

Is it vertical or is it horizontal? The type of FDI across Sectors*

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Abstract

Using firm-level data of more than 17,000 firms investing in 38 developing economies we analyze the location choice of multinational enterprises (MNE). The analysis allows identification of the factors that influence the location choice of MNEs, with a focus on how the results vary across different sectors. The nested logit and conditional logit framework of [McFadden1974] are used to study the location choice of firms in aggregated sectors such as tradables versus nontradables, sectors defined according to their technology-intensities, as well as 2-digit ISI-classified sectors. Such detailed sectoral classifications adds to the literature that mostly focuses on very aggregated sectoral classifications or only the manufacturing sector in analyzing the location choice of MNEs. Results suggest that the factors that drive the location choice of foreign firms differ across the sectors, hence a rigorous theoretical or empirical analysis of the economic geography of foreign direct investment (FDI) should take into account the sectoral composition of FDI rather than lumping the sectors in one framework.

JEL Classification: F23, R38

Foreign direct investment, location choice, multinational enterprises, sectors.

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1 Introduction

Over the past decade the world has witnessed a significant increase in foreign direct investment (FDI). The worldwide FDI has risen from an annual average of US\$181 billion between 1985 and 1995 to an annual average of US\$310 billion between 1992 and 1997, and to approximately US\$600 billion in 2004. The same increasing trend is evident when one considers the share of FDI in gross fixed capital formation in the world. While this share was on average 3.9 percent annually between 1985 and 1995 it has risen to on average 5.5 percent annually between 1992 and 1997, and to above 9 percent in 2004.¹ This trend has been parallel with increased interest among both academics and policy-makers to discuss the *determinants* and *effects* of the increased FDI flows, both at a theoretical and empirical level. However, because of data deficiencies both the determinants and effects of FDI have been mostly analyzed using aggregate FDI levels, with little or close to no mention of the sectoral composition or characteristics of the investments.

Yet, the evolution of the sectoral composition of FDI renders the aggregation of FDI flows data across sectors problematic. As is evident in Figure 1 there has been a worldwide shift in the composition of FDI from manufacturing to services related foreign investments over the past decade. The share of services in total FDI inflows has considerably increased worldwide, a phenomena experienced in both the developed and the developing countries. The increase seems much more prominent in the developing countries, for which the share of services FDI in total FDI flows increased from 37 percent to 55 percent, from the early 1990s to the early 2000s. The same ratio has increased from 58 percent to 73 percent over the same period for the developed countries. The increase in the share of services FDI has been mirrored by a declining share of manufacturing FDI, while the share of primary sector FDI has remained relatively stable.

INSERT FIGURE 1 ABOUT HERE

Looking into the sectoral composition of FDI at a much more disaggregated country level one observes that while there seems to be similar trends in the evolution of the sectoral composition of FDI

¹UNCTAD, Foreign Direct Investment Database.

across aggregated classifications of countries, the experience of each country within the classification can be very different than the others. Table 1 provides information on the sectoral distribution of cross border mergers and acquisitions (M&A) sales in developing countries in 2004, suggesting that the sectoral composition of FDI in the form of M&As shows significant variation across developing countries as well. For example, while 63 percent of the M&As by foreign firms in Africa occurred in the primary sector the same ratio was a mere 4 percent in Latin America and the Caribbean. The same divergence is evident in the share of M&As in the services sectors; while 12 percent of the M&As by foreign firms in Africa occurred in the services sector the same ratio was around six fold that in the Latin American and Caribbean economies, at 65 percent.

INSERT TABLE 1 ABOUT HERE

Figure 2 further provides insight into the divergence across geographic regions in the sectoral composition of FDI flows. The figure provides information on the stock of FDI inflows in 2004, showing the differences across developed as well as developing countries. While the share of services was significantly larger than the share of manufacturing sector FDI stocks in the European Union (EU) and the US the figures are reversed in Canada, where the share of the FDI stock in manufacturing far exceeds that in services sectors. The diversity is even more relevant when one considers within developing countries variations. While the share of manufacturing sector FDI stocks is much larger than other sectors in the East Asia and Pacific region, the services sector dominates the FDI stocks in Europe and Central Asia, and Latin American and Caribbean countries. For Africa the primary sector remains to be the main sector attracting FDI flows. The same story is echoed when one compares the FDI flows sectoral composition across countries. For example, as is shown in table 2, the sectoral composition of FDI inflows in 2002 differs significantly between Chile and Brazil. In Chile the primary sector FDI inflows dominates the flows in 2002, whereas in Brazil manufacturing sector FDI inflows dominate.

INSERT FIGURE 2 AND TABLE 2 ABOUT HERE

The evidence strongly suggests that the sectoral composition of FDI differs across countries, more

aggregated geographic regions, as well as country groups classified according to their economic development levels. This paper attempts to provide an explanation to the underlying reasons for these differences in the sectoral composition of FDI flows across countries by asking the following questions: What are the factors that determine the economic geography of multinational enterprises (MNEs) in different sectors? Are there sectoral differences in the determination of the locational choice of MNEs? These questions are of interest for both academic considerations and policy-making regarding FDI. Identification of the differential determinants of MNE activity across sectors will point to the importance of modeling the detailed characteristics of foreign firms, especially those related to the sector of operation of the MNE, in theoretical frameworks. Such findings will also have important implications regarding the empirical investigation of the effects of FDI. If the below analysis provides evidence that the sector of operation matters in the economic geography and decision-making of MNEs this could point to the underlying reason for the differential impact of FDI to the recipient countries. Alongside its important contributions to the academic discussion of FDI, the analysis will also provide a strong basis for policy formulation.

While this issue is of interest from a geographical perspective it can also be linked to the literature discussing whether FDI is horizontal or vertical in nature. In the broadest sense firms choose to invest in foreign economies either to produce a similar good in different locations or to produce different stages of the final good at different locations, making the former horizontal and the latter vertical FDI in nature.² While through horizontal FDI the MNE is able to avoid transportation and trade costs when serving a foreign market the fragmented production process leads to reduced economies of scale most of the time. Similarly, while vertical FDI through geographic dispersion of the production process allows the MNE to minimize production costs and achieve strategic advantages, it can be associated with increased trade and transportation costs. The eventual decision of foreign investment, both in the case of vertical and horizontal FDI, requires that the MNE consider these costs and benefits.

Horizontal and vertical FDI differ in their effects on the host economy, both their spillover effects

²We will also refer to the terminology by [Dunning1993] regarding the incentives to carry out foreign investment, including (i) market-seeking, (ii) efficiency- seeking, and (iii) resource-seeking foreign investments.

on productivity and labor market implications will differ. As such an interesting question remains as to what type of FDI dominates the worldwide flows. Early evidence suggested that at the aggregate FDI level such international economic activity is dominated by horizontal FDI (see [Brainard1997]; [Markusen and Venables1996]; [Markusen and Venables1998], and [Markusen and Maskus2002]). Recent evidence suggests vertical FDI also seems to be evident (see [Carr et al.2001], [Carr et al.2003]; [Hanson et al.2005]; [Alfaro and Charlton2007]). Whereas several papers suggest a mix of horizontal and vertical FDI is best depicting the aggregate FDI trends, known as the knowledge-capital model ([Blonigen et al.2003]). Recently [Davies2008] suggests that the empirical testing of the three models has so far predicted different patterns of FDI due to mostly improper specifications. More relevant for our perspective the studies in the literature provide some preliminary evidence that the type of investments might differ across countries as well as across sectors (further see [Waldkirch2004]; [Feinberg and Keane2001]; and [Yeaple2003]). The following empirical analysis takes its cue from this last point, with the goal of providing further evidence that in fact the motives for foreign investment of MNEs differ significantly across sectors and this fits in line with the evidence regarding vertical and horizontal FDI. In fact, classifying the factors that drive FDI under two broad categories of those related to vertical and those related to horizontal investments the below results can provide further direct evidence regarding the nature (i.e. horizontal versus vertical) of investments across a range of sectors in developing countries. This evidence is of value added to the literature as the above papers neither focus on a sample of developing countries nor on a wide range of sectors. Taking a different perspective on the question of identifying the type of investment, expanding the host country list of FDI to include 38 developing countries, and studying the question for several sectoral classifications the below analysis reiterates the conclusion that some sectors are dominated by vertical while others are dominated by horizontal FDI.

The literature has posed questions regarding the geographic distribution of FDI flows using two alternative measures of the presence of MNEs in a region. The former measure focuses on the entry decision of a firm in investing in a foreign country, whereas the latter measure focuses on the quantity of investment the MNE undertakes. The choice between studying the entry decision and the quantity

decision of the MNEs determines the econometric framework of the analysis. The quantity approach has its data limitations given the MNEs diverse and creative ways to hide away their investment from being taxed or being subject to various government regulations.³ As such the FDI flow or stock measures originating from the balance-of-payments data could heavily underestimate the true extent of MNE activities. Given the possible measurement problems with the quantity of FDI flows the below analysis will use the former approach, studying the entry decision of MNEs across regions. There is a sprawling literature on the reason of existence of MNEs, whereas studies on the locational choices of MNEs and the economic geography of FDI has only recently been re-emphasized.⁴ Of the studies that analyze the economic geography of FDI most are limited to within-nation locational choice of MNEs or within a certain geographic region such as the transition economies or the EU. Furthermore, these studies mostly ignore the possible differences in the factors that govern the location choice of MNEs across different sectors. The existing studies in the literature tend to focus mostly on the economic geography of MNEs in the manufacturing sector.

The goal of the below analysis is to fill this gap in the literature by studying the location choice of around 17,000 MNEs investing in 38 countries. Unlike previous cross-country analysis, we conduct a detailed sectoral analysis, one that is not just limited to the manufacturing sector and discussing the spatial economic geography of these MNEs across different sectors. The analysis allows for a discussion of the expected sectoral profile of FDI that will flow into a country based on that country's characteristics.

In this respect, this paper fits into the former group of studies mentioned above, in which the issue has been studied using firm-level data and identifying the factors that affect the probability of a firm investing in a specific country/region. There are several studies that look into the economic geography of MNEs within a country. For example [Coughlin et al.1991] and [Woodward1992] have studied foreign firms behavior when investing in the USA, while [Deichmann et al.2003] have carried out the same analysis for foreign firms in Turkey, and [Guimaraes and Woodward2000] for foreign firms in Portugal. Some of these studies have analyzed the decision-making process of the multinational firms

³For example, it is widely known that in many countries, MNEs prefer lending to their foreign subsidiaries to finance their investment. This alone would heavily underestimate FDI.

⁴See, for example, [Navaretti and Venables2004].

across different sectors. However, since they each focus on foreign firms in a single country it is difficult to generalize their findings across countries. The analysis below allows for such a generalization by including several countries in the same analysis, and as such will add value to the existing literature.

Furthermore, the sectoral focus of the studies so far has been relatively limited. Many studies, including but not limited to those by [Coughlin et al.1991], [Woodward1992], [Mariotti and Piscitello1995], [Resmini2000], [Guimaraes and Woodward2000] and [Kim et al.2003], have focused on explaining the economic geography of firms in the manufacturing sector. Other studies have classified sectors in very broad categorizations. When studying the location choice of MNEs within Turkey [Deichmann et al.2003] have looked at the decision across firms in the primary, tertiary and services sectors. Similarly, [Pusterla and Resmini2005] and [Basile et al.] both classify the sectors according to their technology intensities while studying the MNEs location choice in transition economies and in EU, respectively. Aside from these studies that assume broad categorizations of sectors there is a limited number of studies that undertake a more detailed sub-sectoral analysis. For example, [Kolstad and Villanger2004] study the subsectors of the services sector, while [Resmini2000], [Choe2000], [Carlton1983] and [Luger and Shetty1985] study the subsectors of the manufacturing sector, and [Gross et al.2005] study the locational choice of MNEs in both the manufacturing and service sectors in Japan.

As the above discussion points out, while there is an extensive literature on the location choice of MNEs the studies are either limited in their country or region coverages, or in their sectoral analysis. This study fills this void in the literature by addressing both issues; studying the location choice of MNEs across 38 countries, not limited by geography or economic systems, and across several sectors that are defined either in very rough categorizations or in detail. To the best of our knowledge, this is so far the most comprehensive sectoral analysis of the economic geography of MNEs across a wide-range of developing countries.

The remainder of the paper is organized as follows: The relevant literature is surveyed in detail in section 2, allowing for identification of the necessary variables to be included in the econometric analysis. Section 3 discusses the data used in the analysis, while section 4 presents the methodology used. In section 5 the results are discussed and analyzed in detail, across a variety of sectors. Section

6 concludes.

2 Decision-making by MNEs

[Markusen and Venables1998] and [Markusen and Venables2000] construct models that incorporate the features of the new trade theory, allowing for imperfect market structures in the models, and show the ranges of parameters where multinational firms that are horizontal investors in nature operate. The model suggests that measures of market size, in this case defined as the differences in country size and in relative endowments by the authors, and the level of trade- transportation- and investment-related costs are the major determinants of the extent of MNE activities.⁵ On the other hand, [Helpman1984] introduces vertical FDI into a Heckscher-Ohlin trade model where the overseas operations of the MNE are modeled as a separate stage of production, and allow creation of a third tradable good and an additional trading opportunity. This theoretical framework points to the complementarity of trade and FDI, suggesting that MNEs that carry out vertical FDI are driven by cost differences, where the costs include both factor costs, and trade and transportation costs.⁶ These theoretical findings provide a basis for the empirical discussion of the determinants of FDI flows, which we detail below.

In a very concise table [Markusen and Maskus2002] summarize the expected signs of each variable. In short they argue that the knowledge capital and horizontal models would suggest a positive relationship between the sum of GDP of host and home countries and FDI flows, whereas vertical FDI would suggest no relationship. In other words, factor endowments do not affect vertical FDI but do affect FDI that can be modeled as knowledge capital and horizontal FDI. On the other hand cost indicators, which they classify as trade related and investment-climate related affect all types of FDI similarly. While a full testing of the vertical, horizontal and knowledge-capital models requires information on both the home and host country of investment one can argue that the factors relevant to the investment

⁵Chapter 3 of [Navaretti and Venables2004] provides an overview of the horizontal FDI models and their predictions, where the discussion is mainly drawn from [Markusen and Venables1998] and [Markusen and Venables2000].

⁶Chapter 4 of [Navaretti and Venables2004] provides an overview of the vertical FDI models and their predications, where the discussion is mainly drawn from [Helpman1984] and is built on a perfect competition and constant returns to scale model rather than the imperfect market structure models used in modeling horizontal FDI.

decision of the multinational firms can be classified under those related to the factor endowments and those related to the costs related to these investments. We follow a similar grouping of factors, taking a more liberal perspective on which specific variables to include under both sets of factors. The specific variables are chosen following a very rich empirical literature on the determinants of FDI. Given the extent of this literature below we focus our attention to studies that mostly have a sectoral focus.

Factor Endowments

The empirical studies that do test for which model best fits the data in explaining FDI use real GDP and skill endowments as factors that capture the factor endowments of the economies'. In fact, previous studies of FDI-determinants find consistently that larger markets and markets with higher purchasing power tend to attract significantly more FDI and there is higher probability that a MNE would invest in that region. While studies that use aggregate FDI flows as a dependent variable tend to find market related variables are important in attracting FDI, the limited sectoral studies suggest differential effects of the market-related variables on the location choice of MNEs (see [Kolstad and Villanger2004] and Resmini2000 who find contradictory results).⁷ These findings regarding the differential impact of market related factors across different sectors instigates the need to include these measures in the below analysis, which will allow testing the effect of a larger market size in attracting MNEs within a wide range of sectors.

One can also explain the differential response of investments to market size considering the differential motives of foreign investment. Although a priori one would expect that firms would choose larger and richer markets to invest in, both the sign and the magnitude of the relationship between these variables and the probability of a MNE investing in a region depends on the motivation of investment. For example, if the firm is resource-seeking or is in search for a low-cost export base environment for

⁷Although many of the studies have found a positive effect of market-related variables on FDI, several studies also suggest the impact of the market size in increasing the attractiveness of a region to MNEs could be insignificant. For example, while [Mollick et al.2006] and [Coughlin et al.1991] find that GDP per capita positively and significantly contributes to a region attracting more MNE presence, [Hogenbirk and Narula2004] and [Mariotti and Piscitello1995] find evidence to the contrary.

production then the local market size and richness need not significantly affect the location choice of the foreign firm. However, if the purpose were to market-seek then a priori one would expect that the foreign firms location choice would significantly and positively be affected by the market potential of the foreign country. This is also parallel to the findings of [Markusen and Venables1998] and [Markusen and Venables2000] who argue that measures of market size, which they label as differences in country size are of importance in FDI that is horizontal in nature. One could envisage that the motivation of investment by foreign firms would differ across the sectors the firms operate in, which could well be reflected in whether the investment is horizontal or vertical, further justifying the need to formally test the relationship between the location choice of MNEs and the market related measures across different sectors. In summary, [Markusen and Maskus2002] suggest that the market size matters for horizontal and knowledge capital FDI but not for vertical FDI. Below we test for which sectors such relationships are evident in.⁸

Other factor endowments frequently included in the analysis of FDI determinants include human capital, physical capital, and institutional endowments. Below we detail each of these variables. A priori, availability of skilled and educated labor force would be expected to have a positive influence on FDI, and also affect the type of investment as suggested by the empirical testing of the horizontal, vertical and knowledge-capital models in [Markusen and Maskus2002]⁹ [Woodward1992], using the median year of schooling completed, finds that the presence of educated labor force is a significant factor to explain FDI at county level. On the other hand, [Mariotti and Piscitello1995] use share of managers and office staff in total employees in manufacturing and level of schooling (ratio of students enrolled in secondary schools to the total resident population) as proxies for labor quality to find both variables to have

⁸Given the sectoral focus of the below study we extend the interpretation of *market-related* indicators to go beyond the usual market size and purchasing power. We hypothesize that the foreign firms not only look at the size of the overall market when choosing their investment site, but they also consider the economic structure. For example, if the sector the MNE is planning on investing in has been growing in the foreign country the firm could interpret this as market potential in that specific sector. As such, in the below analysis, we include the growth rate of the value added by the specific sector as long as data permits.

⁹See page 700, table 1 where the signs of the interaction terms depend on the skill endowments and also differ across the three models.

minor effects on attracting FDI into Italian provinces. Finally, [Deichmann et al.2003] use the student per teacher ratio as such a proxy and find that regions in Turkey with higher labor quality attract MNEs with a higher probability, with differences in results across broad categories of sectors.

Several studies suggest that the physical infrastructure could also affect the profitability of a foreign firm and could influence the location choice. For example, studies including those by [Gholami et al.2006], [Mollick et al.2006], [Deichmann et al.2003] and [Coughlin et al.1991] find positive causal relation between different types of physical capital and FDI inflows.¹⁰ On the other hand, both [Mariotti and Piscitello1995] and [Hogenbirk and Narula2004] do not find transportation facilities as a significant determinant of FDI for manufacturing in Italy and general FDI for the Netherlands, respectively. This discrepancy in findings can indeed be on account of an aggregate analysis, justifying further need for a more sectorally disaggregated analysis. The below empirical analysis will include several of these infrastructure indicators alongside domestic investment, as a proxy for agglomeration effects as well.

Existence of well-operating institutions, which can be included among the factor endowments of the host country, creates better business climate for foreign as well as local firms, although it is often argued that foreign firms are usually disadvantaged in dealing with negative institutional factors. As support for this idea, [Aykut and Ratha2004] have shown that MNEs from emerging markets are more likely to invest in developing countries than MNEs from developed countries, possibly suggesting that they are more familiar with the institutional structures in the host countries of similar income level as their originating source countries. In order to take the effect of well-functioning institutions into account, a variety of proxies are used in the literature. For instance, [Campos and Kinoshita2003] use indices of rule of law and quality of bureaucracy to find that countries with better institutions attract more FDI inflows. [Kolstad and Villanger2004] use a wider range of institutional variables (composite indices for macroeconomic stability, political risk rating, institutional quality and democratic accountability) and find varying results for the effects of these variables on FDI, though not robust to

¹⁰These physical capital measures include information and communication technologies (ICT) investment, number of residential and non-residential telephone connections per person and traditional measures of infrastructure like transportation facilities.

different specifications, sample or methodology. Finally, [Brada et al.2006] show the importance of political stability in driving FDI patterns. In the below analysis, in line with the literature, we include measures of institutional quality and risk indicators compiled by the Political Risk Services (PRS) under the International Country Risk Guides (ICRG).

Cost related factors

Both empirical testings of horizontal, vertical and knowledge-capital models of FDI and determinants of FDI flows and their geographic location have included several cost indicators among their independent variables in the analysis. In the broadest sense these costs cover the investment related cost factors such as labor costs, and taxes, as well as trade and transportation related costs.

While [Carlton1983], [Campos and Kinoshita2003], [Kim2003], [Coughlin et al.1991] and [Luger and Shetty1988] find that low wage rate is an important factor to attract FDI in a region, [Choe2000] finds a positive and significant effect of wages on FDI. However, Choes analysis is limited to one manufacturing sub-sector, whereas other studies, i.e.[Resmini2000], have found that that the reaction of firms in different sectors to wages shows a very diverse pattern. Her results show that wage differential is a key factor in traditional sectors, while it has a minor effect in technology and capital intensive sectors. Finally, [Mollick et al.2006] [Mariotti and Piscitello1995] find that wage differential is not a significant factor to explain the differences in the amount of FDI that flows into Mexican states and Italian regions, respectively. These results are suggestive that the relationship between labor cost and FDI is not robust across different specifications and estimations, and the results could in fact depend on the sector of investment.¹¹

Given the multinational nature of the foreign firms in question including the exchange rate among the cost-related factors that would affect the location choice of the MNEs is only natural. The foreign

¹¹ It is important to note the relation between labor-related variables and FDI is far from covered when one only focuses on the cost of labor. While several studies examine the relationship between the unemployment rate and FDI, many institutional and government policy-related variables such as flexibility of hiring and firing or union presence have been emphasized by academics and policymakers alike in recent years as key investment climate variables and important factors in effecting firms ease of doing business. The role of such factors is yet to be explored and due to limited consistent data across countries will not be explored in the below analysis.

currency composition of the firms income statement depends on the final product market the firms are serving, i.e. local or international. In other words, the currency the firms revenue and costs are denominated in is determined by the trade-orientation of the firms production, which could differ across the sectors (i.e. tradables versus nontradables, manufacturing versus services, etc.). For example, if the firms revenues and costs are denominated in different currencies then, ex ante, we expect that indicators of the exchange rate would affect the firms location choice significantly. Two such indicators are the stability of the exchange rate and the level of the exchange rate. Using foreign acquisitions information at detailed sectoral level, [Blonigen1997] finds that real dollar depreciations increase the probability that Japanese firms will acquire US firms, especially the firms that have more firm-specific assets. This result forms the basis of the below analysis, where our hypothesis is that the extent of firm-specific assets differs across sectors, and therefore a priori one would expect that the reaction of the location choice of firms to the exchange rate level will differ across sectors.¹²

Another controversy in the literature is with respect to the effect of tax rates on FDI, a variable capturing an important dimension of the cost-related aspect of the location choice of foreign firms. Some studies, such as [Kim2003] maintain that tax rates have a positive and significant effect on FDI. This seemingly counterintuitive result is explained by the fact that some foreign firms receive tax credits at home against tax payments in host country and that this policy reduces tax aversion. On the other hand, [Luger and Shetty1985] find that the effect of taxes on FDI varies across industries, with a negative impact on FDI in drug manufacturing, a positive impact for motor vehicle production and an insignificant impact in the industrial machinery sector. In another study, [Carlton1983] notes that taxes do not exert any considerable influence on FDI; interpreting this finding as being a result of the fact that the effect of tax differentials is offset by the differences in remuneration of immobile factors of production. Alternatively, the variable used in the study may not reflect the actual tax paid by the foreign firms, as tax rates are usually different from actual taxes paid by big companies, especially

¹²While [Blonigen1997] assumes imperfect goods markets to capture the differential wealth effects of exchange rate changes on the domestic and foreign firms [Froot and Stein1991] assume imperfect capital markets to capture the wealth effects of exchange rates.

MNEs. Despite the difficulty of finding the effective tax rates on investment by the MNEs across countries, the above discussion is suggestive of the differential impact of taxes on foreign firms across sectors, which leads us to include a measure of statutory corporate tax rates as an independent variable in the analysis.

Agglomeration

The persistence in the location choice of firms bring to mind the question of whether or not agglomeration plays any role in the decisions of the MNEs. While the theory underlying the question arises from the new trade theory literature, the empirical studies are more pertinent to the below discussion. The broad categories of proxies for agglomeration are measures related to the labor-market or employment and measures related to past foreign and domestic firm activities. [Carlton1983], [Luger and Shetty1985], and [Guimaraes and Woodward2000], among others, can be included among the former group of studies measuring agglomeration by labor-related measures. Whereas, [Campos and Kinoshita2003], [Choe2000], [Kim et al.2003], [Deichmann et al.2003], and [Hogenbirk and Narula2004] are included among the latter group of studies measuring agglomeration with the extent of previous foreign and domestic firm activities in the region.

Studies using labor related measures all find a positive and significant agglomeration effect in the FDI flows (see [Carlton1983], [Luger and Shetty1985] and [Guimaraes and Woodward2000] among other studying the issue across several sectors). Using past FDI activity as an agglomeration indicator,

Furthermore, several studies in the literature have used the population density as a measure of agglomeration, mostly finding a negative relation between this measure of urbanization and the location of foreign direct investment (see for example, [Mariotti and Piscitello1995] and [Kim et al.2003], among others). The hypothesis is that the availability of infrastructure, information and services are much more extensive in the more densely populated, i.e. more urbanized regions. However, the negative relationship between FDI and the rate of urbanization suggests that the population density might be a poor proxy of agglomeration economies, however might capture other economic conditions related to the market potential and availability of labor force. As such, we include the population density as an

additional independent variable in the below analysis, keeping in mind that it might be capturing either the extent of agglomeration economies, better market potential or a saturated labor market.¹³

International Trade

As was discussed above, vertical and horizontal FDI have different implications regarding the relationship between international trade and FDI; in other words regarding the complementarity of trade and FDI. As [Blonigen2001] points out trade and FDI are envisaged as substitutes according to the standard trade theory, while [Helpman1984] notes that modeling vertical FDI in a standard trade theory would suggest that trade and FDI are complements. While several empirical testings of the relationship finds strong evidence of complementarity between international trade and investment, [Blonigen2001] finds substantial evidence for both substitutability and complementarity between trade and investment, using Japanese and US data. These divergent patterns observed render testing whether or not the differential findings are due to differences across sectors important. Furthermore, given our hypothesis that the nature of investment (whether it is vertical or horizontal) differs across sectors, we include measures of the openness of regions to international trade to test for the differential relationship between FDI and trade across sectors.

Not only do we include a measure of overall trade openness of the country but we also test for the possible relationship between the sectoral composition of the countrys exports and the sectoral composition of the FDI the country receives. We do so by including the world market share of the country in the good it exports, i.e. the export of that sector by the country as a share of the total exports of the good in the world market, as long as data permits. This sectoral dimension of the openness measure not only allows capturing the extent of trade but could also be envisaged as the

¹³When data permits, to furthermore allow for the agglomeration economies to be sector specific, given our focus of analyzing the sectoral differences in the geographic location of MNEs, we include the ratio of the value added of the sector in question to GDP as an alternative measure of agglomeration. As much as the value added share of each sector in GDP could be capturing agglomeration economies, it could also be suggestive of the extent of competition in the region. For example, an MNE could view high levels of the value added share measure as indicative of a conducive environment for investments in that sector they could also interpret it as a highly saturated market, one that would be difficult to penetrate. The below analysis considers both possible interpretations.

market power of the country in the sector of analysis. This latter interpretation is based on the fact that the export-share measure included in the analysis measures the size of the countrys trade in a sector relative to the world market.

This detailed discussion motivates the independent variables to be included in the analysis. The most important implication of this discussion for the below study is that the factors that influence the geographic pattern of MNEs should heavily depend on the sector of investment, justifying the need for a general framework that would allow for studying the determinants of FDI across a wide range of sectors which the following study does. In the next section we discuss the data that is used in the analysis.

3 Data

As detailed above, the below analysis studies the factors that influence the geographic distribution of MNEs across different sectoral groupings using firm level data. Carrying out the analysis with firm level data allows us to get around the possible biases caused by the measurement of the quantity of FDI. Below we detail the data used in the analysis. We start by discussing the firm level information.

Firm level data on FDI is obtained from Business Monitor International (BMI).¹⁴ The FDI database of BMI includes comprehensive information on company characteristics such as number of employees, sales volume, industry and business activity as well as details of the investment (e.g. year, industry, local competitors) undertaken in the host country. Data covers major FDI of multinational enterprises on global scope. Although the data collected by the BMI is very comprehensive, company characteristics are not completely provided for each firm. Specifically, we had to eliminate firms for which the year of investment in the host country or the industry of operation are not reported. Given that the below analysis will be studying the entry decision of the MNE, information on the year of investment is of utmost importance. After elimination, we are able to include 17,775 companies and 38 host countries that these companies have invested in during the period 1980-2004 in the below analysis.

The distribution of companies, included in the analysis, across countries is presented in Table 3. China, Hong Kong and Singapore have the highest number of multinational firms while Bahamas,

¹⁴<http://www.businessmonitor.com>

Lithuania and Estonia have the lowest in our dataset. Almost 43 percent of the firms in our dataset have invested in countries from the East Asia and Pacific region. The second most popular region for multinational firms in this dataset is East Europe and Central Asia. Sub-Saharan Africa has the lowest share of FDI inflows in our dataset. The detailed distribution across the 38 countries is provided in Table 4.

INSERT TABLES 3 AND 4 ABOUT HERE

One concern about the BMI dataset is that it only has information on MNEs investing in developing countries. The analysis will be built on the premise that a MNE considering investing in a developing country will compare the locational features of these 38 countries.¹⁵ While the choice of the countries included in the analysis is limited by the availability of data from the BMI dataset, FDI flows to these 38 countries encompass more than 85% of all FDI inflows to the developing countries. In fact, as is evident in Figure 3, this ratio increases to above 90% starting in the early 1990s.¹⁶

INSERT FIGURE 3 ABOUT HERE

Another issue is whether the coverage of the MNEs in the BMI database is reflective of the MNEs existing in the host countries. Although not all foreign firms are registered in the BMI dataset, Figure 5 suggests that the coverage of the firms in the manufacturing and services sectors are very close in their sectoral distribution patterns to the information reported by [UNCTAD2005] World Investment Report regarding the foreign establishments. In fact, the correlations of the sectoral composition of the foreign firms as reported by the BMI and [UNCTAD2005] across different regions are above 90% across the board. Specifically, the sectoral composition of the foreign firms in the BMI and UNCTAD datasets are correlated 95% for the Latin American and Caribbean economies, 97% for the West Asian countries, 99% for the South, East, and South-East Asian economies, and 98% for the South-East Europe and CIS

¹⁵As long as MNEs are deciding to invest in a developing country in a nested fashion, lack of developed country data does not bias our results.

¹⁶As a share of worldwide FDI these 38 countries have been receiving more than 30% of the total FDI flows since the early 1990s.

countries. Such high correlations and Figure 4 suggest that the BMI dataset is a good representative of the MNEs in the countries in the dataset, specifically the BMI dataset allows for selection of an appropriate sample of MNEs from the population of MNEs worldwide when the sectoral composition is considered. Furthermore, one has to test whether the distribution of firms across host countries is reflective of the realized patterns, not creating any such selection bias in the BMI dataset. Due to lack of information on the number of firms across individual countries we instead calculate the Spearman's rank correlation between the FDI inflows data (in millions of USD) from UNCTAD and the number of firms data we have from the BMI and find that the rank correlation is around 65% and statistically significant. Again, this also is suggestive that the use of the BMI dataset should not be ridden by any selection bias.

INSERT FIGURE 4 ABOUT HERE

The sectors available in the dataset are listed in Table 5. While the dataset allows for discussion of the location choices of firms at the 2-digit ISI-Classification level, the analysis is also carried out at more aggregated levels. As discussed in detail in section 5, aggregation is conducted according to the tradability of the final products and the technology-intensity of the industries. In the former classification, the sectors are simply identified as tradables or nontradables. For the latter classification the UNIDO classification system is applied, grouping the sectors as resource-based, low technology intensive and medium and high-technology intensive sectors.¹⁷ The shares of these two agglomerated classifications are provided in Table 5 as well.

INSERT TABLE 5 ABOUT HERE

¹⁷The technology-intensity of the sectors are consistently defined with those in the UNIDO Global Report, Statistical Annex, 1997. The sectors included in the tradables are manufacture of food, beverages and tobacco (31), textile, wearing apparel and leather (32), manufacture of wood and paper products (33 and 34), manufacture of chemicals (35), manufacture of non-metallic and metallic products (36 and 37), manufacture of machinery and equipment (38); while those included in the nontradables are mining and quarrying (22), construction (50), retail and wholesale trade (61 and 62), transport and storage (71), communication (72), financial institutions and insurance (81 and 82), real estate, business (83) and Other Services.

Since in section 2 the discussion of the independent variables was undertaken in great detail the list and definitions of, as well as the sources of, the independent variables used in the analysis are provided in Appendix II. A detailed discussion of the link between the expected signs of each variable and the literature will be provided when we interpret the results in section 5.

4 Methodology

The econometric framework is built on the premise, following [Dunning1993], that MNEs, similar to the domestic firms, are primarily motivated by net worth maximization. The net worth of the firm is a reflection of the firms current discounted value of profits. As such, a firm choosing between two alternative locations for investment, will prefer the investment site where the firms relative present value of discounted profits is higher. In other words, denoting the profits of the i^{th} firm investing in the j^{th} region can be defined as follows:

$$\pi_{ij} = \beta_{ij}z + \epsilon_j \quad (1)$$

If alternatively the firm invests in region k , its profit function becomes:

$$\pi_{ik} = \beta_{ik}z + \epsilon_k \quad (2)$$

where z is a vector of characteristics for the particular region (country in this case), including the variables discussed in section 2 above. The probability that a firm chooses to invest in region j instead of region k , where $Y = 1$, therefore depends on the relative profits as defined in equation (3):

$$Prob[Y = 1|z] = Prob[\pi_{ij} > \pi_{ik}|z] \quad (3)$$

Using the conditional logit estimation, widely used in the analysis of industrial activity locations and market research, the analysis below extracts information from the dataset on which of the regional or sectoral characteristics included in vector z plays an important role in the firms location choice. Specifically, the model is built on the basis that the dependent variable in the analysis takes the value

of 1 for the region/country where the company chooses to invest and the value of 0 for the rest of the regions/countries. This dichotomous dependent variable coded as 1/0 is used in the conditional logit model, which performs maximum likelihood estimation. As shown in [McFadden1974], under certain assumptions, if one assumes that Y_i is a random variable that indicates the choice made, then:

$$Prob(Y_i = j) = \frac{e^{\beta' z_j}}{\sum e^{\beta' z_j}} \quad (4)$$

The vector z is defined to include both region-specific and sector-specific characteristics. The framework acknowledges that the profitability of the foreign firms investment not only depends on a set of variables that capture the economy-wide characteristics of the host country, but also the sector-specific characteristics of the region. For example, if a specific firm decided to invest in Turkey, our dependent variable Y takes the value of 1 for Turkey, and the value of 0 for the remaining 37 countries. This locational choice of the firm depends on the vector z , which can be decomposed as $z_j = [x_j, w_j]$, where x_j includes the economy-wide indicators, while w_j contains the sectoral characteristics of the region.

To the best of our knowledge, almost all similar studies in the literature define the unit of analysis as the firm and the region as sub national, either as a city or as a state within the nation. Furthermore, while there are some studies that carry out a similar analysis across a group of countries, for example [Pusterla and Resmini2005]; [Basile et al.2003], among others, the below analysis is the most encompassing one; including a very large sample of developing countries. Our study differs and adds to the literature in this perspective, as our unit of analysis is still the firm but the region of analysis is at the national level. Previous studies that have used the nation as the regional unit have carried out the analysis using the amount of foreign investment as the measure of the extent of foreign firm activity, whereas the following analysis measures the extent of foreign firm activity by looking at whether the firm locates to a region (country in this case) and not the amount of investment. Therefore, to reiterate, this study is not subject to measurement error problems from using the quantity of FDI as the dependent variable that other studies that have used the nation as the regional unit have suffered from. The unique nature of the database allows us to model the location choice of a firm at the sectoral and

locational depth not used in studies using a similar methodology.

In the estimation, we adopt the following procedure: We first use the conditional logit model. One caveat of the conditional logit model is that the model necessitates the independence of irrelevant alternatives (IIA), which implies that the choice between two alternatives should be independent of the attributes of all other alternatives. As such we test the IIA assumption using the specification test of [Hausmann1978].¹⁸

5 Results

We use the conditional logit model for each of the two-digit sectors as well as the sectoral aggregations as described in Section 3. Our workhorse, as described in the previous section, is the conditional logit model unless the IIA assumption is violated. In fact, The test results reported below suggest that the IIA assumption holds across all sector classifications, rendering the conditional logit sufficient in the empirical testings of the hypotheses.¹⁹

When interpreting the below results we will make reference to two classifications. First, identifying the statistically significant factors that influence the probability of foreign firms investing in a region we will classify these reasons as those that would suggest most investments being market-seeking, efficiency-seeking or cost-reduction-seeking. Second, in reference to the theoretical models of horizontal, vertical and knowledge-capital FDI we interpret the significance of factor endowments as suggestive of horizontal FDI dominating a sector, the significance of cost factors as suggestive of vertical FDI, and a mix of both results as suggestive of knowledge-capital FDI dominating the sector of analysis.²⁰

¹⁸Hausmann's specification test can be used to test for IIA because [Hausmann and McFadden1984] suggest that if a subset of the choice set is irrelevant with respect to the other alternatives, omitting it will not lead to inconsistent estimates.

¹⁹In testing for the IIA assumption's validity we either exclude Latin American countries or China from the regressions. Both groups of countries are always high in the list of countries that attract FDI. In fact, over time the presence of China has been on the rise. To account for this, when running regressions for the 1980-1994 period we exclude Latin American countries while when running regressions for the 1995-2004 period we exclude China. In all regressions the IIA assumption holds allowing for use of the conditional logit estimations across the board and also suggesting our results are robust to the exclusion of China, Argentina or Brazil.

²⁰All regressions also include fixed region effects and regional income classification dummies. When these fixed effects and dummies are not included in the analysis the IIA assumption is violated. Under these circumstances the nested logit

5.1 Tradeables and Non-tradeables Sectors

We start by analyzing the location decision of firms that in sectors that are classified as producing tradable or nontradables. Results (reported in table 6) suggest that for the period 1980-2004 factor endowments, institutional quality, less political and economic risk, lower costs and less trade openness increases the probability a firm invests in a region, regardless of whether the firm is in a sector producing tradable goods or in one producing nontradable goods. The results regarding agglomeration are mixed, not suggesting any clear pattern of persistence in FDI in the tradables and nontradables producing sectors. The significance of both factor endowments and cost related factors suggest that the most suitable theoretical model to explain these results would be the knowledge- capital model. Similarly, the results do suggest that foreign firms in both sectors have incentives to reduce costs as well as market seek. However, this finding and the following interpretations could also be attributed to the fact that aggregation at this extent might still be masking significant sectoral differences.

Both the extent of FDI and the geographic composition of it has evolved significantly in the 1990s. To test for whether the factors that govern the location choice of foreign firms have changed over time the sample is split into two sub-periods, namely 1980-1994 and 1995-2004. While a majority of the factors remain significant across the two sub-periods the importance of several factors seems to change over time. Below we only discuss these factors for which the statistical significance differs across the two time periods.

The bureaucratic quality, included as a measure of institutional quality, is found to be a significant factor as having influenced foreign firms' location choice in the earlier sample while not having any significant impact in the latter part of the sample, i.e. post 1995. In other words, for foreign firms in both sectors that produce tradables and nontradables while corruption is a deterrent throughout the 1980s and the 1990s the quality of institutions no longer seems to matter contrary to the 1980s.

The foreign firms in the nontradables producing sectors are found to prefer locations with larger market sizes during the earlier time period. However, post 1995 the results suggest that the location framework is used, suggesting that the nests are best defined by the regional characteristics which are captured by the fixed effects in the following regressions.

choice of foreign firms in these sectors is not significantly affected by the market size. The alternative factor endowment indicator included in the analysis, the human capital endowment of the region, prevails as a significant factor in the decision of the firms over both time periods.

Similarly, for the foreign firms in the tradable goods producing sectors the real exchange rate and trade openness are found not to have been significant factors in these foreign firms' location choices during the 1980s. However, both the exchange rate level and the extent of trade openness are found to be significant factors that have governed the location choice of multinationals during the post 1995 period. In fact results suggest that the probability that a foreign firm invests in a region increases with an appreciated local currency and a less international integration of that region. The latter finding could be interpreted as suggesting that firms in both sectors view international trade as increased competition and would prefer protected business environments. The evidence can also be interpreted as suggesting substitution between trade and investment activities of MNEs has increased over time. The former finding on the other hand could be suggestive of the existence of wealth effects due to real exchange rate changes. This could be on account of the wealth effect of the real exchange rate changes through its differential impact on the revenue and costs of the firms (see [Blonigen1997] or through its differential impact on external and internal financing terms (see [Froot and Stein1991], leading to decreased foreign investment probability in the region.²¹ Taking the view that the imperfect goods market assumption dominates, then one could interpret the finding that the probability a foreign firm invests in a region is positively affected by the depreciation of the local currency of that region for firms in both the tradable and nontradable sectors could be indicative of the extensive use of intermediate inputs alongside serving of the local markets with the final goods produced, where the cost and revenues of the firm are mostly denominated in different currencies. In such a currency composition of revenues and cost one would expect a local currency depreciation to reduce the probability of foreign firms investing in a region. This interpretation holds for the firms in both the nontradables and the tradables sectors during the post 1995 period, and also for the earlier time period for the firms in the nontradables producing sectors.

²¹ In both [Blonigen1997] and [Froot and Stein1991] the wealth effects are modeled to induce foreign acquisition of domestic assets, the opposite sign of what we find above.

To summarize, the results regarding the location choice of firms in the tradables and nontradables sectors do not suggest clear differences across sectors. In fact, given the significance of almost all the variables one suspects that the aggregation of very different two-digit sectors under broad categories such as tradables and nontradables producing sectors could mask more detailed sectoral differences. Taking cue from this interpretation we further classify the sectors according to their technology-intensities, and follow that analysis with regressions at the two-digit sector level.

5.2 Technology Intensity

The location choice of the firms might not only differ across the sectors with different trade-orientation, but could also differ according to their technology-intensities. Grouping the sectors according to UNIDO's classification, three categories are formed: sectors that are resource-based, sectors that are low-technology intensive, and sectors that are medium- and high- technology intensive. Results presented in table 7 suggest that the factors that govern the location choice of the firms operating in these three categories differ in important ways.

Among the three sectors firms in both medium-high technology intensive sectors and resource-based sectors invest in regions with a larger market size and more human capital, suggesting firms in both sectors can be depicted as market-seeking or carrying out investments best depicted by horizontal FDI models where factor endowments matter most. The evidence suggests that market-seeking and horizontal FDI prevails throughout both the 1980s and the 1990s and early 2000s in the medium and high technology intensive sectors. However, the importance of factor endowments in the location choice of foreign firms in both resource-based and low-technology intensive sectors are found to change over time. In fact, in the resource-based sectors only after post 1995 do factor endowments seem to matter. An even more mixed and unintuitive over time pattern is evident in the role of factor endowments in the geographic choices of foreign firms in the low-technology sectors. In short, given the significance of factor endowments in the location decision of foreign firms in the medium and high-technology sectors (MHT) and not in any other suggests that the MHT is dominated by horizontal FDI while others might be dominated by FDI that is vertical in nature.

Firms in all three sector classifications are found to be deterred by higher corporate taxes, suggesting the cost factors matter across all three sector classifications, and across all time periods of analysis.

Foreign firms investing in resource-based sectors do not seem to be affected by the institutional quality as suggested by the insignificance of the bureaucratic quality and corruption indicators. The firms investing in low-technology intensive sectors however seem to prefer investing in regions where corruption is less, with not much concern about the quality per se of the institutions. On the contrary, foreign firms investing in medium and high-technology sectors seem to care more about the bureaucratic quality rather than the extent of corruption. However, it is important to note that the institutional features that foreign firms care about in the region they are investing in seems to evolve over time. For example, while corruption did not influence the location choice of foreign firms in low-technology intensive sectors during the 1980s it has become a significant factor in governing their location choice post 1995.

All foreign firms, regardless of the technology intensity of the sector they are operating in, prefer investing in regions with lower political risk. A similar finding prevails for their preference of a more stable, except for firms in low-technology intensive sectors. It is important to note that the importance of these risk factors also evolve over time. While both less political and economic risk is preferred by firms in the MHT sectors at all times, firms in the resource-based sectors have started to care less about both over time.

The negative sign we find for the trade variable is suggestive that trade and FDI are substitutes across all sectors. While this finding prevails over time for both the resource-based and MHT sectors, the substitutability between trade and FDI is found to be a relatively new phenomena in low-technology sectors. Finally, the results on agglomeration does not suggest any strong and clear role of persistence of foreign investment, neither across sector nor across time.

5.3 ISIC 2-digit Sectoral Classifications

While the analysis of aggregated sectoral groupings suggest differences across firms location choice depending on the sector they operate in, a more disaggregated sectoral analysis could allow identification

of sectoral differences in more detail. The following discussion takes this approach and analyzes the investment location decision of firms at the two-digit ISI- classification sectoral level. The two- digit sector results are presented in tables 8 and 9, where all regressions are estimated using conditional logit specification since the Hausmann specification test results show that the IIA holds in all regressions. To allow for a more in depth interpretation of the aggregated sector findings we include the tradables subsectors in table 8 and the nontradables subsectors in table 9.

Before going into detail it is worthwhile discussing the general findings that come out for each sector. The following general interpretations are drawn from three sets of regressions, each for different time periods (1980-2004, 1980-94 and 1995-2004). Any factor whose influence changes over time is discussed in more detail following the general findings.

Foreign firms operating in the food, beverages and tobacco (FBT) sector are found to choose their investment location mostly as a substitute to trade, possibly to tariff-jump or eliminate competition, and in regions where corporate taxes are lower. Given the lack of importance of factor endowments in their decisions and the importance of costs, one can argue the sector is mostly dominated by vertical FDI. Whereas firms operating in the chemicals and machinery and equipment sectors seem to prefer investing mainly in regions with larger factor endowments, both reflected in larger market size as well as better human capital endowments. This finding, accompanied by the varying significance of cost factors, suggests that these two sectors are dominated by horizontal FDI.

The subsectors classified as nontradables, including construction, wholesale and retail trade, transportation and communication and finally finance and business services all are affected negatively and significantly by political and exchange rate risk in their investment location choice. Whereas, firms in subsectors classified as tradables react in a less systematic way to risk. For example, while foreign firms in both the FBT and chemicals sectors were deterred by high political and exchange rate risk in the 1980s risk factors have lost their significance in the later 1990s and early 2000s. Foreign firms in the machinery and equipment sectors however have become more sensitive to political risk over time.

While risk-avoidance is clear among all the nontradable subsectors the strong evidence of any horizontal investment only prevails in the finance and business services sector. This result is not surprising,

given that the foreign investments in the finance sector are usually foreign banks acquiring or merging with local banks to spread similar operations from their headquarters to these subsidiaries.

In the second part of the sample, i.e. 1995-2004, the quality of institutions has played no role in the geographic distribution of foreign firms. In fact, in the earlier part of the sample, i.e. 1980-1994, only the location choice of firms in the chemicals, machinery and equipment and wholesale and retail trade was influenced positively by better institutions. Corruption also did not play a significant role in the location choice of foreign firms, except for being a deterrent to foreign firms in the chemicals and wholesale and retail trade in the 1980s, and to firms in the construction and finance and business services sectors in the late 1990s and early 2000s. This finding reiterates that firms care more about the riskiness of a country rather than the quality of their institutions.

Corporate taxes are found to be a significant deterrent only to foreign firms in the food, tobacco and beverages sector throughout the time period of analysis. However, during the 1980s and early 1990s the results suggest that firms in many more sectors, including chemicals, wholesale and retail trade, and finance and business services were also negatively affected by taxes. During the late 1990s and early 2000s only foreign firms in the transportation and communication sector.

The real exchange rate is found to matter only in the location choice of foreign firms in the transportation and communication sector. In line with the findings from the aggregated sectors, results suggest that an appreciated local currency increases the probability of investments by foreign firms in the transportation and communication sector. This could be suggestive of costs incurred in foreign currencies and revenues incurred in local currencies of firms in the transportation and communication sector. A similar wealth effect seems to be evident in the food, beverages and tobacco sector during the 1980s and the construction sector during the late 1990s and early 2000s.

The finding that trade and FDI are viewed as substitutes, or alternatively that FDI prefers to function in markets with less international competition, found in the aggregated sector regressions prevails in most sectors at the 2-digit level. In fact, for all the 2-digit sector classifications we find that at some point in time the probability that a foreign firm invested in a region significantly decreased with increased international economic integration of that region. Finally, the mixed results regarding the

agglomeration effects are further evident at the 2-digit level as well, where there is no clear persistence pattern in the geographic choice of foreign firms.

6 Conclusions

The analysis contributes to the literature by analyzing the location choice of a very large sample of multinational firms (17,000 firms), and by undertaking a very detailed analysis of the differences in these locational choices across a wide range of sectors, both aggregated according to the characteristics of the final product and the 2-digit ISI-classification. In summary, the findings suggest that the factors that govern the location choice of multinational firms differ across sectors. This result suggests that the countries with different characteristics, or in other words different comparative advantages, will succeed in attracting foreign firms from different sectors.

Understanding the economic geography of multinational firms across different sectors is of great importance for policy-makers. As [Aykut and Sayek2007] and [Alfaro2003] show, the growth effects of FDI extensively depend on the sectoral composition of the FDI inflows. Therefore, understanding the factors that govern the sectoral composition of the foreign investments is of relevance in identifying the benefits that accrue from these foreign investments. As competition among countries to attract the larger share of the worldwide FDI pie intensifies, understanding the geographic dispersion of foreign investment at the micro and more detailed level gains increased importance. This paper contributes to both the academic and the policy discussions regarding the topic.

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Table 1: Sectoral distribution of cross-border M&A sales in developing countries (2004)

Shares	Primary	Manufacturing	Services
Africa	63.5	24.9	11.6
Asia and Oceania	0.9	32.7	66.4
Latin America and Caribbean	4.0	30.5	65.4
South-East Europe and CIS	0.3	38.1	61.6

Source: Own calculations from World Investment Report, 2005, UNCTAD.

Table 2: Sectoral Distribution of FDI Inflows in Chile and Brazil, 2002 (as % of total inflows)

Major Sectors	Brazil	Chile
Primary	6.5	58.3
Manufacturing	76.9	6.3
Services	16.6	35.4

Source: UNCTAD, FDI Database.

Table 3: Distribution of Firms across Regions (in %)

East Asia and Pacific (EAP)	42.9
East Europe and Central Asia (ECA)	27.0
Middle East and North Africa (MENA)	9.8
South Asia (SA)	2.6
Sub Sahara Africa (SSA)	2.1
Latin America and Caribbean (LAC)	15.6

Source: Authors Dataset from BMI.

Table 4: Distribution of Firms across Countries

Country	Number of Firms	Region	Country	Number of Firms	Region
Argentina	587	LAC	Bahamas	32	LAC
Bahrain	72	MENA	Brazil	846	LAC
Bulgaria	307	ECA	Chile	585	LAC
China	1572	EAP	Colombia	218	LAC
Croatia	94	ECA	Czech Republic	897	ECA
Egypt	510	MENA	Estonia	40	ECA
Greece	98	MENA	Hong Kong	1365	EAP
Hungary	1058	ECA	India	460	SA
Indonesia	837	EAP	Jordan	48	MENA
Latvia	64	ECA	Lithuania	33	ECA
Malaysia	789	EAP	Peru	290	LAC
Philippines	721	EAP	Poland	636	ECA
Romania	219	ECA	Russian Federation	610	ECA
Saudi Arabia	422	MENA	Singapore	1204	EAP
Slovakia	67	ECA	Slovenia	50	ECA
South Africa	372	SSA	Taiwan	74	EAP
Thailand	841	EAP	Turkey	661	ECA
Ukraine	65	ECA	United Arab Emirates	589	MENA
Venezuela	218	LAC	Viet Nam	224	EAP
TOTAL: 17775					

Source: Authors Dataset from BMI.

Table 5: Distribution of Firms across Industries

Industry	Number of Firms	%
Mining and Quarrying	279	1.6
Manufacture of Food, Beverages and Tobacco	547	3.1
Textile, Wearing Apparel and Leather Industries	212	1.2
Manufacture of Wood & Paper Products	263	1.5
Manufacture of Chemicals	1533	8.6
Manufacture of Non-Metallic and Metallic Products	152	0.9
Manufacture of Machinery and Equipment	3214	18.1
Construction	638	3.6
Retail and Wholesale Trade	3903	22.0
Transport and Storage	1252	7.0
Communication	794	4.5
Financial Institutions and Insurance	1836	10.3
Real Estate, Business and Other Services	3152	17.7
TOTAL	17775	
of which:		
Tradables	5921	33.3
Non-Tradables	11284	63.5
Resource-Based Sectors	810	4.6
Low-Technology Sectors	364	2.0
Medium & High Technology Sectors	6793	38.2

Source: Authors Dataset from BMI.

Table 6: Determinants of FDI in Aggregated Sectors by Tradability

	Tradable Sectors			Non-Tradable Sectors		
	1980-2004	1980-1994	1995-2004	1980-2004	1980-1994	1995-2004
	1	2	3	4	5	6
<i>Factor endowments</i>						
Market size	4.49E-01 [8.88]***	5.05E-01 [7.20]***	5.26E-01 [4.57]***	1.20E-01 [3.34]***	1.08E-01 [2.15]**	9.79E-02 [1.30]
Human capital	1.08E-02 [5.51]***	1.37E-02 [4.99]***	1.00E-02 [3.08]***	1.07E-02 [7.58]***	1.41E-02 [6.96]***	6.50E-03 [2.92]***
<i>Institutions</i>						
Bureaucratic quality	1.25E-01 [3.82]***	2.43E-01 [5.61]***	7.16E-02 [1.03]	4.57E-02 [1.87]*	9.99E-02 [3.10]***	-7.70E-03 [0.17]
Corruption	-5.98E-02 [1.82]*	-8.97E-02 [1.95]*	-1.53E-01 [2.37]**	-7.28E-02 [3.06]***	-8.42E-02 [2.52]**	-1.76E-01 [4.07]***
Political risk	1.58E-02 [5.23]***	1.46E-02 [3.45]***	1.73E-02 [3.45]***	1.96E-02 [9.47]***	2.14E-02 [7.11]***	2.36E-02 [7.21]***
Exchange rate stability	-2.69E-01 [6.90]***	-3.47E-01 [6.37]***	-2.42E-01 [2.73]***	-2.60E-01 [9.42]***	-2.66E-01 [6.99]***	-1.87E-01 [3.05]***
<i>Cost factors</i>						
Tax	-1.32E-02 [3.69]***	-1.40E-02 [2.97]***	-1.29E-02 [1.82]*	-1.44E-02 [5.65]***	-1.47E-02 [4.14]***	-1.64E-02 [3.64]***
Real exchange rate	-2.28E-02 [2.58]***	1.18E-02 [0.94]	-2.96E-02 [2.04]**	-3.60E-02 [6.11]***	-2.09E-02 [2.44]**	-3.46E-02 [3.70]***
<i>Trade</i>	-3.38E-03 [3.38]***	8.40E-04 [0.56]	-3.43E-03 [1.92]*	-9.08E-03 [11.95]***	-7.99E-03 [7.05]***	-7.96E-03 [6.21]***
<i>Agglomeration</i>						
FDI stock (-1)	-7.34E-02 [2.01]**	-3.78E-02 [0.85]	-1.18E-01 [1.17]	7.49E-03 [0.29]	1.80E-02 [0.56]	4.13E-02 [0.62]
Domestic investment	1.06E-02 [2.26]**	2.40E-03 [0.37]	7.47E-03 [0.87]	1.26E-02 [3.56]***	1.44E-02 [2.98]***	7.68E-03 [1.25]
Population density	3.40E-04 [1.14]	-2.66E-04 [0.61]	9.53E-04 [2.38]**	4.16E-04 [2.07]**	-2.20E-04 [0.70]	5.74E-04 [2.22]**
Regional and income dummies	YES	YES	YES	YES	YES	YES
Number of Observations	79330	48124	31206	143461	80768	62693

Note: Absolute value of z statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Market size is measured as real GDP, measured in 2000 US\$. Human capital is the average years of secondary schooling in total population. Bureaucratic quality, corruption and political risk measures are from the ICRG indicators. Exchange rate stability is the annual percentage change in the exchange rate of the national currency against the US dollar. The tax measure reflects the highest corporate statutory tax rate. The real exchange rate is measured as the domestic currency per US\$. Trade is the ratio of the sum of exports and imports to GDP. Domestic investment is measured as the gross fixed capital formation as a share of GDP. FDI stock (-1) is the lag value of net stock of FDI in US\$. Population density is the number of people per square kilometer.

Table 7: Determinants of FDI in Aggregated Sectors by Technology Intensity

	Resource-Based Sectors			Low Technology Sectors			Medium-High Technology Sectors		
	1	2	3	4	5	6	7	8	9
<i>Factor endowments</i>									
Market size	2.50E-01 [1.93]*	1.48E-01 [0.86]	1.46E-01 [0.45]	2.12E-01 [0.89]	7.07E-01 [2.17]**	-1.94E+00 [2.40]**	3.88E-01 [8.38]***	3.62E-01 [5.52]***	5.48E-01 [5.68]***
Human capital	1.42E-02 [2.74]***	1.08E-02 [1.59]	1.76E-02 [1.80]*	-8.79E-03 [1.03]	-2.15E-02 [1.73]*	-2.40E-02 [1.53]	1.31E-02 [7.25]***	2.07E-02 [7.85]***	1.02E-02 [3.53]***
<i>Institutions</i>									
Bureaucratic quality	1.36E-01 [1.52]	1.12E-01 [1.02]	-3.73E-02 [0.18]	-2.06E-02 [0.15]	6.00E-02 [0.35]	-2.91E-01 [0.73]	7.94E-02 [2.60]***	2.25E-01 [5.42]***	6.94E-02 [1.16]
Corruption	-7.82E-02 [0.88]	2.77E-02 [0.23]	-1.97E-01 [1.05]	-2.81E-01 [1.98]**	-2.43E-01 [1.22]	-6.92E-01 [2.12]**	-7.91E-04 [0.03]	-7.01E-02 [1.62]	-1.10E-01 [1.96]**
Political risk	2.59E-02 [3.17]***	3.28E-02 [2.94]***	2.28E-02 [1.63]	5.32E-02 [3.52]***	5.31E-02 [2.50]**	5.12E-02 [2.04]**	1.10E-02 [4.14]***	1.04E-02 [2.69]***	1.55E-02 [3.60]***
Exchange rate stability	-3.39E-01 [3.36]***	-2.40E-01 [1.85]*	-3.40E-01 [1.27]	1.21E-01 [0.69]	-9.71E-02 [0.41]	2.12E-01 [0.41]	-2.52E-01 [7.05]***	-2.23E-01 [6.36]***	-2.37E-01 [3.07]***
<i>Cost factors</i>									
Tax	-3.82E-02 [4.29]***	-3.38E-02 [3.00]***	-6.00E-02 [3.04]***	-2.65E-02 [1.78]*	-3.73E-02 [2.06]**	7.33E-02 [1.77]*	-1.12E-02 [3.32]***	-7.33E-03 [1.58]	-1.85E-02 [3.09]***
Real exchange rate	-4.50E-02 [1.96]*	-4.90E-02 [1.60]	-5.51E-02 [1.34]	-1.39E-02 [0.35]	5.58E-02 [0.97]	-3.72E-02 [0.46]	-3.90E-02 [4.91]***	-9.53E-03 [0.82]	-3.90E-02 [3.10]***
<i>Trade</i>									
Trade	-7.62E-03 [2.80]***	-7.02E-03 [1.82]*	-1.08E-02 [2.02]**	-7.97E-03 [1.67]*	2.27E-03 [0.34]	-1.97E-02 [1.70]**	-4.98E-03 [5.45]***	-2.51E-03 [1.79]**	-3.91E-03 [2.49]**
<i>Agglomeration</i>									
FDI stock (-1)	2.54E-02 [0.28]	6.22E-02 [0.60]	6.68E-03 [0.02]	7.14E-02 [0.45]	-5.62E-02 [0.28]	1.80E+00 [2.79]***	-8.08E-02 [2.33]**	-3.79E-03 [0.09]	-2.02E-01 [2.34]**
Domestic investment	4.14E-03 [0.32]	7.92E-03 [0.48]	8.27E-03 [0.32]	8.53E-03 [0.41]	-1.06E-02 [0.38]	6.12E-02 [1.32]	1.66E-02 [3.83]***	1.18E-02 [1.93]*	1.07E-02 [1.41]
Population density	-2.11E-03 [2.15]**	-2.00E-03 [1.78]*	-1.63E-03 [1.06]	-2.35E-03 [1.45]	-3.05E-03 [1.40]	1.66E-03 [0.71]	6.11E-04 [2.31]**	4.55E-04 [1.11]	6.02E-04 [1.75]*
Regional and income dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Observations	11601	7714	3887	4602	3168	1434	90949	51808	39141

Note: Absolute value of z statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Market size is measured as real GDP, measured in 2000 US\$. Human capital is the average years of secondary schooling in total population. Bureaucratic quality, corruption and political risk measures are from the ICRG indicators. Exchange rate stability is the annual percentage change in the exchange rate of the national currency against the US dollar. The tax measure reflects the highest corporate statutory tax rate. The real exchange rate is measured as the domestic currency per US\$. Trade is the ratio of the sum of exports and imports to GDP. Domestic investment is measured as the gross fixed capital formation as a share of GDP. FDI stock (-1) is the lag value of net stock of FDI in US\$. Population density is the number of people per square kilometer.

Table 8: Determinants of FDI in Individual Sectors (Tradables)

	Food, Beverages and Tobacco			Chemicals			Machinery and Equipment		
	1	2	3	4	5	6	7	8	9
	1980-2004	1980-1994	1995-2004	1980-2004	1980-1994	1995-2004	1980-2004	1980-1994	1995-2004
<i>Factor endowments</i>									
Market size	9.66E-02 [0.63]	-3.64E-02 [0.18]	-2.83E-01 [0.68]	4.53E-01 [4.42]***	6.35E-01 [4.46]***	2.12E-01 [0.90]	5.16E-01 [7.48]***	5.15E-01 [5.29]***	8.31E-01 [5.48]***
Human capital	1.43E-02 [2.33]**	1.19E-02 [1.49]	7.13E-03 [0.63]	1.43E-02 [3.66]***	1.56E-02 [2.76]***	1.27E-02 [1.99]**	1.19E-02 [4.42]***	1.99E-02 [5.16]***	9.92E-03 [2.27]**
<i>Institutions</i>									
Bureaucratic quality	1.34E-01 [1.26]	2.51E-02 [0.20]	1.71E-01 [0.72]	9.38E-02 [1.43]	1.75E-01 [2.02]**	1.16E-01 [0.84]	1.44E-01 [3.23]***	3.72E-01 [6.06]***	5.49E-02 [0.59]
Corruption	-6.73E-02 [0.64]	6.31E-02 [0.46]	-3.12E-01 [1.35]	-8.92E-02 [1.41]	-1.70E-01 [1.89]*	-1.52E-01 [1.23]	-2.04E-03 [0.04]	-4.31E-02 [0.66]	-1.12E-01 [1.28]
Political risk	2.62E-02 [2.73]***	3.93E-02 [3.05]***	1.88E-02 [1.13]	1.92E-02 [3.20]***	2.47E-02 [2.85]***	1.29E-02 [1.33]	7.84E-03 [1.94]**	4.02E-04 [0.07]	1.61E-02 [2.36]**
Exchange rate stability	-3.96E-01 [3.33]***	-2.25E-01 [1.56]	-3.97E-01 [1.17]	-2.71E-01 [3.50]***	-3.77E-01 [3.50]***	-2.54E-01 [1.42]	-2.61E-01 [4.88]***	-3.83E-01 [4.91]***	-2.69E-01 [2.34]**
<i>Cost factors</i>									
Tax	-3.49E-02 [3.29]***	-3.47E-02 [2.63]***	-4.41E-02 [1.73]*	-1.05E-02 [1.43]	-1.87E-02 [1.91]*	6.32E-03 [0.44]	-6.07E-03 [1.22]	-2.25E-03 [0.34]	-1.24E-02 [1.31]
Real exchange rate	-2.85E-02 [1.09]	-5.95E-02 [1.73]**	-4.44E-03 [0.09]	-1.37E-02 [0.78]	2.16E-02 [0.84]	-2.64E-02 [0.93]	-2.51E-02 [2.09]**	2.37E-02 [1.36]	-3.21E-02 [1.63]
<i>Trade</i>	-9.61E-03 [2.84]***	-1.16E-02 [2.53]**	-1.40E-02 [1.97]**	-4.85E-03 [2.33]**	-3.89E-07 [0.00]	-7.16E-03 [1.89]*	-1.56E-03 [1.19]	3.43E-03 [1.68]*	2.26E-05 [0.01]
<i>Agglomeration</i>									
FDI stock (-1)	8.82E-02 [0.82]	1.13E-01 [0.91]	2.09E-01 [0.57]	-4.20E-03 [0.06]	-1.98E-02 [0.22]	1.59E-01 [0.78]	-1.54E-01 [3.02]***	-7.38E-02 [1.17]	-3.26E-01 [2.46]**
Domestic investment	4.06E-03 [0.26]	1.55E-02 [0.80]	1.55E-02 [0.47]	2.58E-02 [2.73]***	1.93E-02 [1.49]	3.09E-02 [1.75]*	6.19E-03 [0.98]	-7.56E-03 [0.82]	-4.72E-03 [0.42]
Population density	-1.81E-03 [1.75]*	-2.06E-03 [1.71]*	-1.37E-03 [0.74]	5.35E-04 [0.91]	-2.82E-04 [0.32]	1.51E-03 [1.86]*	9.73E-04 [2.47]**	6.44E-04 [1.04]	1.21E-03 [2.34]**
Regional and income dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Observations	7880	5521	2359	19797	11562	8235	43329	25679	17650

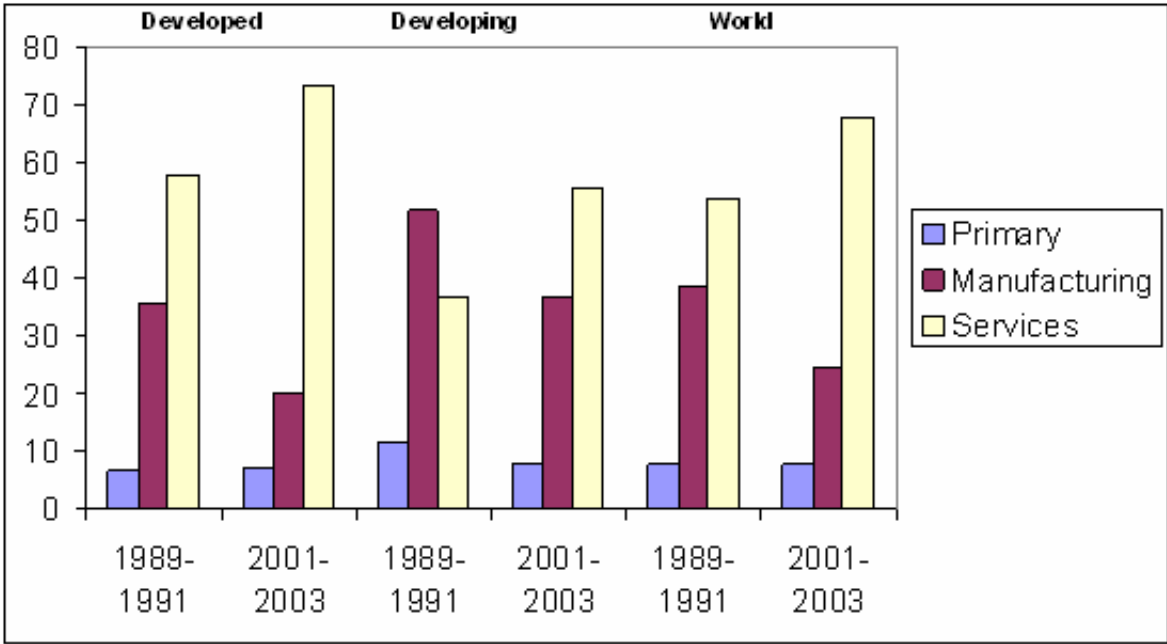
Note: Absolute value of z statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Market size is measured as real GDP, measured in 2000 US\$. Human capital is the average years of secondary schooling in total population. Bureaucratic quality, corruption and political risk measures are from the ICRG indicators. Exchange rate stability is the annual percentage change in the exchange rate of the national currency against the US dollar. The tax measure reflects the highest corporate statutory tax rate. The real exchange rate is measured as the domestic currency per US\$. Trade is the ratio of the sum of exports and imports to GDP. Domestic investment is measured as the gross fixed capital formation as a share of GDP. FDI stock (-1) is the lag value of net stock of FDI in US\$. Population density is the number of people per square kilometer.

Table 9: Determinants of FDI in Individual Sectors (Nontradables)

Factor endowments	Transportation and Communication												Regional and income dummies		
	Wholesale and Retail Trade			Transportation and Communication			Finance and Business Services			YES	YES	YES	YES	YES	YES
	1980-2004	1980-1994	1995-2004	1980-2004	1980-1994	1995-2004	1980-2004	1980-1994	1995-2004	1980-2004	1980-1994	1995-2004	1980-2004	1980-1994	1995-2004
Market size	-1.57E-01 [0.95]	-2.82E-01 [1.22]	3.72E-01 [1.16]	1.92E-02 [0.30]	-3.19E-02 [0.37]	-2.08E-01 [1.32]	1.74E-01 [2.15]**	-2.85E-02 [0.24]	3.33E-01 [2.16]**	1.98E-01 [3.51]**	2.70E-01 [3.36]**	1.24E-01 [1.07]	1.98E-01 [3.51]**	2.70E-01 [3.36]**	1.24E-01 [1.07]
Human capital	1.33E-03 [0.22]	6.18E-03 [0.68]	1.91E-03 [0.19]	1.31E-02 [5.15]**	1.83E-02 [5.37]**	1.52E-03 [0.36]	1.41E-02 [4.36]**	2.58E-02 [5.25]**	8.02E-03 [1.59]	9.77E-03 [4.47]**	8.60E-03 [2.64]**	8.72E-03 [2.54]**	9.77E-03 [4.47]**	8.60E-03 [2.64]**	8.72E-03 [2.54]**
Institutions															
Bureaucratic quality	-1.45E-01 [1.37]	-1.65E-01 [1.21]	2.94E-02 [0.15]	2.16E-01 [4.98]**	2.59E-01 [4.73]**	5.16E-02 [0.57]	-2.45E-02 [0.44]	9.28E-02 [1.20]	3.30E-02 [0.33]	-5.68E-03 [0.15]	1.36E-02 [0.26]	-4.06E-02 [0.59]	-5.68E-03 [0.15]	1.36E-02 [0.26]	-4.06E-02 [0.59]
Corruption	-1.27E-01 [1.27]	-3.18E-02 [0.23]	-4.53E-01 [2.36]**	-1.31E-01 [3.02]**	-1.64E-01 [2.92]**	-3.06E-02 [0.36]	5.17E-02 [0.98]	-2.28E-02 [0.29]	-1.35E-01 [1.42]	-8.78E-02 [2.34]**	-7.12E-02 [1.29]	-2.51E-01 [3.77]**	-8.78E-02 [2.34]**	-7.12E-02 [1.29]	-2.51E-01 [3.77]**
Political risk	2.92E-02 [3.32]**	1.88E-02 [1.53]	5.75E-02 [3.70]**	1.79E-02 [4.81]**	2.10E-02 [4.14]**	1.33E-02 [2.06]**	1.18E-02 [2.62]**	1.40E-02 [2.03]**	1.82E-02 [2.60]**	2.37E-02 [7.14]**	2.72E-02 [5.44]**	2.80E-02 [5.60]**	2.37E-02 [7.14]**	2.72E-02 [5.44]**	2.80E-02 [5.60]**
Exchange rate stability	-3.06E-01 [2.67]**	-3.76E-01 [2.46]**	5.60E-02 [0.21]	-4.04E-01 [8.10]**	-3.49E-01 [5.11]**	-3.31E-01 [2.86]**	-2.25E-01 [3.60]**	-2.06E-01 [2.38]**	-2.38E-01 [1.80]**	-1.68E-01 [3.79]**	-1.93E-01 [3.17]**	-8.20E-02 [0.84]	-1.68E-01 [3.79]**	-1.93E-01 [3.17]**	-8.20E-02 [0.84]
Cost factors															
Tax	-2.08E-03 [0.18]	5.77E-03 [0.36]	-3.14E-02 [1.51]	-1.06E-02 [2.30]**	-1.47E-02 [2.44]**	-3.51E-03 [0.38]	-1.92E-02 [3.26]**	-5.28E-03 [0.59]	-3.56E-02 [3.78]**	-1.52E-02 [3.80]**	-2.06E-02 [3.66]**	-9.69E-03 [1.41]	-1.52E-02 [3.80]**	-2.06E-02 [3.66]**	-9.69E-03 [1.41]
Real exchange rate	-8.68E-02 [3.38]**	-5.26E-02 [1.41]	-7.74E-02 [1.89]**	-1.40E-02 [1.32]	-5.10E-03 [0.35]	-2.77E-02 [1.50]	-6.78E-02 [5.04]**	-6.15E-02 [3.06]**	-5.59E-02 [2.69]**	-2.76E-02 [3.00]**	-1.84E-02 [1.35]	-1.68E-02 [1.18]	-2.76E-02 [3.00]**	-1.84E-02 [1.35]	-1.68E-02 [1.18]
Trade	-1.21E-02 [3.66]**	-1.28E-02 [2.63]**	-7.70E-03 [1.35]	-8.94E-03 [6.53]**	-7.93E-03 [3.99]**	-1.04E-02 [4.21]**	-9.23E-03 [5.59]**	-1.19E-02 [4.59]**	-6.28E-03 [2.32]**	-9.08E-03 [7.40]**	-7.38E-03 [4.02]**	-7.46E-03 [3.71]**	-9.08E-03 [7.40]**	-7.38E-03 [4.02]**	-7.46E-03 [3.71]**
Agglomeration															
FDI stock (-1)	1.48E-01 [1.23]	2.84E-01 [1.87]**	-5.03E-01 [1.72]**	4.62E-02 [1.02]	7.74E-02 [1.46]	2.90E-01 [2.16]**	8.23E-03 [0.13]	1.53E-01 [1.91]**	-1.55E-01 [1.07]	-3.20E-02 [0.77]	-9.42E-02 [1.81]**	5.94E-02 [0.59]	-3.20E-02 [0.77]	-9.42E-02 [1.81]**	5.94E-02 [0.59]
Domestic investment	2.07E-02 [1.37]	3.72E-02 [1.84]**	-1.34E-02 [0.52]	1.70E-03 [0.27]	5.32E-04 [0.07]	6.03E-03 [0.51]	2.09E-02 [2.66]**	2.84E-02 [2.57]**	1.37E-02 [1.02]	1.37E-02 [2.42]**	1.79E-02 [2.24]**	6.21E-03 [0.65]	1.37E-02 [2.42]**	1.79E-02 [2.24]**	6.21E-03 [0.65]
Population density	3.95E-04 [0.46]	5.71E-04 [0.45]	-2.01E-04 [0.16]	-1.57E-03 [3.09]**	-2.06E-03 [3.04]**	-4.00E-04 [0.62]	1.10E-04 [0.24]	1.01E-03 [1.35]	-6.98E-04 [1.17]	1.13E-03 [3.98]**	8.71E-05 [0.19]	1.43E-03 [3.86]**	1.13E-03 [3.98]**	8.71E-05 [0.19]	1.43E-03 [3.86]**
Regional and income dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of Observations	7965	4464	3501	44830	28142	16688	27824	14568	13256	59019	31835	27184	59019	31835	27184

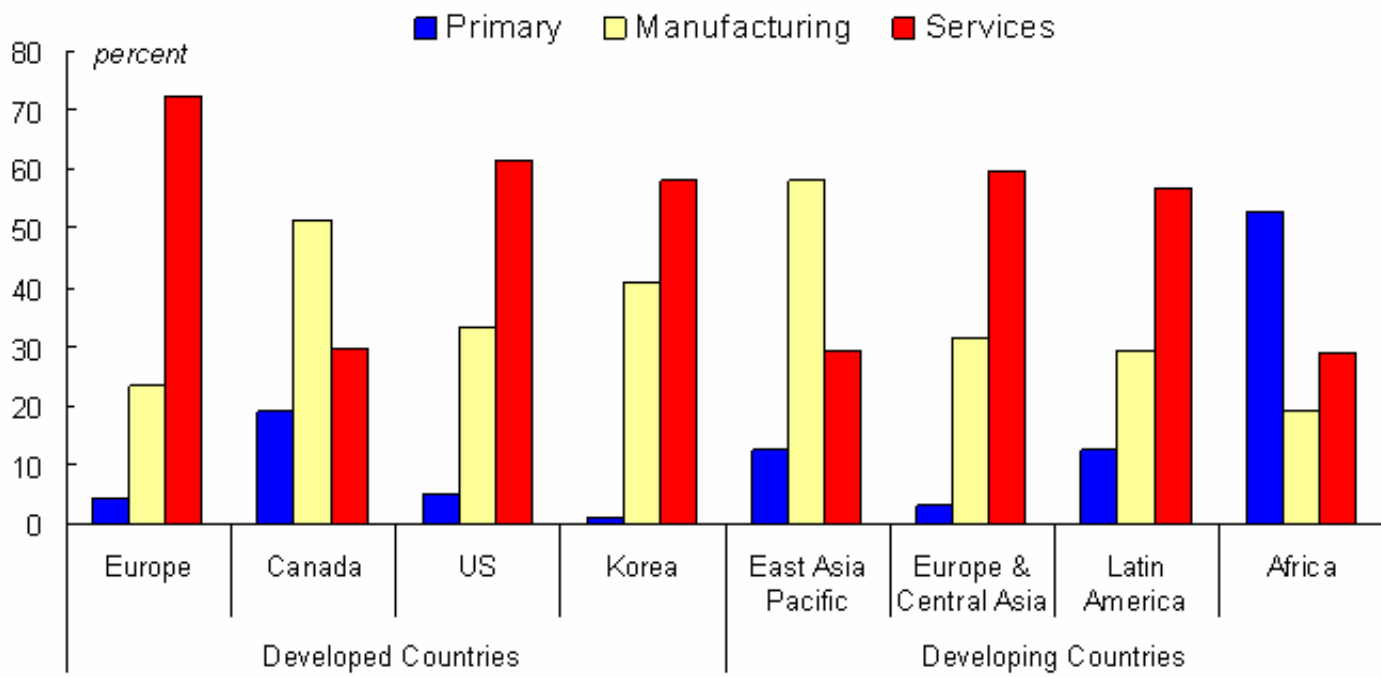
Note: Absolute value of z statistics in brackets. * significant at 10%; ** significant at 5%; *** significant at 1%. Market size is measured as real GDP, measured in 2000 US\$. Human capital is the average years of secondary schooling in total population. Bureaucratic quality, corruption and political risk measures are from the ICRG indicators. Exchange rate stability is the annual percentage change in the exchange rate of the national currency against the US dollar. The tax measure reflects the highest corporate statutory tax rate. The real exchange rate is measured as the domestic currency per US\$. Trade is the ratio of the sum of exports and imports to GDP. Domestic investment is measured as the gross fixed capital formation as a share of GDP. FDI stock (-1) is the lag value of net stock of FDI in US\$. Population density is the number of people per square kilometer. Although the tenth specification violates the IIA assumption, we keep it for the sake of cross sectoral comparison.

Figure 1: Trends in the sectoral composition of FDI flows: share of each sector in total FDI flows, 1989-2003



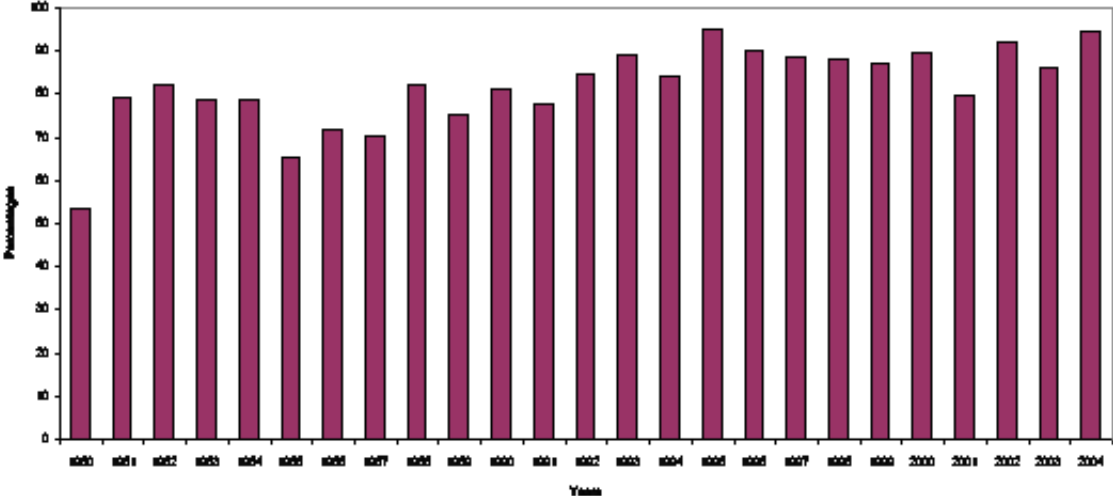
Source: World Investment Report, 2005, UNCTAD and own calculations.

Figure 2: FDI inflow stock by sector, 2004



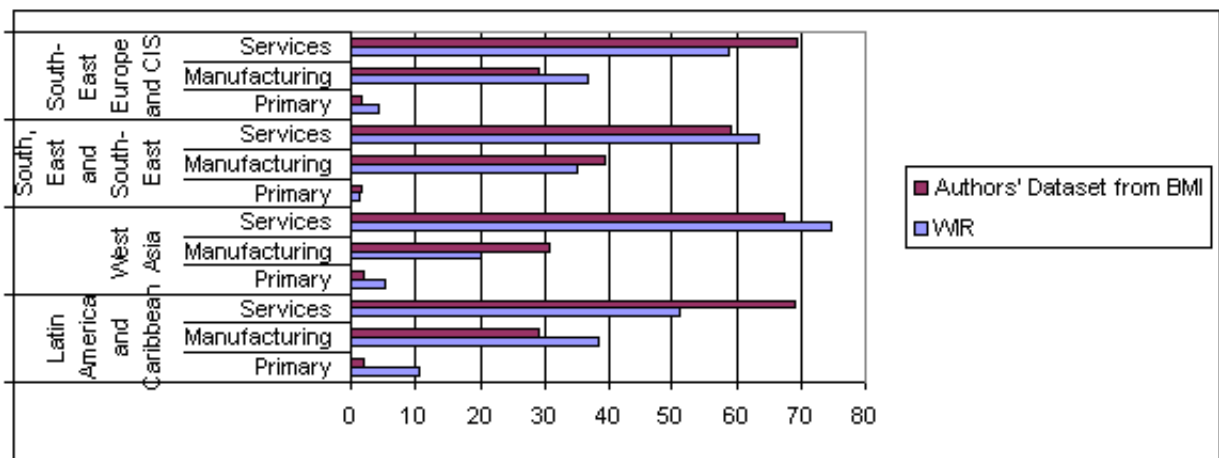
Source: Global Development Finance, World Bank.

Figure 3: FDI inflows to the countries in the dataset as a share of FDI inflows to the developing countries



Source: World Bank (2005), World Development Indicators.

Figure 4: Assessing the coverage of MNEs, in comparison to the UNCTAD database



Notes: In percentages. Source: UNCTAD (2005) and BMI.

Appendix: Data Sources and Descriptions

- *Human capital (HK)*: average years of secondary schooling in total population. *Source*: Barro and Lee (1996), updated version downloadable from: <http://www.cid.harvard.edu/ciddata/ciddata.html>
- *FDI*: sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. *Source*: World Development Indicators (WDI).
- *FDI per GDP*: net inflows of FDI as a share of GDP. *Source*: World Development Indicators (WDI).
- *Structural, Political and Economic Indices*: data is drawn from two risk methodologies: "Political Risk Services" and the "International Country Risk Guide". The included indices are bureaucracy quality (BCI), composite risk rating (CRI), corruption (CI), democratic accountability (DAI), economic risk rating (ERI), exchange rate stability (ERSI), external conflict (ECI), financial risk rating (FRI), government stability (GSI), internal conflict (ICI), international liquidity (ILI), investment profile (IPI), law & order (LOI), military in politics (MPI), political risk rating (PRI), risk points for budget balance (RBBI), risk points for current account as % of GDP (RCAGI), risk points for current account as % of export of goods (RCAEI), risk points for debt service (RDI), risk points or exchange rate stability (RERSI), risk points for foreign debt (RFDI), risk points for GDP growth (RGGI), risk points for GDP per head of population (RGPI), risk points for inflation (RII), risk points for international liquidity (RILI), socioeconomic conditions (SCI). Three indices were constructed using principal component analysis (PCA). These are indices for international liquidity, exchange rate stability and overall risk of the country. The following table shows the PCA results. *Source*: International Country Risk Guide (ICRG).
- *Exchange rate stability*: Annual percentage change in the exchange rate of the national currency against the US dollar (against the euro in the case of the USA). *Source*: International Country Risk Guide (ICRG).
- *Real GDP*: the sum of gross value added by all resident producers in the economy plus any

product taxes and minus any subsidies not included in the value of the products. *Source:* World Development Indicators (WDI).

- *Gross Fixed Capital Formation (GFCF)*: includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. According to the 1993 SNA, net acquisitions of valuables are also considered capital formation. *Source:* World Development Indicators (WDI).
- *Corporate Tax (tax)*: the highest corporate statutory tax rate. *Source:* Tax Database of Michigan Ross School of Business.