relationship between economic growth and FDI stocks in particular sectors, the results for the petroleum industry support the previous finding that positive growth effects

Table 2. GDP growth rates for country subgroups (median), according to host-economy characteristics and FDI stocks in different sectors,[a] 1990-2000

Host-economy characteristics		Total		Petroleum		Manufacturing		Services	
		FDI low	FDI high	FDI low	FDI high	FDI low (*or 0*)	FDI high (*or >0*)	FDI low (*or 0*)	FDI high (*or >0*)
Per-capita GDP (PPP)	Below median	1.8	–0.3	1.7	1.4	*1.2*	*0.4*	*0.1*	*1.6*
	Above median	2.1	2.4	1.6	2.7	2.3	2.5	2.4	2.8
Schooling	Below median	1.4	1.3	1.3	1.4	*1.2*	*0.4*	*-0.1*	*1.4*
	Above median	0.5	2.3	2.4	2.4	2.4	2.2	2.5	2.5
Institutional development	Below median	1.4	–0.3	2.2	–0.2	*-0.2*	*0.1*	*-0.2*	*1.4*
	Above median	1.7	2.4	1.8	2.6	1.5	2.9	1.8	2.5
Openness	Closed	0.9	0.4	1.3	–0.3	–0.2	0.6	*–0.2*	*1.5*
	Open	2.4	2.7	2.1	3.1	2.7	2.4	2.4	2.6

Sources: BEA (2003); World Bank (2002); Kaufmann *et al.* (2002); Sachs and Warner (1995).

[a] For definitions and sources of variables, see the annex. Each country subgroup according to host-economy characteristics is further divided into two FDI groups. Depending on the number of zero observations with regard to FDI stocks, the separation is between FDI = 0 and FDI > 0 (figures in italics) or between FDI = low and FDI = high. In the latter case, FDI = low includes FDI = 0.

of higher FDI stocks are restricted to the subgroup with favourable host-economy characteristics. The problem of resource-seeking FDI resulting in enclaves dominated by foreign affiliates with few growth-enhancing spillovers seems to be concentrated in closed host economies with a deficient institutional environment.

By contrast, host economies with unfavourable characteristics appear to have benefited from higher FDI in the services sector, and even more so than host economies with favourable characteristics. This can be attributed to two factors. In many host economies with unfavourable characteristics, FDI stocks in the services sector are of a recent vintage since they are the outcome of the move to privatize public enterprises. While this type of FDI often takes place in the form of mergers and acquisitions, which may crowd out local investment, it typically leads to follow-up FDI, as well as transfers of technology and know-how in order to modernize undercapitalized operations. Negative balance-of-payments effects are, thus, unlikely. Additionally, the potential of intensifying competition and dismantling distortions in the economic policy framework should be greater in host economies with unfavourable characteristics.

Yet, the results for the services sector in table 2 have to be qualified since they are not fully comparable between the subgroups with favourable and unfavourable characteristics. For the latter subgroup, the distinction had to be made between host economies with FDI=0 and those with FDI>0; for the former subgroup which included considerably fewer zero observations, the distinction had to be made between host economies with low and high FDI. If three FDI groups (FDI = 0, low, and high) are considered instead of two, the link between FDI and economic growth turns out to be highly ambiguous for economies with favourable characteristics as well as those with unfavourable characteristics.[14] Independently of host-economy characteristics, the evidence is in conflict with the proposition

[14] The results for three FDI groups are not shown here for the sake of brevity; for details, see Nunnenkamp and Spatz (2003).

of a strictly positive relation between zero, low and high FDI on the one hand and median growth rates on the other hand. The latter finding largely applies to the manufacturing sector, too.

The results for the manufacturing sector in table 2 are similar to the results for all sectors taken together in that the growth impact of FDI tends to be more benign for host economies with favourable characteristics. The contrast between the two subgroups of host economies is greatest if locational attractiveness is measured by institutional development. The difference in the median growth rate of per-capita GDP between economies with low and high FDI is 1.4% in the subgroup with better institutional development, but only 0.3% in the subgroup with poorer institutional development. For per-capita GDP and schooling, negative growth effects in host economies with poor characteristics are found, and basically no growth effects in host economies with favourable characteristics. Most surprisingly, however, the finding that the growth impact of FDI is more benign in host economies with favourable characteristics does not hold if locational attractiveness is measured by the Sachs and Warner (1995) index on openness to trade. This result, which is in conflict with the above reasoning on the virtues of efficiency-seeking FDI, could be due to the fact that United States FDI in manufacturing was still dominantly market seeking in 1990.[15] Neither can it be ruled out, however, that the growth effects of efficiency-seeking FDI do not differ from the growth effects of market-seeking FDI. In any case, it appears easier to attract FDI by opening up to international trade (see table 1 above) than to derive positive growth effects of FDI in this way.

Another finding in table 2 casts doubts on the widely perceived rise and superiority of efficiency-seeking FDI. The relevance of openness is very much the same for the growth effects of FDI in manufacturing and the growth effects of FDI in services, in which, due to the prevalence of non-tradability, FDI is market-seeking almost by definition. In order to shed

[15] According to Dunning (2002), traditional market-seeking FDI, together with resource-seeking FDI, still accounts for the majority of FDI undertaken in developing countries.

more light on the difference between market-seeking and efficiency-seeking FDI with respect to their growth impact, the manufacturing sector has been disaggregated into seven industries in the subsequent section.

The relevance of industry characteristics

The seven manufacturing industries for which the Bureau of Economic Analysis reports separate FDI stock data reveal pronouncedly different characteristics in various respects (table 3). For instance, labour intensity differs by a factor of three between electrical equipment and chemicals. Chemicals represent the most human capital intensive industry with an average compensation of about $20,000 per employee, compared to about $8,000 in electrical equipment. Chemicals, together with machinery, also rank high with respect to R&D expenditures of United States affiliates in developing host economies and technology transfers from parent companies.

Most interestingly, table 3 offers some hints on the type of FDI undertaken in manufacturing industries. It can reasonably be assumed that efficiency-seeking FDI should result in a closer vertical integration between United States parent companies and their affiliates in developing economies and a stronger export orientation of the latter. Considering both indicators together, United States FDI in machinery, electrical equipment, and transport equipment tends to be efficiency-seeking, whereas United States FDI in the food, chemicals, and metals industry tends to be market-seeking.[16] Taking into account that chemicals and electrical equipment represent the most important industries for United States TNCs in developing economies, in terms of

[16] It may be surprising that FDI in transport equipment is classified as efficiency seeking (mainly because vertical integration is clearly above the average of total manufacturing). United States automobile companies were engaged in countries such as Brazil predominantly to serve local markets. However, the characteristics of transport equipment are shaped significantly by United States FDI in Mexico, which accounted for more than 40% of United States FDI stocks in this industry in all developing economies in 1990. In Mexico, United States automobile companies pursued integration strategies much earlier than in other host countries.

FDI stocks in 1990, these two industries can be regarded as the prototypes of market-seeking and efficiency-seeking FDI in the rest of the analysis.[17]

Table 3. Characteristics of manufacturing industries: selected indicators,[a] 1995

Industry	Labour intensity[b]	Human capital intensity[c]	R&D intensity[d]	Technology transfers[e]	Export orientation[f]	Vertical integration[g] (1)	(2)
Food	27.9	12.5	1.51	2.39	20.8	3.6	5.4
Chemicals	19.9	19.7	6.51	5.77	18.8	11.3	12.1
Metals	25.1	16.5	0.96	1.54	30.8	10.6	9.2
Machinery	28.2	12.8	5.56	12.43	75.7	43.3	59.1
Electr. equip.	61.0	8.1	2.70	2.91	53.0	64.9	120.2
Transp. equip.	22.2	15.1	6.35	1.13	40.6	65.1	76.4
Other manuf.	25.8	14.2	1.29	3.18	24.8	17.1	22.3
Total manuf.	30.1	12.8	3.70	4.64	40.5	35.0	43.9

Source: BEA (2003).

[a] Data refer to majority-owned non-bank United States affiliates, except technology transfers (all affiliates). Data are for 1995, if not mentioned otherwise, since many observations are missing for earlier years. Industry characteristics are calculated for all developing host economies, by adding up Africa, Asia (excluding Australia and Japan), Middle East and Latin America, if not mentioned otherwise.

[b] Number of employees of United States affiliates per million $ of value added.

[c] Compensation of employees ($1,000) per person employed by United States affiliates.

[d] R&D expenditures of United States affiliates as a percentage of value added.

[e] Royalties and license fees paid by United States affiliates to their parent companies as a percentage of value added. Data refer to 1999 because of missing data for earlier years.

[f] Total exports of United States affiliates as a percentage of total sales. Data refer to 1996. All developing host economies proxied by subtracting Canada, Europe and Japan from all host economies (because of missing observations for developing economies).

[g] Sum of exports of United States affiliates to, and imports of United States affiliates from their parent companies as a percentage of total sales of affiliates. Data refer to 1996. Column (1): all developing host economies proxied by subtracting Australia, Canada and Europe from all host economies (Japan not excluded because of missing observations); column (2): only Latin American host economies (missing observations for other developing country regions).

[17] The chemical industry accounted for about 21% of United States FDI stocks in the manufacturing sector of developing economies; the share of electrical equipment was about 17%. Machinery ranked third, with 14%.

The host-economy characteristics introduced in the previous section matter for developing countries' attractiveness for both market-seeking FDI in chemicals and efficiency-seeking FDI in electrical equipment. All p-values reported in table 4 point to significantly higher FDI stocks in these two industries in the economy subgroup with favourable characteristics. Yet, the relevance of host-economy characteristics for average FDI stocks differs between chemicals and electrical equipment in one remarkable respect. In chemicals, it is for all four characteristics that the ratio of FDI stocks to GDP was 0.2% higher in more attractive host economies than in less attractive host economies. In electrical equipment, however, openness to international trade turns out to be a more important stimulus to FDI than the other three host-economy characteristics, as was to be expected for an export-oriented industry.

Table 4. Host economy characteristics[a] and FDI stocks in manufacturing industries,[b] 1990

Host-economy characteristics		FDI stocks in 1990 (Per cent of GDP)						
		Food	Chemicals	Metals	Machinery	Electr. equip.	Transp. equip.	Other
Per-capita GDP (PPP)	below median	0.02	0.02	0.01	0.00	0.00	0.00	0.02
	above median	0.10	0.23	0.02	0.08	0.19	0.03	0.14
	p-value	0.008	0.016	0.541	0.143	0.031	0.091	0.009
Schooling	below median	0.03	0.04	0.01	0.01	0.02	0.01	0.06
	above median	0.10	0.22	0.01	0.07	0.19	0.02	0.10
	p-value	0.035	0.054	0.103	0.301	0.058	0.625	0.291
Institutional development	below median	0.05	0.05	0.01	0.00	0.01	0.01	0.04
	above median	0.08	0.23	0.01	0.09	0.21	0.03	0.13
	p-value	0.276	0.065	0.869	0.138	0.033	0.223	0.040
Openness	closed in 1990	0.04	0.07	0.02	0.02	0.01	0.02	0.07
	open in 1990	0.11	0.27	0.01	0.10	0.28	0.03	0.14
	p-value	0.092	0.101	0.792	0.306	0.039	0.611	0.215

Sources: BEA (2003); World Bank (2002); Kaufmann *et al.* (2002); Sachs and Warner (1995).

[a] For definitions and data sources of variables, see the annex.

[b] Average for the respective subgroup of host economies.

Turning to the relationship between median growth rates and FDI stocks in individual manufacturing industries, one might argue that industry-specific FDI-to-GDP ratios are too low to have an impact. However, it appears to be premature to draw such a conclusion from the ratios reported in table 4. Low averages sometimes conceal considerable variation in FDI-to-GDP ratios.[18] More importantly, low FDI-to-GDP ratios do not necessarily imply that the growth impact of FDI remains insignificant. The example of China is telling in this regard. In 1993, i.e. 15 years after the process of opening up to FDI had started, the ratio of *total* United States FDI stocks in China to its GDP (0.21%) was still below the average ratio recorded in table 4 for FDI in the chemical industry of host economies with favourable characteristics. Nevertheless, FDI in China is widely believed to have stimulated economic growth. More significant growth effects than low FDI-to-GDP ratios tend to suggest may be due to spillovers from FDI, at least where the conditions for spillovers are favourable.

It seems that FDI may have an impact on growth even if average FDI-to-GDP ratios are small (table 5). Moreover, the growth effects of FDI appear to be related to industry characteristics. Most interestingly, the difference in median growth rates between economies with and without FDI stocks is highest in electrical equipment (1.3%) and machinery (1.1%).[19] In all other industries, this difference is below one

[18] For example, United States FDI stocks in electrical equipment exceeded 1% of GDP in several Asian host economies. The same is true for United States FDI in the chemical industry of several Latin American countries.

[19] In addition, the median growth rates for three FDI groups with zero, low and high FDI stocks in 1990 have been calculated. The results (not reported here) corroborate the absence of a strictly positive relationship between FDI stocks and median growth rates. Varying industry characteristics notwithstanding, metals, machinery and transport equipment have in common that the median growth rate is even lower in the high FDI group than in the group without any FDI stocks. This may be attributed to FDI-related capital outflows in countries where the engagement of United States TNCs had reached an optimal size through an earlier accumulation of FDI stocks. However, the proposition of negative balance of payments effects when high FDI stocks comprise a larger share of long-standing engagements cannot be tested with the data at hand (Nunnenkamp and Spatz, 2003).

percentage point (e.g. 0.7% in chemicals). A similar result is observed when industry-specific FDI stocks in 1990 and average annual growth rates in 1991-2000 are correlated across all sample economies. It is only for electrical equipment and machinery that the correlation is significantly positive.[20]

The growth effects of FDI appear to be particularly strong in electrical equipment and machinery, even though these two industries differ in several respects. The labour intensity is much higher in electrical equipment; R&D expenditures and technology transfers are clearly above the manufacturing average in machinery, but below average in electrical equipment (table 3). Yet, both industries share important characteristics. First, FDI in machinery and electrical equipment is less demanding in terms of complementary human capital in the host economies than FDI in other industries. Second, the export orientation of FDI is strongest in machinery and electrical equipment. Third, the integration of United States affiliates into corporate networks via intra-firm trade is fairly strong in both industries. These factors seem to have helped positive growth effects of FDI.

Table 5. GDP growth rates of sample economies (median), according to FDI stocks in manufacturing industries,[a] 1991-2000

Industry	FDI = 0		FDI >0	
Food	1.4	(52)	2.3	(29)
Chemicals	1.2	(52)	1.9	(29)
Metals	1.4	(62)	2.1	(20)
Machinery	1.2	(72)	2.3	(16)
Electrical equipment	1.1	(64)	2.4	(20)
Transport equipment	1.4	(78)	2.0	(10)
Other	1.4	(57)	1.3	(23)

Sources: BEA (2003); World Bank (2002); Kaufmann *et al.* (2002); Sachs and Warner (1995).

[a] Number of observations in parentheses.

[20] The correlation coefficient of 0.24 for electrical equipment is significant at the 3% level; the correlation coefficient of 0.18 for machinery is significant at the 10% level.

Furthermore, industry characteristics suggest that a positive growth impact of FDI is less likely in Latin American host countries than in Asian host economies.[21] The industry structure of United States FDI stocks in manufacturing is strikingly different in these two regions. Market-seeking FDI in the food, chemicals and metals industries accounted for 41% of United States FDI in total manufacturing in Latin America, but for only 26% in Asia. By contrast, the share of machinery and electrical equipment in FDI in total manufacturing in Asia (58%) was almost three times the corresponding share in Latin America (20%). Hence, the industry structure of FDI offers an explanation that is complementary to the reasoning on crowding out by Agosín and Mayer (2000) for relatively weak growth effects of FDI in Latin America.

Host economy characteristics and different types of FDI

In the final step of the analysis, it is checked whether, and in which way, the growth impact of FDI is shaped by the interaction of host-economy characteristics and industry characteristics. From that analysis, a clear picture emerges for the interaction between the institutional development of host economies and the growth impact of FDI in manufacturing industries (table 6).[22] Institutional development has a similar influence on the link between FDI and economic growth for all manufacturing industries. On the one hand, sample economies in which institutional development was above the median reported a higher growth rate when they had attracted FDI by 1990; the difference in median growth rates is about one percentage point in all industries. This indicates that a favourable institutional environment helped positive growth effects of FDI, independently of whether FDI was undertaken in technologically

[21] Asia and Latin America together accounted for 95% of United States FDI stocks in all developing economies in 1990 (BEA 2003).

[22] The results for transport equipment and other manufacturing are not reported in table 6. This is because United States FDI in transport equipment is extremely concentrated in few developing host economies, while other manufacturing comprises a too heterogeneous set of industries to allow for a meaningful interpretation.

advanced or less advanced industries, and for market-seeking or efficiency-seeking reasons. On the other hand, poor institutions have two effects: (a) few economies receive FDI in manufacturing under such conditions, especially so in industries in which FDI tends to be efficiency-seeking (machinery, electrical equipment);[23] (b) for all industries except chemicals, FDI lacks positive growth effects under such conditions. In other words, a threshold of institutional development is required to attract FDI *and* to benefit from higher subsequent growth.

Yet, the findings presented here underscore that the link between FDI and economic growth varies between different types of FDI and that host-economy characteristics have an important say in this respect. For all host-economy

Table 6. GDP growth rates for country subgroups (median), according to host-economy characteristics and FDI stocks in manufacturing industries,[a] 1991-2000

		Industry/FDI									
		Food		Chemicals		Metals		Machinery		Electrical equipment	
Host economy characteristics		FDI *=0*	FDI *>0*	FDI *=0*	FDI *>0*	FDI *=0*	FDI *>0*	FDI *=0*	FDI *>0*	FDI *=0*	FDI *>0*
Per-capita GDP (PPP)	below median	1.2	1.4	0.6	1.4	1.1	0.4	0.4	1.6	0.6	2.4
	above median	2.3	2.3	2.4	2.3	2.3	2.4	2.2	2.4	2.2	2.5
Schooling	below median	0.9	1.0	0.1	1.0	0.6	0.9	0.4	0.7	0.4	2.1
	above median	1.9	2.4	2.3	2.6	2.2	2.5	1.4	2.9	1.6	2.5
Institutional development	below median	0.8	0.0	–0.0	0.6	0.2	0.2	–0.0	–0.5	–0.0	–0.1
	above median	1.4	2.4	1.7	2.5	1.7	2.7	1.7	2.6	1.4	2.5
Openness	closed	–0.2	1.3	–0.2	1.0	–0.1	0.2	–0.2	1.0	–0.2	2.3
	open	1.6	2.5	1.7	2.7	1.6	2.8	1.6	3.1	1.4	2.6

Sources: BEA (2003); World Bank (2002); Kaufmann *et al.* (2002); Sachs and Warner (1995).

[a] For definitions and data sources of variables, see the annex.

[23] In machinery, only three economies out of 37 economies with poor institutional development had received FDI in 1990; in electrical equipment, it was five out of 35 economies.

characteristics except institutional development, the difference in median growth rates between economies with and without FDI, typically, turns out to be smaller in industries in which FDI is market-seeking (food, chemicals, metals) than in industries where FDI is efficiency-seeking (machinery, electrical equipment).[24] This applies to economies with favourable characteristics and those with unfavourable characteristics alike.

The results for the subgroup with unfavourable characteristics must be interpreted with a considerable degree of caution. In various instances, very few economies with unfavourable characteristics hosted United States FDI, especially when it comes to efficiency-seeking FDI in machinery and electrical equipment. Nonetheless, two results for the subgroup with unfavourable characteristics should be noted. First, on average, the link between FDI and economic growth is more pronounced in industries in which FDI is considered efficiency seeking. Second, the difference in median growth rates is considerably higher in electrical equipment than in machinery, notably in the case of schooling as indicator for locational attractiveness. The latter result suggests that it is more difficult for host economies with relatively low secondary school enrolment ratios to reap positive growth effects of FDI in machinery, which, according to table 3, is more demanding than electrical equipment in terms of requiring complementary human capital in the host economies. At the same time, the higher labour intensity and the lower technology intensity of electrical equipment renders it easier for less advanced developing economies to benefit from FDI in this industry.

In contrast to economies with unfavourable characteristics, open host economies with relatively high secondary school enrolment ratios reveal a particularly strong

[24] On average, the growth rate of economies with FDI>0 exceeded the growth rate of economies with FDI=0 by half a percentage point in the food, chemicals and metals industries when per-capita GDP, schooling and openness are used as indicators for locational attractiveness. The corresponding difference in growth rates amounted to 1.2% in machinery and electrical equipment.

link between FDI and economic growth in the case of machinery. The industry characteristics reported for machinery provided a better fit with the host-economy characteristics in this subgroup of economies. Taken together, these results for economies with favourable and unfavourable characteristics support the hypothesis that higher growth effects of FDI are more likely when the gap between the operations of TNCs and host-economy conditions in terms of technology and factor intensities is relatively small. The opposite hypothesis, according to which a larger gap fosters FDI-induced catching up processes, has to be rejected.

Among the host-economy characteristics considered, it is mainly with regard to schooling that efficiency-seeking FDI turns out to be superior to market-seeking FDI in stimulating higher growth in host economies with favourable characteristics. In particular, schooling appears to be much more important than the general level of economic development, measured by per-capita GDP.[25] More surprisingly, it is for essentially all manufacturing industries that the difference in median growth rates between host economies with and without FDI tends to be particularly large when openness is taken as indicator for locational attractiveness. Yet, open host economies benefit most from FDI in machinery, which was to be expected given the outstandingly high export orientation of FDI in this industry reported in table 3.[26]

The observation that even market-seeking FDI in the food, chemicals and metals industries is associated with an about one percentage point higher growth rate in open host economies may be because openness tends to contain the allocative distortions arising from FDI in import-substituting industries.

[25] The difference in median growth rates between higher-income economies with and without FDI ranges only from 0.3% in electrical equipment to –0.1% in chemicals.

[26] Moreover, the difference in growth rates related to FDI in electrical equipment, which ranks second with regard to export orientation, is still larger than the difference in growth rates related to FDI in chemicals, which represent the most important target of market-seeking FDI.

Nevertheless, openness does not seem to be required for reaping positive growth effects of market-seeking FDI. The difference in median growth rates is roughly the same for closed economies, notably for FDI in chemicals. This finding points to two limitations of the classification of industry and host-economy characteristics used in this article:

- The classification of FDI in food, chemicals and metals as market-seeking in table 3 is based on the operations of United States affiliates in all developing host economies.[27] It cannot be ruled out that the export orientation of FDI in chemicals, for example, is considerably higher in open host economies than in closed host economies.
- For classifying host economies as open or closed, the assessment of Sachs and Warner (1995) for the year 1990 has been used. However, several economies have opened up to international trade in subsequent years. Possibly, these liberalizers account for the considerable difference in median growth rates between closed economies with and without FDI in several industries, including chemicals.

These possibilities have been checked tentatively by referring to United States FDI in the chemical industry. Eliminating 12 developing economies which opened up to international trade in 1991–1994 (Sachs and Warner 1995) from the subgroup considered closed in table 6 had little effect on the difference in median growth rates between economies with and without FDI (not shown). However, just 5 of the 25 sample economies that remained closed in 1994 hosted United States FDI stocks in chemicals, while United States FDI was absent in just 3 of the 12 economies that opened up in 1991–1994. What can safely be concluded from this pattern is that opening up to international trade matters for becoming attractive for FDI in chemicals. At the same time, there are indications that the nature of FDI in industries such as chemicals may change when host countries

[27] This is because country-specific data on operational characteristics of United States affiliates are extremely patchy. Note also that the data do not allow for a finer disaggregation of FDI in fairly heterogeneous industries such as chemicals.

open up. For instance, the export orientation of United States FDI in chemicals is extremely low in the Brazilian economy (5%), which Sachs and Warner (1995) considered closed in 1990. It is four times as high in Mexico, which opened up much earlier than Brazil, and still considerably higher in Malaysia (32%), in which openness has a longer history. The different nature of FDI in particular industries and the relation to host-economy characteristics should be an issue for further research. However, serious data constraints render this task fairly difficult.

Summary and conclusions

Positive growth effects of FDI in developing economies cannot be taken for granted. Our analysis based on United States FDI stocks in a large number of developing economies clearly suggests that the currently prevailing euphoria about FDI among policymakers and external advisers rests on weak empirical foundations. This is for several reasons:

- The link between FDI and subsequent growth varies considerably when host economies are classified according to locational characteristics such as GDP per capita, schooling, institutional development and openness to trade. In host economies with unfavourable characteristics, higher total FDI stocks tend to be associated with lower subsequent growth. Even though the picture is brighter for economies with favourable characteristics, generally it seems to be much easier to attract FDI than to derive macroeconomic benefits from FDI.
- The comparison of median growth rates between subgroups of host economies reveals that the link between FDI and economic growth is stronger in the services sector than in the manufacturing sector.
- The growth effects of FDI also differ between manufacturing industries. These differences are related to industry characteristics such as factor requirements, export orientation and the integration of foreign affiliates into corporate networks via intra-firm trade. Drawing on these characteristics for separating efficiency-seeking FDI from

market-seeking FDI in manufacturing, it is mainly for the former type of FDI that positive growth effects are found.

- Finally the hypothesis that a large technological gap between the host and home economy of FDI fosters FDI-induced catching-up processes in developing economies has been rejected. Rather, the interaction of host-economy and industry characteristics suggests that positive growth effects of FDI are more likely when the technological gap is relatively small.

This analysis had to be based on FDI stocks in 1990, in order to minimize the risk of reverse causation, i.e. higher growth feeding back into more FDI. Future research will show whether the presumption, according to which the recent boom of FDI in developing economies is unlikely to have fundamentally changed the links between FDI and growth, is still valid. The evidence available so far invites the conclusion that policymakers in developing countries and external advisors (see, e.g., United Nations, 2002) are focusing on the wrong question: the central challenge is not to attract FDI! Succeeding in this respect would only solve the minor part of the problem, which is to derive macroeconomic benefits from FDI. For developing economies with unfavourable locational characteristics, in particular, it makes little sense to offer fiscal incentives and outright subsidies, in order to attract TNCs into technologically advanced industries. Scarce public resources could be used more productively.

Apart from improving the local availability of a sufficiently qualified labour force, host economies are well advised to focus on developing sound institutions, which appear to be a prerequisite for attracting, and benefiting from both market-seeking and efficiency-seeking FDI. Finally, openness to trade is required to successfully participate in the widely perceived trend towards efficiency-seeking FDI. As it seems, opening up to international trade may even turn market-seeking FDI into efficiency-seeking FDI in manufacturing industries such as chemicals and, thus, improve the growth impact of FDI. This issue deserves more attention in future research on the link between FDI and economic growth in developing countries.■

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Annex: Definition of variables and data sources

The following data have been derived from the BEA (2003) online database:

- Total number of employees of majority-owned non-bank United States affiliates, 1995.
- United States direct investment position abroad on a historical-cost basis, 1990.
- Royalties and license fees paid by United States affiliates to parent company, 1999.
- Total imports of majority-owned non-bank United States affiliates from parent companies, 1996.
- Expenditure for R&D of majority-owned non-bank United States affiliates, 1995.
- Total sales of majority-owned non-bank United States affiliates, 1996.
- Total value added of majority-owned non-bank United States affiliates, 1995.
- Total employee compensation of majority-owned non-bank United States affiliates, 1995.
- Total exports of majority-owned non-bank United States affiliates, 1996.
- Total exports of majority-owned non-bank United States affiliates to parent companies, 1996.

The following data have been derived from other sources:

- Gross domestic product per capita in PPP terms, 1990: World Bank (2002).
- Annual average growth rate of gross domestic product per capita, 1991–2000: World Bank (2002).
- Index of institutional development, 1997/1998: Kaufmann *et al.* (2002).
- Index on openness to trade (0 = closed, 1 = open), 1990: Sachs and Warner (1995).
- Secondary school enrolment (as a percentage of population of official school age), 1990: World Bank (2002).

Annex table 1. GDP growth and FDI stocks in 78 sample economies[a], 1990-2000

Economy	Economic growth,[b] 1991-2000	United States FDI stocks in % of GDP, 1990
South America		
Argentina	3.4	1.8
Bolivia	1.4	4.0
Brazil	1.3	3.1
Chile	5.1	6.3
Colombia	0.8	4.2
Ecuador	-0.3	2.6
Guyana	4.6	1.8
Paraguay	-0.7	0.8
Peru	2.3	2.3
Suriname	2.0	42.3
Uruguay	2.4	1.0
Venezuela	-0.1	2.2
Central America		
Costa Rica	2.9	4.4
El Salvador	2.5	1.9
Guatemala	1.4	1.7
Honduras	0.4	8.6
Mexico	1.9	3.9
Panama	2.7	174.8
Caribbean		
Antigua and Barbuda	2.8	0.8
Dominican Republic	4.1	7.5
Grenada	3.2	0.5
Haiti	-2.5	1.1
Jamaica	0.1	14.7
St. Kitts and Nevis	4.2	0.6
St. Vincent	2.5	0.5
Trinidad and Tobago	2.3	9.6
Africa		
Algeria	-0.2	0.0
Burkina Faso	2.6	0.1
Congo	-2.6	0.8
Egypt	2.4	2.9
Ethiopia	1.7	0.0
Gabon	-0.3	6.0
Ghana	1.8	2.0
Côte d'Ivoire	-0.4	0.5
Kenya	-0.9	1.2
Lesotho	2.0	0.2
Malawi	1.8	0.2
Mali	1.4	0.1
Mauritania	1.1	-0.3
Mauritius	4.1	0.1
Morocco	0.6	0.2
Niger	-1.4	0.1
Nigeria	-0.2	-1.4
Rwanda	-0.2	0.0
Senegal	0.8	0.3
South Africa	-0.3	0.7
Sudan	5.4	0.1
Swaziland	0.1	0.5
Togo	-1.1	0.2
Tunisia	3.1	0.3
Uganda	3.3	0.1
Democratic Republic of Congo	-8.0	0.4
Zambia	-1.8	0.9
Zimbabwe	-0.4	1.0
North Africa and West Asia		
Bahrain	2.4	-3.3
Israel	2.2	1.4
Jordan	0.7	0.2
Oman	0.3	0.8
Saudi Arabia	-0.5	1.8
United Arab Emirates	-2.7	1.2
Asia		
Bangladesh	3.0	0.0
Brunei Darussalam	-0.7	0.7
China	9.0	0.1
Fiji	0.3	0.1
Hong Kong (China)	2.6	8.1
India	3.6	0.1
Indonesia	2.7	2.8
Korea, Rep. of	5.2	1.1
Malaysia	4.6	3.3
Pakistan	1.4	0.5
Papua New Guinea	2.2	1.3
Philippines	0.7	3.1
Singapore	4.8	10.8
Sri Lanka	3.9	0.1
Thailand	3.6	2.1
Tonga	2.7	3.5
Vanuatu	-0.4	0.7
Samoa	2.0	0.5

Sources: BEA (2003); World Bank (2002).

[a] Note that the number of observations varies between the different steps of the empirical analysis. This is because of missing data for some sample economies, notably with regard to industry-specific FDI stocks.

[b] Average annual growth rate of per-capita GDP in percent.