GROWTH, TECHNOLOGY TRANSFER AND FOREIGN DIRECT INVESTMENT

OECD Paper[*]

I.   Introduction

1.   The impact of FDI on the process of economic development has been discussed at length since the late 1960s.[1] More recently, a significant increase in FDI flows towards developing and emerging economies, and concerns about the practices of MNEs have contributed to the resurgence of both theoretical and policy debates. Although economic models can help assess costs and benefits of private capital inflows, the role of FDI in development remains unsettled. The question is not merely academic since an increasing number of countries have implemented policies for attracting international investments, by providing financial incentives and granting special tax allowances.

2.   Investment liberalisation has been and remains an engine for economic growth and for integrating developing countries into the world economy. The potential benefits of foreign direct

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[1] .   *Private Foreign Direct Investment in Development* by Reuber et al. (1973) is one of the first pieces of research that deals largely and exclusively with the issue of FDI in LDCs. *Foreign Investment, Transnationals and Developing Countries*, by Lall and Streeten (1977) provides an exhaustive review of the debate that emerged in the 1970s, and offers one of the first empirical analyses on the effects of FDI on developing countries' welfare.

investment (FDI) can come through several channels. FDI is an important source of financing of domestic capital needs and compared with other forms of private capital flows – e.g. portfolio equity and debt flows – FDI is more stable. FDI allows the transfer of technology. Multinational enterprises – the main drivers of FDI – are a powerful and effective means to disseminate technology from developed to developing countries, and are often the only source of new and innovative technologies that are usually not available through the market. Technology disseminated through FDI generally includes the 'entire package' including experts, skills and the financial resources to exploit the technology appropriately. Other potential benefits of FDI for host countries include increased competition in input and product markets; human capital development and higher wages; and improvement in corporate governance standards and legal traditions.

3.   In the past years, the arguments as to whether, to what extent, and how international investment benefits development have become particularly topical. There has been growing public concern that these benefits still have to be demonstrated and, where benefits exists, that they are not being shared equitably. Some of the potential costs associated with FDI could include increased unemployment due to restructuring and increased market concentration. In addition, many factors account for differences in the level and range of benefits accruing to recipient countries, including exogenous factors such as size and proximity to markets or endowment of natural resources. Clearly policy coherence, institutional and regulatory framework conditions, and the availability of skilled labour and infrastructure also matter and impact upon a country's ability to capture the benefits of investment. However, there are diverging views on how public policy can help maximise the benefits (and minimise the costs) in order to meet a country's development needs.

4.   Responding to this public debate and exploiting the comparative strengths of the CIME will require striking a balance between efforts to promote liberalisation and addressing development, social and environmental concerns. Advancing the investment agenda requires the support of sound policy-orientated analysis. Analytical work on the benefits and costs of FDI can help to develop and maintain open policies towards international investment and explain the continuing relevance of these policies for both developed and developing countries. An analysis of these benefits and costs can also contribute to the analysis on what policies or policy frameworks best capture the benefits of FDI for development while mitigating the costs, and identify key issues that call for national or international action.

5.   This paper is part of a First Report which surveys the benefits and costs of FDI, and draws on existing empirical studies mainly in the academic literature, and on work conducted by the Development Centre and other parts of the OECD, the World Bank and UNCTAD. The First Report, to be completed by December 20001, aims to contribute to the debate by addressing the question of what role FDI plays in the efforts of developing countries to attain sustainable development and takes a fresh look at key development issues related to foreign direct investment. A critical dimension of this work, therefore, is an assessment of why some countries are more able to take advantage of the gains from liberalisation.

6.   This paper focuses on the impact of FDI on growth and technology transfer. It looks at the impact of FDI on economic growth. The evidence on technology transfer and its impact is also reviewed.

II.   Determinants of FDI, recent trends and policy developments

7.   Foreign direct investment has been one of the defining features of the world economy and globalisation over the past twenty years. It implies the creation of new enterprises abroad, or the acquisition of substantial stakes in existing foreign enterprises. This form of investment has grown at an unprecedented pace for two decades, exceeding official aid flows by a factor of more than three. There occurred only a slight interruption during the recession in the early 1990s. More firms, and in more

industries and countries, than ever before are expanding abroad through direct investment. At the microeconomic level, far-reaching organisational change is taking place as a result of e-business and new technology, which are transforming the value chain for many industries. The structure of MNEs is evolving, as are their FDI strategies.

8.   Today, some 60,000 parent companies worldwide have established over 500,000 foreign affiliates in countries other than their own, with the amount of inward FDI stock valued at roughly $4,000 billion. These foreign affiliates are estimated to have generated total gross output of more than $2,600 billion and total employment of over 35 million in host countries. While about 90 per cent of all parent companies are located in OECD countries, a little more than half of all foreign affiliates are in operation in non-OECD countries, providing a major source of industrial production and employment in a number of emerging and developing economies.[2] This chapter discusses some of the factors determining the location of FDI and recent trends and the policy developments that influenced these trends. An assessment of these recent developments can help to understand the scope for continued growth in FDI and the potential benefits for developing countries.

II.1   Factors driving FDI location decisions

9.   Firms can choose amongst many different options when extending their operations abroad. These options include FDI, exporting, licensing, or entering into a joint venture or strategic alliance. Traditional theories in International Business cite the presence of a set of factors consisting of *ownership* advantages, *location* advantages, and *internalisation* advantages – widely known as OLI-framework as developed by John Dunning (1993) – as the explanation for why FDI is chosen by MNEs. Ownership advantages refer to those assets of a firm that allow it to compete successfully in overseas markets, despite – in comparison with local firms – a lack of knowledge of the local market and the costs of setting up a foreign affiliate. Ownership advantages usually comprise superior technology or management knowledge. Location advantages are those benefits that a host country can offer a firm: large markets, low labour or production costs or both, and a good infrastructure. Internalisation advantages refer to transaction-costs, and occur when it is cheaper to exploit ownership and location advantages through FDI rather than exporting. While ownership and internalisation advantages are investor specific determinants, the location advantage is specific to the host country. However, this latter advantage may have gained importance in the investors' decision making process, judging by the recent competition by host countries for attracting FDI.

10.   There is a vast literature on the *location advantages* of FDI. UNCTAD (1998) presented the main ideas that come forward in this literature in a systematic way by categorising the location determinants of FDI into three main groups: economic determinants; the host country policy framework for FDI; and business facilitation. Following Dunning (1993), the economic determinants are broken down by UNCTAD into three sub-groups: market seeking; efficiency seeking; and a combination of natural resources and (strategic) asset seeking. Lee and Houde (2000) discuss the six main location advantages of countries, along with the characteristics of the FDI flows they might attract.[3] These main advantages consist of:

  – *Market size and growth prospects*. Factors like market size, prospects for market growth, and the degree of development and per capita incomes of host countries are important

2.   See UNCTAD (1999).

3 .   Some of these advantages may fall under several categories. For example, investment promotion and investor protection are both part of the host-country policy framework and business facilitation; and the abundance of cheap natural resource is both resource/asset seeking and efficiency seeking FDI.

determinants in the location decisions made by MNEs. Host countries with larger market size, faster economic growth and a higher degree of economic development will provide better opportunities for enterprises to exploit their ownership advantages and creates possibilities for economies of scale. FDI attracted by these advantages is called 'market-oriented'.

– *Natural and human resource endowments – including the cost and productivity of labour*. Factor cost advantages and the availability of natural and human resource endowments are a driving force behind FDI. Especially FDI oriented towards exports (either back to the home country or to third countries) seeks to use those comparative advantages related to low labour costs or the abundance of natural resources. Recently attention has shifted from the *natural* endowments of resources and labour to *acquired* endowments of resources, such as the availability of intermediate goods and skilled labour. The availability of strategic assets, such technological and innovative assets e.g. brand names, has also become an important determinant in the location decisions of MNEs.

– *Physical, financial and technological infrastructure*. Differences in infrastructure, such as transportation, influence the FDI location decision not only among candidate countries but also amongst different regions within a country. FDI is more likely to flow to those areas with good accessibility and consequently lower transportation costs. Besides highways, railways, ports and airports, the level of telecommunication services has gained increasing importance with the recent transformations in the information and telecommunications industries of the past decades. High local technological capabilities are an important factor for attracting FDI flows in high-value added activities.

– *Openness to international trade and access to international markets*. Economic reforms and open door policies and other efforts to promote trade – *inter alia* by conducting bilateral trade agreements and adopting unilateral actions (e.g. lowering tariff barriers) – can attract export-oriented FDI. Attractive and strategic geographic positions, adjacent to potential importing countries and providing access to regional and global markets, are also significant factors in attracting FDI – especially FDI flows aimed at exports.

– *The regulatory and policy framework and policy coherence*. General economic, political and social stability forms the background of a host country's FDI policy. A transparent and well-functioning legal framework and business environment is of the first order of importance since it lowers the (political) risk of doing business in an unfamiliar environment. Rules and regulations regarding the entry and operations of foreign firms, and standards of treatment of foreign firms, are particularly relevant in this respect. Good corporate governance and fair business practices are equally important. Bureaucratic and restrictive administrative practices, coupled with bribery, incur additional costs. This not only adversely affects initial FDI decisions but also the successive reinvestment of earnings. Also important are policies that impact upon the functioning and structure of markets such as policies concerning trade, competition, mergers and acquisitions (M&A), and privatisation, as well as the policy coherence.

– *Investment promotion (and protection)*. Proper investment protection is usually a minimum requirement for FDI. Without transparent dispute settlement procedures, or unreasonable interpretation of existing measures, FDI might be deterred. On the other hand, many countries offer investment promotion packages to attract FDI. These incentive packages may be part of the location decision of FDI, and can include factors such at tax and other financial incentives that affect net profit rates which seems to be primary concern of the investors.

II.2   *Policy developments*

11.   The growth in international investment of the past decades has been due in large part to increased liberalisation brought about by reduced barriers to trade and investment and discriminatory subsidies. This improvement in the investment climate in the 1990s was influenced in part by the recognition of the benefits of FDI. The 1990s also witness the removal of domestic impediments through widespread regulatory reform and privatisation.

12.   Although there are no universal rules governing international investment, OECD member are committed to provide non-discriminatory treatment to inward direct investment and related financial flows by virtue of the legally binding OECD Codes of Liberalisation. The 33 countries that adhere to the OECD Declaration on International Investment and Multinational Enterprises have also undertaken a political commitment to accord national treatment to established foreign direct investors, promote voluntary standards of corporate responsibility by multinational enterprises, encourage moderation and restraint in the use of investment incentives, and avoid imposing conflicting regulatory requirements on multinational enterprises.[4] These instruments have provided an effective framework for international co-operation and have served to underpin the liberalisation achieved in recent decades, see Annex I.

13.   Bilateral investment treaties (BITs) have become an increasingly important vehicle for promoting and protecting investment flows by providing legal security to foreign investors and their investments. Typically BITs establish rules concerning the treatment of foreign investors and their investment by host countries, including national treatment and most-favoured nation treatment; prompt, adequate and effective compensation in the case of expropriation; and free movement of capital and other financial flows related to the investment. In addition, BITs include rules on dispute settlement, both with regard to state-to-state arbitration and investor-state arbitration. Most of the BITs have been signed in the 1990s and parallel the rise in investment flows. In the three decades leading up to 1990, only 500 BITs had been signed, whereas by the end of the decade this number has almost quadrupled; and in 1999 the vast majority were concluded between developing countries (UNCTAD, 2000).

14.   Besides removing barriers to trade and investment, harmonisation and mutual recognition of regulation is also important since the large variety of different legal systems and regulations – though intrinsically not restrictive – can also serve as a barrier to trade and investment. For instance, regulatory reforms at the European Union level and the harmonising of European legislation, combined with a liberalised internal market, have been important drivers in the increase of intra-European investment and trade. Other regions have used regional integration schemes to liberalise trade and investment regulation. Examples include North America (NAFTA), Asia (ASEAN[5]), Australia and New Zealand (ANZCERTA), Latin America (Mercosur[6]) and sub-Saharan Africa (SADC[7]). Talks on the Free Trade Area of the Americas (FTAA), designed to set up a hemispheric-wide free trade zone by 2005, are currently underway.

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4 .   This includes all 30 OECD Member countries, as well as Argentina, Brazil, Chile, Estonia and Lithuania. The OECD encourages non-Members to adhere to this Declaration, which includes the Guidelines for Multinational Enterprises.

5 .   Consisting of Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

6 .   Consisting of Brazil, Argentina, Paraguay and Uruguay.

15. In addition to liberalisation and regulatory reform, OECD countries further increased their reliance on market systems through privatisation. The OECD public enterprise sector is currently estimated to be less than half the size it was at the beginning of the 1980s, see Gonenc et. al. (2001). The privatisation movement was in large part induced by dissatisfaction with the performance of state-owned enterprises, and the increased capital investment needed to upgrade infrastructure, especially in the public utility sector. Privatisation offered the opportunity to restructure and introduce competition in sectors previously dominated by state monopolies, to increase investment, and to improve productive and allocative efficiency, all of which benefit consumers and the economy as a whole.[8] However, in many emerging markets and economies in transition, the benefits from the change in ownership have sometimes proved disappointing, due to weaknesses in the legal, institutional or market environment. In addition, the privatisation process needs to be open and transparent and allow foreign participation in a non-discriminatory manner.

16. With increasingly more countries acknowledging the benefits of FDI, barriers to international investment are gradually being removed. Of the almost 1000 changes in FDI regulations undertaken worldwide in the 1990s, 94 percent were aimed at creating a more favourable environment for FDI (UNCTAD, 2000). Instead of barriers, many countries now employ *incentives* to attract FDI. Indeed, incentive based competition for FDI has become a wide-spread phenomenon, involving governments at all levels (national and sub-national) in both OECD and non-OECD countries (Oman, 2000). Examples of such incentives include tax holidays, preferential access to (government) credit, subsidies and the reduction of import duties for goods needed for production. These incentives are meant to reap the maximum benefits associated with the activities of MNEs e.g. knowledge, management skills, technological advantages, etc. However the cost-effectiveness of such incentives is questionable since they usually attract primarily short-term profit-orientated or cheap cost-motivated FDI. Furthermore, evidence suggests that competition for FDI results in no net gain in those countries FDI market shares.

17. While the investment environment has improved considerably in the past decade, barriers to investment have not disappeared and many countries remain reluctant to undertake full liberalisation commitments, even where they are actively encouraging FDI. In order to retain national 'control' over the economy some countries still do not permit FDI in sectors considered "strategic". Restrictions on foreign ownership also provide an important barrier to entry and prevent the market for corporate control from functioning efficiently.[9] Other examples of remaining restrictions include reciprocity and discretionary liberalisation i.e. where sectors are opened to FDI but on a case by case authorisation basis. Some countries use measures that are more specifically tailored towards a single goal, like the use of screening procedures to select FDI projects which they consider best serve their country's needs or the imposition of conditions on FDI in an attempt to ensure that technology is transferred. Disincentives regarding investment also include measures designed to align firm strategy with government's economic goals e.g. demands that firms live up to specific performance requirements. Finally, a lack of political and economic stability and predictability can also act as a barrier to investment, as can a lack of transparency of regulations, corruption, weak protection of intellectual property rights, and arbitrary application of regulations and laws.

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7 .   The Southern African Development Community comprises 14 countries consisting of Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, Zimbabwe, and Swaziland.

8 .   The available empirical evidence suggest that privatisation has had a positive effect on the profitability and performance of privatised industries, and that liberalisation has been beneficial for efficiency and consumer welfare in reforming countries.

9 .   This is the reason why the OECD Principles of Corporate Governance advocate the equitable treatment of shareholders, including foreign shareholders.

III.   FDI and growth

18.   In the course of the impressive surge in capital flows during the recent decade, many developing countries have embraced foreign investors as a potential source of economic growth. Attitudes have, however, differed between the forms of FDI that produce an immediate and visible impact on domestic value added, and those that, at first, take the form of a transfer of the ownership of well-run existing enterprises. The first category includes greenfield investment, and M&As where the domestic enterprise sector is restrained in its access to international capital markets.

19.   This approach toward FDI and growth is essentially consistent with the so-called 'resource-gap' model. In this model, developing countries find themselves trapped in a low-growth path due to the lack of financial resources that prevents the attainment of optimal growth rates. The inflow of foreign capital foster growth in the host economy by easing the shortages of capital, foreign exchange and skills. To host countries it includes the additional benefit that (perhaps most visibly in the case of greenfield investment), it includes an upfront element of value creation and direct increases in employment. The growth process can become self-sustained if backward and forward linkages emerge from MNEs to the host economy and if FDI contributes to raising the profitability of domestic investment.

20.   On the other hand, as regards the financing of growth, the resource gap model does not imply that FDI contributes relatively more to growth than domestic investment (or such investment that may be feasible on the background of the available resources). However, a body of literature, especially following the financial crises in emerging market economies in the 1990s, has stressed the importance of FDI relative to other sources of finance. First and foremost, FDI tends to be less volatile than other capital flows, thereby exerting durable positive effects on growth (see Lipsey, 1999 and Reisen and Soto, 2000). Moreover, FDI is mostly equity investment, while excessive reliance on borrowed funds and other debt creating investment, whether domestic or foreign, may lead to excessive leverage of the corporate sector, which significantly raises the downside risk in the case of an adverse shock to the economy.

21.   Even in resource constrained economies, however, literature identifies cases in which the benefits of FDI could be mitigated by certain drawbacks. Most importantly, some economists have stressed the potential negative effects of FDI on the host economy by 'crowding out' domestic investment and suppressing local entrepreneurship. This point is briefly below. A second concern is the risk that host countries could experience a deterioration in their balance of payments due to increased imports. Further strains on the host country's balance of payments position could emanate from profit repatriation and reduced tax revenues as a result of transfer-pricing practices, tax allowances and other financial incentives granted to foreign firms. The linkages between FDI and trade flows are reviewed in detail in Chapter VIII of the present paper.

III.1   Modelling the impact of FDI on growth: theory

22.   It is by now commonly agreed in literature that, although the resource gap model has helped to assess the benefits and costs of private capital flows, the role of FDI for development remains unsettled in this conventional analysis (see among others Reuber et al., 1973 and Lall and Streeten, 1977). More recently, therefore, there has been renewed interest in the empirical analysis of the FDI-growth nexus. Such interest has also been stimulated by new developments in growth theory. The so-called 'endogenous growth' model identifies knowledge accumulation as the driving force explaining long-term growth of the economy (OECD, 2001). FDI, which provides a channel for knowledge acquisition and dissemination, can therefore act as an engine of growth for the recipient economy.

23.   According to endogenous growth models, the impact of FDI on growth depends crucially upon the existence of production and knowledge externalities. In the standard neo-classical model, production is represented by a constant-return-to-scale technology, relating the level of output to input bundles. FDI enters this model as an additional input to production. More precisely, FDI is treated as additional investment that increases domestic capital stock. This is not the only channel, however, through which FDI can affect growth. Industrial organisation studies point to the peculiar nature of FDI, which is better described as a "combination of capital stock, know-how and technology" (de Mello, 1997), whereby it may impact on both labour and capital productivity.

24.   The central question in the empirical analysis of the FDI-growth nexus is thus to investigate whether FDI significantly affects the rate of growth of income, and, if it does, whether this effect works via increases in factor productivity. One can address this question by using various econometric techniques. Standard growth-accounting exercises have been widely applied in the early literature to break down the growth rate of aggregate output into contributions from the growth of capital and labour inputs and the change in technology. These analyses, however, provide only a mechanical decomposition of output growth into its various sources, without explaining how these changes are affected by the 'fundamentals' of the economy. Such limitations can be overcome by estimating growth equations based on the neo-classical production theory (see Barro and Sala-i-Martin, 1995, Chapter 10).

Box 1. The risk of crowding out

There are two separate channels trough which FDI may partly, or wholly, crowd out domestic fixed capital formation: product markets, by adversely affecting knowledge accumulation and growth by local firms in competing activities; and factor markets, by reducing access for local firms to factor inputs and finance[1].

The first issue reflects "infant industry" considerations (Bruton, 1998), in this case by protecting incipient learning in domestic versus foreign firms. FDI can hamper or distort the growth of domestic capabilities in competing industries when direct exposure to foreign competition prevents local enterprises from undertaking lengthy and costly learning processes. Insofar as host country competences would, in a counterfactual scenario, have developed, one may say that crowding out occurs if potentially competitive local firms can not compete with the affiliates of MNEs at a given time.

Crowding out can impose long-term costs on the host economy if it holds back the development of domestic capabilities and retards the growth of a local innovative base. In extreme cases, this can make technological upgrading and deepening dependent on decisions taken by MNEs, and it could even lower the host economy's technological level. However, it is important to note that overall economic losses occur only if the enterprises that are being crowded out are potentially efficient. In addition, MNEs may also crowd in local firms, by creating linkages with domestic suppliers, subcontractors and institutions.

The second form of crowding out reflects an uneven playing field for domestic firms because of segmentation in local factor markets. MNEs may gain privileged access to such inputs as finance and skilled personnel because of their reputation and size. This may raise entry costs for local firms, or altogether deprive them of the most productive factors. MNEs may also have stronger bargaining positions vis-à-vis host country institutions and governments. Similar arguments may apply where MNEs have better access to foreign factor markets than their domestic competitors, for instance if they can raise capital in world markets at lower rates.

25.   A crucial question is to what extent FDI may crowd out domestic investment (see Box 1). This question has been tackled by including domestic investment directly in the growth equations (Borenstein, De Gregorio and Lee, 1998) or estimating investment equations that incorporate FDI (Agosin and Mayer, 2000 and McMillan, 1999). Second, since the long-term effects of FDI on growth are predicted on the existence of technology and knowledge externalities extended to domestic firms in the host country, one should also look into the question of whether these externalities indeed take place. Empirical studies addressing this question are more microeconomic in nature and will be discussed in Chapters IV and V. However, only few attempts have been made in the macroeconomic context to take into explicit account such spill-over effects (Bende-Nabende et al., 2000). Finally, it has been argued that local conditions such as technological capabilities, human capital and the development of domestic financial markets are likely to play an important part in the location of FDI flows. Therefore, one should examine empirically whether any necessary pre-condition (or threshold) has to be met in the host economy for the FDI-driven growth to materialise[10].

26.   As noted above, knowledge accumulation and diffusion play the key role in endogenous growth models. The existence of technological and knowledge externalities counterbalance the effects of diminishing returns to capital accumulation and keeps the economy on a sustained long-term growth path. FDI can significantly contribute to the increase of the stock of knowledge in the host economy, not only by introducing new capital goods and production processes (embodied technical change), but also by providing new managerial know-how and skills improvement that can spread to domestic firms (disembodied technical change). Skills improvements may take place through formal training or learning-by-doing within foreign affiliates. FDI, by improving the stock of knowledge of the host country, will therefore have both short-term and long-term impacts on its economy and boost long-term growth (see Box 2 for a more technical discussion).

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[10] This argument is related to a large body of literature on threshold externalities (see Azariadis and Drazen, 1990), according to which the attainment of certain minimum critical thresholds in the host economy is required to trigger the development process.

27.   However, the inclusion of FDI in neo-classical growth equations poses two major problems from the methodological point of view. One is the problem of *reverse causality*. GDP growth by itself or factors that affect GDP growth (such as well-functioning institutions) may influence FDI as well. If causality runs from growth to FDI, the use of ordinary least squares (OLS) estimation techniques would yield biased results. Instead of verifying whether FDI inflows foster GDP growth, the econometric analysis may have picked up how much the latter influences the former. Another major problem is related to that of 'spurious correlation' caused by *omitted variables* in growth equations. FDI is likely to be significantly correlated with other explanatory variables that are also expected to affect growth. In this case, omitting some important variables from the right-hand side of the growth equation would result in biased estimation of the growth coefficient of FDI, since this coefficient is most likely to pick up the impact of these omitted variables. As a corollary, one need to know how and to what extent FDI interacts with other explanatory variables. Many factors that are expected to exert a positive impact on growth (such as domestic capital formation and trade) may be stimulated by FDI as well (the trade linkages are discussed in Chapter VII). In

order to disentangle the full effects of FDI on growth, various spill-over effects must therefore be specified and estimated in an appropriate manner.[11]

28.   Finally, in addition to the externalities-based benefits of technology and human capital transfers, FDI may contribute to growth by helping host countries overcome structural impediments to realising their economic potential. Recent literature suggests that this is the case where the entry of MNEs has a positive effect on competition. Another potential channel is the impact of FDI on enterprise restructuring and corporate governance practices. The theoretical and empirical evidence of these linkages between FDI and growth are reviewed in Chapters VI and VII.

III.2   *FDI and growth: evidence from macroeconomic data*

a)   *Overview of recent results*

29.   This section reviews and discusses the main findings of a number of recent empirical studies conducted on the basis of estimated endogenous growth models. This literature review focuses on the four major questions that arise from the above discussion in the macroeconomic context: (1) Does FDI significantly affect the rate of growth of income or productivity? (2) Does FDI 'crowd out' or 'crowd in' domestic investment? (3) Do technology and knowledge spillovers take place in the domestic economy? and (4) Are there any necessary pre-conditions (e.g. human capital, technological or financial market development) for these positive effects to materialise? The results of this review are presented in the overview table attached to the end of this chapter, with an indication of which questions are addressed by individual studies. In this section, much of the discussion will be directed to (1) and (4), as these two questions are indeed the focal point of existing empirical studies in the growth literature.

30.   Perhaps most importantly, a vast majority of these studies reviewed here indicate that FDI does make a positive contribution to both income growth and factor productivity in host countries. Using a panel data of 16 OECD countries and 17 (mostly Asian) non-OECD countries over the 1970-90 period, de Mello (1999) find a positive and significant impact of FDI on output growth in both country groups, once country-specific characteristics are taken into account.[12] FDI tends to increase output growth through higher productivity in OECD countries (technological leaders) and through capital accumulation in non-OECD countries (technological laggards). In a similar vein, Xu (2000) using US survey data on manufacturing MNEs finds strong evidence on the positive effect of FDI on TFP growth in recipient countries, but the technology-transfer effect is found to be statistically significant only for developed countries. He argues that the absorption of MNEs' technology may require a certain level of human capita accumulation on the recipient side and that such a threshold condition can not met by many developing countries.

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[11] To address these methodological problems, researchers have taken different approaches, such as the application of 'Granger-causality' tests and cointegration analysis to time-series data (e.g., de Mello 1999 and UNCTAD 2000), the use of instrumental variable (IV) technique to identify the autonomous impact of FDI on growth (e.g., Carkovic and Levine 2000, Reisen and Soto 2000 and Lensink and Morrisey 2001), and the construction and estimation of a full structural model based on three-stage least squares (3SLS) or full-information maximum-likelihood methods (Bende-Nabende, Ford and Slater 2000).

[12] Such characteristics are dealt with by introducing country-specific and group-specific dummies and applying a standard fixed-effect estimation technique.

31.   On the other hand, the results of Carkovic and Levine (2000) whose panel data include 72 countries over the 1960-95 period find no significant impact of FDI on growth. The exogenous component of FDI does not exert a significant positive impact on growth, neither it enjoys a strong link with productivity growth. The impact on capital accumulation is found to be statistically significant and positive, but such relationship is not robust, depending on the specification of regressions with respect to other determinants of capital growth. Such discrepancies in estimation results may be explained at least in part by the choice of sample countries and periods.

32.   Reisen and Soto (2000) investigate the growth impact of short- and long-term capital flows using a panel of 44 developing countries over the 1986-97 period. Their estimation results find a robust and positive correlation between FDI and portfolio equity flows on the one hand and GDP growth on the other. The superiority of equity over debt flows in stimulating growth is also established for those economies with underdeveloped banking systems. Since high volatility in capital flows may wreak havoc on the economic performance of a country, the apparent lower volatility of FDI relative to other kinds of capital flows is another possible growth enhancing feature[13]. It should, be noted that the panel data used by Reisen and Soto (2000) cover almost only middle- and low-income countries over a shorter period when significant changes in capital flows have taken place.

33.   Finally, on the issue of crowding out of domestic investment, McMillan (1999), using dynamic panel data for a large range of countries, finds evidence of a significant degree of crowding in. Agosin and Mayer (2000), on the other hand, find mixed results among some of the main groups of emerging economies. Using data for the period 1970-1996 and the two subperiods 1976-1985 and 1986-96 covering, the authors conclude that there has been a strong crowding in of domestic investment in Asia, and to a lesser extent in Africa. In Latin America, on the other hand, there is strong evidence of crowding out. With other words, empirical research does not lend itself to general conclusions about the overall effects of FDI on domestic capital formation. It should, however, be kept in mind that (owing to the externalities and structural impacts of FDI mentioned above) even the extreme case of complete crowding out does not preclude FDI from having a positive impact on economic growth.

b)   Threshold externalities

34.   One explanation of the disparities between different empirical studies could be the presence of threshold externalities. Recent literature shows that developing countries need to have reached a certain threshold of development in the educational or infrastructure level before being able to capture the benefits associated with FDI (Saggi, 2000). A useful survey by de Mello (1997) point to the different roles played by FDI in fostering growth: recipient countries' technological capabilities are likely to determine the scope for spillovers from foreign to domestic firms. Hence, the growth impact of FDI would tend to be more limited in technological less advanced countries.

35.   Borenzstein *et. al.* (1998) address the technology-gap question by developing a model of economic growth whereby FDI contributes to technological progress through capital deepening, i.e.

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[13] To be sure, there are divergent views among academic researchers on the growth impact of volatility in capital flows. Nonetheless, one point on which most economists agree is that shocks from short-term capital flows are transmitted more quickly between countries than those from FDI and other long-term flows. Furthermore, as regards volatility of FDI, Lensink and Morrisey (2001) argue that while volatility is found to have a consistent negative effect on growth, it is not volatility of FDI *per se* that retards growth but that such volatility captures the growth-retarding effects of unobserved variables. The swings in FDI might reflect political and economic uncertainty in the host country, a factor that is widely acknowledged hampering economic growth.

through the introduction of new varieties of capital goods. Acknowledging that such beneficial effects are likely to depend on the skills of the domestic labour force, FDI is interacted with a measure of human capital development (i.e. secondary school attainment). The authors find that FDI contributes to growth though the magnitude of this effect depends on the stock of human capital available in the host economy. In particular, they argue that FDI raises growth only in those countries where the labour force has achieved a minimum threshold of education. They also find that FDI tends to "crowd in" domestic investment, suggesting that the attraction of complementary activities dominates the displacement of domestic competitors[14].

36.	Similar results are obtained by Blomström *et al.* (1994). The authors find that the positive impact of FDI on growth (while robust to different sample specifications) vanishes when limited to lower-income developing countries. They argue that FDI is a source of growth only for a country already at a relatively high level of development and that low-income countries lack the necessary capabilities needed to absorb the FDI-related technology transfer. This issue is reviewed and discussed in further detail in Chapter IV.

*c)	Local financial markets*

37.	The development of domestic capital market can be seen as another possible requirement for realising the potential benefits of FDI in the host country. The impact of financial market development on growth has been widely studied theoretically (among others, Acemoglu and Zilibotti, 1994) and empirically (Beck, Levine and Loayza, 2000). Imperfect and underdeveloped financial markets are likely to penalise domestic firms more than foreign affiliates of MNEs. Alfaro *et al.* (2001) developed a model where FDI induces higher growth through direct increase of production in the MNEs sector and through indirect increase in the domestic sector via spillovers. In this model financial market constraints hinder the capability of domestic firms to benefits from the spillover effects of FDI. This model was tested empirically by introducing both the measure of FDI inflows and of financial market development as well as an interactive term of the two in the augmented growth regression. The interactive term is found to have a positive and significant impact on GDP growth, while the FDI term is negatively significant[15]. They interpret these results in such way that "there is a threshold level of the development of financial markets below which FDI will not have any beneficial effect on growth" (*Ibid.*, p. 12).[16]

38.	Similarly, Hermes and Lensink (2000) argue that the development of the financial system in the recipient economy is an important precondition for FDI to have a positive impact on economic growth. Many of the growth-enhancing effects of FDI work through the adoption of new technologies and skills, which, in turn, rest upon the availability of financial resources. The existence of well-developed financial systems, therefore, by mobilising savings efficiently and screening investment projects is an important precondition for the FDI-growth nexus to materialise. The empirical investigation lends support to this claim. Only in those countries with a sufficiently developed financial system (as proxied by the private sector bank loans to GDP) FDI did boost the growth of GDP per capita.

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[14] McMillan (1999) also argues that FDI can play a strong catalyst role for domestic investment in developing countries. According to Agosin and Mayer (2000), such 'crowding in' effect of FDI can be found in the case of Asian countries but not necessarily for other developing regions.

[15] The result is robust to the use of different measures of financial market development.

[16] Since both the volume of FDI and the efficiency of financial markets are likely to be higher in faster growing economies, reverse causality could yield a biased result on the interactive term. Instrumental variable estimation of the cross-country growth regression, however, does confirm previous findings, pointing to a positive and significant contribution of FDI to growth in countries where financial markets are sufficiently developed.

c)   Methodological issues

39.   The recent literature on threshold externalities is influenced by the emergence of new and improved statistical estimation techniques, which has allowed researchers to correct for some of the uncertainties about causality and estimate bias that dogged some of the earlier work (see Box 2). Two recent papers address this issue, applying heterogeneous panel estimation techniques (i.e. assuming that slope coefficient can differ across countries) to the FDI-growth relationship. The empirical results presented by de Mello (1999) lend support to the existence of cross-country heterogeneity in the FDI-growth relationship by comparing the results of the fixed-effect estimator with those of the mean group estimator. Separate regressions are estimated for each country and then estimated coefficients are averaged for each group. While the homogeneity assumption seems to be appropriate for OECD countries, heterogeneity has to be acknowledged for non-OECD countries, where aggregate parameter estimates do differ from the average of individual country coefficients.

40.   Usha Nair and Weinhold (2000) apply a somewhat different technique over a sample of 24 developing countries from 1971 to 1995. They first estimate a dynamic panel model under the assumption of homogeneity and find that the growth rate of FDI has a strong positive impact on GDP growth. They also check if either the level of human capital or trade openness affects this relationship by using interactive terms. Results point to no statistically significant impact of FDI-schooling, but to a significant and negative impact of the FDI-openness term on GDP growth. This would mean that the growth impact of FDI is lower in more open economies. Heterogeneity is then introduced and the model re-estimated using a mixed (fixed and random) effect model. Results reinforce the existence of a positive impact of FDI on growth. Furthermore the mean coefficient estimate for the FDI-openness term is positive, though not statistically significant. This findings reinforce the claim that large differences exist as to the way FDI interacts directly and indirectly (i.e. through its impact on other growth determinants such as human capital or openness) with growth across countries.

Box 3. Estimation strategies

First, recent developments in the growth empirics using panel-data analysis have opened the door for more rigorous testing of the FDI-growth nexus. Panel-data estimation not only allows one to exploit both cross-section and time-series variability of the data, but also to account for unobserved country heterogeneity by introducing country-specific effects. The application of these techniques to dynamic models, however, may violate the statistical assumptions assuring unbiased estimation. The dynamic nature of the data can introduce correlation between the error term and the explanatory variables. This is an additional source of endogeneity, generating the potential of reverse causality discussed above. Arellano and Bond (1991) and Arellano and Bover (1995) have developed an appropriate instrumentation technique for dynamic panel data (DPD) that allows controlling for the potential endogeneity of all explanatory variables, thereby yielding unbiased results.

Second, the use of country-specific effects in panel-data estimation allows one to introduce a certain degree of heterogeneity among countries under consideration. This technique, however, does not solve the heterogeneity problem. All other estimated coefficients, in fact, are assumed equal across countries. This assumption of homogeneity is not problematic if the causal link can be supposed to operate in more or less the same way in all countries. Evidence coming from micro-economic studies, however, points to firm-specificity in acquiring FDI-related spillovers. Results from macro-economic studies reviewed here reinforce such evidence, pointing to the existence of necessary pre-conditions or thresholds in order to have recipient countries benefit from FDI. Therefore, the heterogeneity problem seems to be an important feature. Failing to acknowledge that in the empirical estimation leads to serious bias and inconsistency. The interpretation of the result can be misleading, since imposing homogeneity of coefficients implies that the causal relationship under investigation either occurs everywhere or it occurs nowhere in the panel (Usha Nair and Weinhold, 2000).

IV.   FDI and technology transfer

41.   While technology is an abstract term, three main characteristics of technology can be identified (Bassant and Chandra, 1999). Technology can be characterised by the knowledge that is embodied in *products*, *processes* and *practices*. Products comprise the knowledge of how things work, their design, and their interface with other products. Processes comprise knowledge on how a product can be produced or changed. And practices consist of the routines necessary to manage the product-process combination and the knowledge re-generation process.

42.   Multinational firms are among the most important players in the world responsible for creating and controlling technology. They facilitate putting tangible and intangible resources available in different countries to their most productive uses. As part of the global profit-making operations of multinational enterprises, FDI, by its nature, involves the transfer of capital, technology and knowledge from home to host countries. Using better technologies offers possibilities to increase productivity and hence economic growth and development. Hence it is not surprising that many countries view investments by those MNEs as one of the most important means to acquire technology and knowledge to upgrade their own production base. However, it is difficult to paint an unambiguous picture as to how FDI can transfer technology, and how this technology is going to contribute to development. It is not *a priori* clear that every type of technology transferred is appropriate, and not every investment made is by definition beneficial to host country development.

43.   This chapter gives an overview of the existing literature and evidence with regard to FDI and technology transfer in the development context. It deals with the importance of FDI compared to other means of technology transfer such as trade and licensing, and lists the relative costs and benefits of each of these modes. It then describes the various mechanisms at work when technology is transferred and disseminated through FDI. FDI can contribute directly to technology transfer by using processes and knowledge from the firm's headquarters in foreign subsidiaries. One of the most important means of generating knowledge in other countries is through the internationalisation of the R&D activities of MNEs. FDI can also impact a host economy in indirect, and sometimes unintended, ways. These 'spillover effects' may be quite large and can arise through labour migration of trained workers, through establishing local linkages with buyers and suppliers, and through imitation by, and competition with, local firms in the same industry. After reviewing the empirical evidence on the spillover effects of FDI, this chapter discusses the contribution of technology to productivity, and the necessary conditions for technology to contribute to growth.

IV.1   *FDI versus other modes of technology transfer*

44.   FDI is only one of the various means available for a firm to transfer technology outside its home country, or that a host country can use to acquire technology. There are three basic ways for a firm to exploit its technologies abroad – and consequently three different ways for countries to acquire that technology. Firstly, a firm may *export* products that embody the technology. Secondly, a firm may *license* its technology to an agent abroad who then uses the technology to upgrade its own production. Thirdly, a firm can set up a *foreign establishment* (i.e. use FDI) to exploit the technology itself.

Trade

45.　　International technology transfer through trade occurs when a country imports higher-quality (than it can produce itself) intermediary goods to use in its own production processes. Empirical evidence shows that openness to *US* exports is a particularly important determinant of international technology transfer (Park, 1995). This is because the US is a disproportionate generator of commercial technologies. A country may acquire knowledge through 'backwards engineering' or imitation (Blomström et al, 1999) of imported goods, and openness to imports also stimulates domestic competition (Bayoumi et al, 1997).

46.　　Using data for 87 countries, Hakura and Jaumotte (1999) confirm that trade indeed serves as a channel for international technology transfer to developing countries. However, it appears that intra-industry trade plays a more important role in technology transfer than inter-industry trade. Intra-industry trade is more pervasive among developed countries, and inter-industry is more prominent in trade between developed and developing countries. Hence, an immediate implication of their findings is that developing countries will enjoy relatively less technology transfer from trade than developed countries.

Licensing

47.　　Successful penetration of foreign markets can seldom be based on exports alone. Various tariff and non-tariff barriers, government policies or the investment climate can make exporting a costly option. Also for certain industry sectors – notably in services – trade can be a complicated means to exploit a firm's superior technology or management capabilities overseas. In those cases, a firm may choose to license its technology to a local firm.

48.　　Licensing may be an especially economical way to transfer technology for standardised, relatively simple, and mature technologies to recipients that know how to implement them. Also for smaller firms that lack the capital to invest overseas, licensing may be an interesting option (Correa, 1999). The licensee may have better information about the local market and customs, and can use this information to extract higher rents from the market (Horstmann and Markusen, 1996).

49.　　However, there is usually a greater risk of 'losing' the technology to host country firms when using the licensing option. Transaction cost theory suggests that the market for knowledge is prone to failure for a number of reasons. In this case, the explicit sale of technology to external agents is a less advantageous alternative than keeping the technology "in-house" (Fors, 1996). For example, the value of the technology can be dissipated because of increased competition (Ethier and Markusen, 1991; Markusen, 1999; Saggi, 1996, 1999). Therefore, MNEs usually use licensing for their older technologies, and introduce their newer ones only through their own foreign affiliates. Following this argument, it is not surprising that technology tends to be introduced more quickly into host countries when MNEs have the option of introducing the technology through their affiliates rather than through joint ventures or licensing agreements (Mansfield and Romeo, 1980; McFetridge, 1987). Though licensing is usually seen as an *alternative* for FDI, according to UNCTAD data, transactions between parent firms and their subsidiaries in royalty and license fees account for more than 80 percent of international technology transactions, implying that FDI and licensing often go hand in hand.

50.　　MNEs sometimes also use licensing to acquire market knowledge and other information from local partners, before making an investment (and then ending the licensing arrangement). Nicholas et al (1994) found that 60% of Japanese MNEs in Australia used a local agent before making a direct investment, and 39% exported to Australia before making a direct investment of any sort. One can view such temporary licensing as a method of information acquisition on the part of the foreign firms, as opposed to the local firm seeking superior production technology.

51.	The most important means of transferring technology to developing countries remains FDI. Technology transfer through FDI generates benefits that are unavailable when using other modes of transfer. First of all, an investment not only comprises the technology itself but also includes 'the entire package'. Besides the technology, FDI brings the needed complementary resources such as management experience and entrepreneurial abilities, which can be transferred by training programs and learning by doing (Baldwin et al, 1999). Unlike trade in goods, where developing countries have to try to imitate and learn from 'backward engineering', FDI involves the explicit transfer of technology (Saggi, 2000). This may be especially beneficial for countries with underdeveloped local capabilities. Secondly, by their mere entry and presence, MNEs disturb the existing equilibrium in the market forcing domestic firms to innovate in order to protect their market shares and profits. This alone is likely to lead to productivity increases in local firms (WTO, 1998).

52.	Thirdly, many technologies and other know-how used by MNE affiliates are not always available in the market. Especially newer or higher-tech knowledge is often only available through the MNE itself. For example, Smarzynska (1999) found that a firm's R&D expenditure is negatively related to the probability of a joint venture (where possibilities for 'leakage' are large) and positively related to greenfield entry.[17] Generally, MNEs are concentrated in industries that exhibit a high ratio of R&D relative to sales and a large share of technical and professional workers (Markusen, 1995). It is often argued that precisely *because* MNEs rely heavily on intangible assets such as superior technology, they are able to successfully compete with local firms who otherwise would naturally have a comparative advantage because they are better acquainted with the host country environment.

53.	Fourthly, some technologies and know-how, even if available in the market, may be more valuable or less costly when applied by the MNE that developed them, rather than by outsiders (WTO, 1998). This is especially the case when the technology is developed for the specific purposes of the MNE, or when the MNE's workers have specific skills in using the technology. Another benefit of FDI in transferring technology versus other modes of transfer is that the typical features of a MNE, for example, scale economics, capital reserves, or marketing and sales experience, can contribute significantly to exploiting the technology in a profitable manner. MNEs also offer brand names and access to regional and global markets (UNCTAD, 1999)

54.	However, these possible benefits are accompanied by possible costs. A highly efficient MNE affiliate may lead to a fall in the number of local firms if the less efficient local firms are forced out of business ('crowding out'). Though this may increase overall resource allocation in the long term, the short-term consequences for local employment and market concentration may be severe. For example, if MNE affiliates are very strong, in the absence of an appropriate competition policy framework they may abuse their monopoly power, with consequentially harmful effects. Other costs include the repatriation of profits with consequences for balance of payments and exchange rates, and the avoidance of taxation through transfer pricing. Also, as noted in Chapter II above, FDI is concentrated in a small number of developing countries, and cannot be relied on to solve all development problems. While this is not a cost, or a criticism of FDI, *per se*, it is a missed opportunity and that capturing the benefits of FDI is not straightforward.

55.	The 'whole package' that often comes with FDI also has a reverse side, particularly for countries with relatively high local capabilities and that are able to exploit the technology themselves. Instead of relying on the MNEs expertise, local firms in these countries may prefer to obtain the technology through licensing, though this option may not always be available if the MNE chooses not to license the

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17.	This relationship also held for high technology sectors.

technology. Local firms in this case have to acquire the technology through FDI, which can be an expensive alternative to acquiring the technology through licensing.

IV.2 *Mechanisms of technology transfer and diffusion*

56. Knowing that FDI is important in technology transfer does not however explain exactly how this transfer and consequent spillovers take place. The literature suggests four channels by which technology transfer through FDI occurs, either directly or indirectly through spillovers. These include:

  − *Vertical linkages*; MNEs may transfer technology to firms that supply them with intermediate goods, or to buyers of their own products.

  − *Horizontal linkages*; local firms in the same industry or phase of the production process may adopt technologies through imitation, or are forced to improve their own technologies due to increased competition from MNEs.

  − *Labour migration*; workers trained or previously employed by the MNE affiliate may transfer their knowledge to other local firms when switching employers or when setting up their own business.

  − *Internationalisation of R&D*; the R&D activities of MNEs when located abroad may contribute to creating local knowledge generation capacity arising from the partially public good characteristics associated with these activities.

57. Evidence for each of these four channels is discussed below.

IV.2.1 *Vertical linkages with buyers and suppliers*

58. For some time now it has been recognised that MNEs may benefit the host country via the backward and forward linkages they generate. Backward linkages are relations with suppliers, forward linkages refer to relations with buyers – either consumers or other firms using the MNEs intermediate products as part of their own production process (this may also include machinery, for example). Though linkage creation does not *per se* imply that technology or knowledge is transferred or spilt over, Blomström et al (1999) show that in general it is unlikely that MNEs are able to fully appropriate all the value of these explicit and implicit transfers with their host country business partners.

59. Some evidence exists regarding the factors that promote vertical linkages. Firstly, it seems that linkages are more pronounced the larger the size of the host market and the technological capabilities of the local suppliers. Secondly, according to a model of Rodríguez-Clare (1996), more linkages are created when the production process of the MNEs uses intermediate goods intensively; when there are large costs of communication between headquarters and the affiliate production plant; and when the home and host countries are not too different in terms of the variety of intermediate goods produced. Government policies can also promote linkage creation through policies requiring a minimum of local content.

60. As regards backward linkages, MNEs can contribute to raising the productivity of their supplier firms in various ways. MNEs can provide technical assistance or information to raise the quality of the suppliers' products or to facilitate innovations. In fact, McIntyre et. al. (1996) note that quality seems to be the driving force for technology transfers through backward linkages. When a foreign affiliate wants to export the products they produce they will have to meet the quality standards of world markets. In this

case, the suppliers' intermediate products will have to be high quality as well. Consequently, McIntyre et al found that MNEs usually do not hesitate to train local suppliers. However, it is possible that negative effects may occur, for example, if suppliers are forced to meet the higher standards of quality, reliability, and speed of delivery required by the MNE without any training or assistance being provided by the MNE affiliate. In the short term this could lead to suppliers failing to meet the necessary requirements, leading to firm failures and job losses.

61. MNEs can provide or assist suppliers in purchasing raw materials and intermediary goods. MNEs can also help prospective suppliers to set up production facilities. They can help in providing training in management and organisation, and assist suppliers to diversify by finding additional customers (Lall, 1980). Empirical evidence of these linkages are found in many studies, including *inter alia* Lall's (1980) study on Indian truck manufacturers, Wanatabe (1983a, b), UNCTC (1981) and Behrman and Wallender (1976).

62. Linkage creation by foreign affiliates in host countries depends largely on their decisions on how to source inputs (Chen, 1996). Though in some cases local content starts at a very low level, local vertical linkages are generally extended over time, which could be a consequence of technology transfer. Studies of the Asian electronics industry have generally shown that linkage creation was negligible at first, but had grown substantially five years later (Rasiah, 1994). However, whenever addressing the impact of linkage creation it should be taken into account that MNEs only improve welfare if they generate linkages *beyond* those that are generated by the local firms they displace. Furthermore, in most developing countries MNEs engage largely in low-tech and labour-intensive production oriented towards exports, where the level of technology transfer or linkages are low or negligible.

63. Forward linkages occur with firms' buyers. This can be distributors, which can benefit from the marketing and other knowledge of the MNE, or – in case of intermediate products – downstream firms who can use higher-quality and/or lower priced intermediate goods in their own production processes. Downstream firms can benefit from lower prices arising from increased competition in their supply market (Pack and Saggi, 1999) and consumers thus also benefit from lower-priced final products. Aitken and Harrison (1991) find that spillovers from forward linkages are important in most industries – and in fact they argue that the downstream effects of FDI are generally more beneficial then the upstream effects.

IV.2.2   Horizontal linkages through demonstration and competition

64. Related to the issue of vertical linkages, is the diffusion of technology through horizontal 'linkages' i.e. to competitors of the MNE affiliate. This diffusion of technology takes place through either demonstration effects or competition effects. The demonstration effect states that exposure to the superior technology of the MNE may lead local firms to update their own production methods (Saggi, 2000). When an MNE starts using a specific technology that has not yet been used in the host economy, its competitors may start imitating the technology. Often, the introduction of a new technology by an MNE reduces the (subjective) risk for local firms to use the same technology. Local firms may lack the capacity, financial resources or information to acquire the necessary knowledge or to adopt the technology to local circumstances. However, when a certain technology used by an MNE succeeds in the local environment this may trigger a wider adoption by local firms in the host country. A vital part of this demonstration argument is geographical proximity. The vast majority of developing countries, however, are not well integrated in the world economy, making technology transfer through demonstration effects extremely difficult.

65. While FDI may expand the set of technologies available to local firms, it also usually increases competition. Moreover, demonstration and competition effects reinforce each other. The entry of an MNE

increases competition, which is in itself an incentive to upgrade local technologies, which in turn further increases competition that stimulates an even faster rate of adaptation of the new technology (Sjöholm, 1997). Wang and Blömstrom (1992) also stress that the more competition the MNE affiliate faces from domestic firms, the more technology they have to bring in to retain their competitive advantage, and hence the larger will be the potential for spillovers.

66.   The effects of increased competition are usually seen as beneficial. Increased competition encourages both productive efficiency and a more efficient allocation of resources. This may be especially the case when MNEs enter industries where high entry barriers reduced the degree of domestic competition (e.g. utilities). Case studies however have indicated that it is not so much improvements in resource allocation, as a reduction in slack or X-inefficiency that makes a substantial contribution to productivity improvements (WTO 1998). This is the case when efficiency increases arise due to local firms enforcing stricter or more cost-conscious management and motivating employees to work harder, instead of imitating technology.

67.   In theory competition generally improves efficiency and welfare, however, entry by an MNE may not always increase competition. In fact, entry may lead to increased concentration. Economies of scale are important determinants of industrial structure, and when a foreign MNE enters a relatively small national industry and increases average firm size this may initially improve resource allocation. On the other hand, concerns have arisen that strong foreign MNEs out-compete all local firms, or at least force local firms to merge, and the increased industrial concentration can result in market power. The abuse of market power by the MNE (and possibly local firms) would then result in a decrease in allocative efficiency.

68.   Empirical evidence for both demonstration and competition effects are difficult to obtain. Both effects are most likely to occur at the industry level (Saggi, 2000). Relating R&D expenditures by industry with foreign presence is one method of checking whether local adoption efforts are encouraged via FDI. However, these need to be controlled for the effect of FDI on market structure, which is very difficult. Still, some general studies addressing horizontal linkages exist. Blomström et al (1999) find that studies that compare new technology adoption by foreign owned and domestically owned firms tend to conclude that new technology is frequently introduced sooner by foreign owned affiliates and that competition spurs quicker adoption of innovations by both domestically owned and foreign owned firms. The first statement seems to be confirmed by a study of Haddad and Harrison (1993), who showed that foreign firms exhibit higher levels of TFP growth.

69.   As regards competition effects, according to the WTO (1998), evidence suggests that FDI is likely to lead to higher concentration in most host countries, and there is a larger risk that MNEs crowd out local firms in developing countries than in developed countries, because of their greater technological advantages. They find that the vast majority of studies find a positive correlation between foreign entry or presence and seller concentration in host country industries. However, one study finds (Haddad and Harrison, 1993) that this correlation disappears once other determinants of concentration are taken into account, and that MNEs do not cause concentration but are instead drawn to concentrated industries.

70.   Aitken and Harrison (1999) using plant level data for Venezuela found a positive relationship between foreign equity participation and plant performance implying that foreign participation does indeed benefit plants that receive such participation. However, this effect was robust for only small plants (less than 50 employees). For larger plants, foreign participation resulted in no significant improvement in productivity relative to domestic plants that received no participation. In general, productivity in domestic plants that received no foreign participation declined when foreign investment in other firms increased. This could result from a crowding out effect: foreign competition may have forced domestic firms to lower

output, thereby forgoing economies of scale. On balance, however, the authors found that the effect of FDI on the productivity of the entire industry was weakly positive.

71.   Other papers have also found negative results regarding the spillover effects of FDI on purely domestic enterprises, e.g. Djankov and Hoekman (1999) for the Czech Republic. However, such findings need not imply that host countries have nothing to gain from FDI. Positive impacts such as improved resource allocation take time. And when foreign firms bring more efficient production methods, in the short run, it is not surprising that local firms suffer.

IV.2.3   Labour migration

72.   Another way through which technology may be transferred and disseminated in a host country is through labour migration. Workers employed by the MNE affiliate acquire knowledge of its superior technology and management practices. By switching employers or setting up their own business the technology is spread (Glass and Saggi, 1999). MNE affiliates usually try to avoid this kind of spillovers by paying an 'efficiency wage', a premium in order to keep employees from switching jobs to domestically owned competitors (Globerman, Ries and Vertinsky, 1994). If disclosing secrets to local managers would create unacceptable risks, e.g. due to managers' tendency to switch jobs to competitors, the MNE may consider using expatriate managers rather than local ones.

73.   The effects of labour migration are difficult to establish. Nevertheless, several studies have been undertaken that may provide some insights; though they show quite differing results. Katz (1987) found that managers of local firms in Latin America were often trained in MNE affiliates where they started their careers. And for Kenya, Gershenberg (1987) finds that for the 72 top and middle managers he followed, MNEs offered more training to their managers than private local firms. But he also finds evidence that only a small percentage (16%) of the jobshift involved movement from multinationals to host country firms. For Mexico, Venezuela and the USA, Aitken et al (1995) show that higher levels of FDI are associated with higher wages in all three countries. In the two developing countries, they find that multinationals pay higher wages than local firms and no evidence of increases in wages by local firms.

74.   In Asia, Bloom (1992) finds substantial technology transfer in South Korea when production managers switched to local firms. Pack (1997) finds similar results for Taiwan where, in the mid 1980s, almost 50% of all engineers and 63% of all skilled workers of MNE affiliates that changed jobs joined local firms. UNCTAD (1999) also examines a Bangladesh' garment firm, Desh. Daewoo from Korea supplied Desh with technology and credit, and eventually 115 of the 130 initial workers left Desh to set up their own firms or to join newly set-up local garment firms.

IV.2.4   Internationalisation of R&D

75.   Multinational firms are among the world most important creators of knowledge and technology. Whereas the first five positions in the top 25 largest R&D players world-wide are taken by governments (respectively, the USA, Japan, Germany, France and the UK); the top 25 is dominated by MNEs (Van Tulder et.al., 2001). Many of these firms concentrate their R&D activities in their home country (Chen, 1996) or other developed countries (Correa, 1999). Developing countries only account for an estimated 6% of global R&D expenditures (Freeman and Hagedoorn, 1992). And even among those developing countries, expenditures are very concentrated. UNCTAD (1999) calculated – taking US firms as a proxy – that the top four developing economies (Brazil, Mexico, Singapore and Taiwan) accounted for 77% of total R&D expenditure in developing countries.

76.	The rationale for this concentration can be found in the need for efficient supervision and scale economies in the R&D process itself (Caves, 1996). Also, one major advantage arising from concentration of R&D – from the firm's perspective – is 'agglomeration economics'; meaning it is more efficient to cluster specific R&D expertise in a certain region, using local research institutions and other organisations to form an 'innovation system'. These kind of 'locational advantages' are fairly durable over time, so that MNEs tend to keep most of their R&D centralised at home headquarters (Globerman 1997). Many developing countries do not offer the necessary infrastructure and institutions that would facilitate a fruitful interaction between academia, government and industry (Sachs, 1999). Another reason is the lack of protection of property rights, including intellectual assets (De Soto, 2000). A study by Bennett et al (2001) of EU-based companies regarding technology transfer to China mentions weak intellectual property rights as the main obstacle for building or expanding the R&D base of these companies in China.

77.	The centralisation of R&D is one of the large policy concerns of developing countries regarding MNEs. In the case where R&D is transferred to foreign subsidiaries this has basically been in relation to adaptive tasks, drawing on a few local resources to better serve the local market (Correa, 1999). MNEs are often blamed for failing to adopt their technologies, that are designed for industrialised country wages and capital costs, to the factor prices prevailing in developing countries (Caves, 1996). In those cases where R&D is performed in developing countries, the expenditures have been found to generate significant efficiency gains, both within and across industries in the R&D performing country (Bernstrein, 1988 and 1989). It has been argued (see WTO, 1998) that R&D by foreign affiliates is better than local R&D expenditures, since MNE affiliates have access to the aggregate knowledge base of the parent company and can use the parents firm's R&D facilities.

### IV.3	*Technology transfer and growth – host country conditions*

78.	As discussed in chapter III.2 above, FDI may disseminate technology in a host country in various direct and indirect ways. Though some studies (as cited above) have attempted to examine the specific effects of each of the modes of transfer discussed, it is usually impossible to disentangle the effects of the various channels when assessing how technology transfer through FDI impacts productivity and economic growth. When comparing the gap between developed and developing countries, most empirical and technical studies usually take into account a catch-up variable that is generally rationalised as capturing the effects of international technology transfers.

79.	Many studies have suggested that foreign investment contributes relatively more to domestic productivity than domestic investment. Baldwin et al (1999), for example, found that domestic technological progress is aided by foreign technological progress. They cite the study of Eaton and Kortum (1997), who find that domestic productivity growth is mainly related to foreign innovation, rather than domestic innovation. As regards the Mexican manufacturing sector, Blomstrom and Wolf (1994) find that the spillovers in the Mexican industry were large enough to help Mexican firms converge towards US productivity levels during the period 1965-1982. Others that found positive results are Caves (1979) for Australia, Globerman (1979) for Canada and Blomström and Persson (1983) for Mexico. Sjöholm (1997) also found spillovers from FDI to have a positive effect on productivity growth, especially in industries with high degrees of competition.

80.	However, there are also studies that suggest that the effects of FDI have not always been beneficial for local firms. Haddad and Harrison, (1991, 1993) find no positive results for Morocco in the late 1980s. Aitken and Harrison (1991), though finding a positive correlation between foreign presence and TFP growth conclude that this may be wrong if MNEs are attracted by the more productive sectors in the first place. A study by Borensztein et al (1998) found that the positive relation between FDI and TFP growth only holds when a host country has achieved a minimum threshold of human capital development.

81.	The diverse experiences of developing countries suggest that the positive effects of FDI is not automatic, but may be affected by various host industry and country characteristics. Several of these characteristics have been studied and tested. One of the most prominent is the 'technology gap' between the technologies used by the foreign MNE affiliate and the local firms. Related to this gap are the levels of local capabilities needed to acquire and work with the technology.

82.	One of the most critical issues regarding the transfer of technology is, given the level of local firms capabilities, whether these technologies are appropriate for local firms and can enable them to compete effectively in the global market (Bassant and Chandra, 1999). Many studies have suggested that this is not always the case, and that firms will have to make a variety of investments to actually benefit from technology inflows. The capability of the host country firms to 'absorb' foreign technology appears to be an important determinant of the size of the realised spillovers.

83.	Following this argument, spillovers should be easier to identify empirically when the technological attributes of local firms match those of the MNE affiliates. Kokko (1994) and Kokko et al (1996) provide evidence for this hypothesis, and find that for Mexico and Uruguay spillovers are difficult to identify in industries where foreign affiliates have much higher productivity levels than local firms. Also, when foreign firms are not 'self-contained enclaves', spillovers can be easily recognised. Kokko (1994) found that a high technology gap combined with low competition prevented spillovers from occurring.

84.	Besides the *relative* difference in the technological capabilities of the host MNE and the local firm, the *absolute* level of absorptive capacity is also important. Keller (1996) for example states that access to foreign technologies alone is not enough to increase growth rates if, for example, the country's stock of human capital remains unchanged. Evidence for this argument is given by *inter alia* Xu (1999 and 2000). Using data on outward investment of the US to forty countries, Xu finds that technology transfer associated with FDI contributes to productivity growth in developed and middle-developed countries but not in the least developing countries. A possible explanation is that the absorption of MNEs technology by host countries requires a relatively high level of human capital. Most LDCs do not meet the human capital threshold required for recipient countries to benefit from technology spillovers. Haddad and Harrison (1993) find similar evidence. When they divided sectors into high-tech and low-tech, they found that the effect of FDI was more positive in the low-tech sectors than in the higher-tech ones. The authors interpreted this result to be an indication of the lack of absorptive capacity of local firms in the high tech sector.

85.	One of the other factors at play – besides relative and absolute technological capabilities – is a successful interaction of firms with each other and with academia, governments and other actors in order to take advantage of synergy effects across sectors (Bassant and Chandra, 1999). Ernst (1999) has addressed this issue as well, stating that weak and incomplete local linkages and limited sharing and pooling of resources implies that countries have only limited opportunities to build their own innovation systems. Empirical research has also shown that as a developing country industrialises, its reliance on international technology sourcing – i.e. on the strategies of MNEs – increases substantially (Lall, 1997). In the long run, technology is only valuable for a host country if it is capable of creating a national stock of know-how, co-ordinated by a policy for science and technology, and if they have the industrial capacity to use it (Germidis, 1984).

V.   Policy challenges (to be expanded)

86.   In order to reap the full benefits of FDI, host and home countries both need to open their markets to foreign capital and trade and to work together to establish a coherent set of other supporting policies. FDI is not homogeneous and its benefits vary across sectors and countries.

87.   If policy-makers focus on trying to attract FDI to an economy with an environment that is unfavourable to domestic investment and private enterprise, the results are likely to be less favourable with respect to the long-term development needs of a country. The enabling framework for FDI consists of a wide range of policies affect FDI decisions including:

- Transparent and non-discriminatory investment and regulatory regimes;

- Adequate corporate governance and competition and regulatory policy frameworks;

- Transparency, rule of law, and fighting corruption;

- Human resource development;

- Facilitating structural adjustment and labour mobility;

- Strengthening of the financial sector.

88.   Home countries also have a role to play in supporting FDI for development needs, including:

- Policy coherence in support of development;

- Supporting capacity building and the participation of less developed countries' participation in multilateral fora;

- Promoting private-public partnerships;

- Encouraging government and private initiatives for corporate responsibility.

89.   Policy requirements to maximise the benefits of FDI for development will be explored in a Final Report.

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MAJOR FINDINGS CONCERNING FDI AND GROWTH

Overview table: Findings of empirical studies **Study**	Data/Coverage	Questions addressed	Estimation technique	Major findings
Agosin and Mayer (2000)	UNCTAD. 32 developing countries over the period 1970-96.	(2)	Three investment equations (one for each region) on pooled data using SUR.	Crowding–in has been strong in Asia, while crowding-out has been the norm in Latin America. In Africa, FDI has increased overall investment one-to-one. The positive impacts of FDI on domestic investment are not assured.
Alfaro, Chanda, Ozcan, and Sayek (2001)	Net FDI inflows from IMF – IFS. Three samples (39 to 41 countries). Data averages over the period 1981-97.	(1), (4)	Cross-country OLS and IV regression.	FDI contribute significantly to economic growth, but the level of development of local financial markets is crucial for the positive effects to materialise.
Bende-Nabende, Ford, and Slater (2000)	WB data on FDI inflows as a percentage of GDP — 5 ASEAN countries over the period 1970-94	(1), (3)	System of equations estimated through 3SLS. A specific equation is estimated for each endogenous dependent variable in the growth regression (six channel equations). The model is estimated separately for each one of the five countries.	FDI has a positive and significant coefficient in the growth equation for three out of five countries. The negative sign of FDI in Singapore and Thailand is deemed to the specific characteristics of capital formation in these countries. Authors claim that FDI boosts growth in countries with a fair balance of domestic private capital and FDI. Furthermore, FDI is positively associated with positive spillover effects that lead to human resources development, transfer of technology, expansion of trade and learning by doing. The spillover process is positively related to the level of economic development.
Blomstrom, Lipsey, Zejan (1994)	FDI inflow s from IMF. 78 developing countries over the period 1960-85.	(1)	Granger causality	FDI Granger-causes economic growth
Borenszstein, de Gregorio, and Lee (1998)	FDI gross outflows from OECD countries. 69 countries, two periods: 1970-79 and 1980-89	(1), (2), (4), (5)	Two equation (one per each decade) system estimated using SUR and IV (three stage least squares).	FDI and growth: FDI exert a positive effect on growth only when a minimum level of human capital exists. FDI and domestic investment: the complementarity between foreign and domestic investment is not robust to different specifications.
Crankovic and Levine (2000)	Gross FDI inflows from new WB database and IMF. Period: 1960-95	(1), (2), (4)	Dynamic panel data estimator (GMM)	The exogenous component of FDI does not exert a significantly different from zero impact on GDP growth. Nor FDI enjoy a strong link with productivity (TFP) growth. These results are robust after controlling for the level of human capital and financial development.

De Mello (1999)	Net FDI inflows from IMF's Balance of Payments Statistics. 16 OECD and 17 non-OECD over the period 1970-90.	(1), (4)	Stationarity and cointegration analysis plus dynamic panel estimation (fixed effect and mean group estiamtors).	The FDI-growth nexus is not robust in all countries. Where the positive relationship holds, it depends on country-specific factors. FDI enhance output growth through higher productivity in OECD countries, and thorough capital accumulation in non-OECD countries. The impact of FDI on growth tends to be lower in technological leaders and higher in laggards.
Hermes and Lensink (2000)	WB data on FDI as a percentage of GDP. 67 least developed countries, average of 1970-1995 data.	(1), (4)	Cross-country OLS with stability tests	FDI enhance growth once a country has reached a given threshold of human capital and financial market development. For most developing countries (30 over 67, almost all SSA countries) this threshold has yet to be attained.
Lensink and Morrisey (2001)	WB data on gross FDI for 90 countries over the 1975-97 period.	(1)	OLS fixed effect panel and IV cross-section.	FDI has a positive effect on growth whereas volatility of FDI inflows has a negative one.
McMillan (1999)	IMF and UNCTAD. 1970-96.	(2)	Dynamic panel data on investment equations.	FDI is a strong catalyst for domestic investment in developing countries. Lagged FDI has a stronger effect on private domestic investment than lagged private domestic investment itself.
Morrisey and Lensink (2001)	WB data on FDI/GDP over the 1975-98 period over 115 countries.	(1) (4)	OLS and IV for cross section using the 1975-98 average values. Fixed effect panel using three ten-year periods.	FDI exert a robust positive impact on growth. This result is not conditional on the level of human capital. Volatility of FDI has a negative impact on growth, but it probably captures the growth-retarding effects of unobserved variables such as political uncertainty.
UNCTAD (2000)	UNCTAD data on FDI inflows. Five-year periods over 1970-1995 for more than 100 LDCs.	(1)	Granger causality and OLS	Results from analysis of times series characteristics of the explanatory variables show that 1. FDI is always positively related to contemporaneous growth in per capita income. Correlation with past growth rates is not robust. 2. FDI is not related to past investment, while it is correlated with past trade. Growth regressions including lagged FDI and investment and other controls over individual and pooled periods have poor explanatory power. Lagged FDI is found to exert a positive but not statistically significant impact on growth. It turns out to be significant only when interacted with the level of schooling.
Usha Nair and Weinhold (2000)	WB data on net FDI inflows as percentage of GDP for 243 developing countries over the 1971-95 period.	(1), (4)	Non-dynamic fixed effects panel, first-differenced instrumented panel and mixed (fixed and random) effect model (heterogeneous panel)	Standard fixed effects estimation points to a significant and positive impact of FDI growth on GDP growth. Results from the dynamic model with heterogeneity reinforce this claim and show how the indirect impact of FDI on growth works differently across countries.
Xu (2000)	Share of MNEs affiliates' value-added in host country GDP. 40 countries over the period 1966-94. Data from the US Direct Investment Abroad Benchmark Survey.	(1), (4)	Instrumental variables panel data estimation with country and time specific effect	FDI boost total factor productivity growth. Strong evidence of technology diffusion from US affiliates to developed countries, but only weak evidence for developing countries.
Zhang (2000)	Inward FDI stock from WB and UNCTAD/TNC for 11 Latin American and East Asian countries. Period: 1970-95.	(1), (4)	Stationarity and cointegration.	FDI is found to promote growth in 5 out of eleven countries, among which four are Asian. The impact of FDI on growth is country specific and tends to be positive where pro-free trade and pro-education policies are adopted, so to encourage export-oriented FDI.