Foreign Direct Investment in a Developing Country: An Empirical Investigation

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This version: July 25, 2002

Abstract

Recent empirical studies of the determinants of multinational activity across countries have found that horizontal multinationals dominate. This finding is not surprising given that data was confined to investments either originating in or targeted at the United States. This paper, in contrast, uses data on foreign direct investment (FDI) in a relatively skilled-labor and capital scarce country, Mexico, at a highly disaggregated level to investigate what determines FDI flows among mostly dissimilar countries. The estimation is based on a recently developed unifying framework of multinational activity which yields clear empirical predictions. Neither the horizontal nor the vertical model can be rejected for Mexico. Recipient industries tend to be large, yet concentrated, with large average firm size, suggesting that the existence of both economies of scale and imperfectly competitive markets are important for inducing firms to expand abroad.

Keywords: Foreign Direct Investment, Multinationals, Mexico.

JEL Classification: F21, F23.

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1 Introduction

During the last decade, growth in world foreign direct investment (FDI) far outpaced growth in either world production or world trade. While merchandise trade grew about 85 percent, and world production grew 27 percent, world FDI flows increased by 535 percent. This growth is shared almost equally between industrialized and developing countries. Indeed, between 1990 and 1999, developing countries' share of the world inward stock of FDI increased from 20.6 percent to over 30 percent (Youssef, 1998; UNCTAD, 2000). Even the least developed countries are starting to see significant increases in FDI inflows (UNCTAD, 2001).

Coincident with this growth in FDI, theoretical research on the multinational firm and its determinants has burgeoned. Yet, empirical research is lagging behind the theoretical advancements. Few studies on the determinants of FDI are based on a consistent, general-equilibrium model of multinational activity. Moreover, most evidence on what determines FDI relates to developed countries, with the majority using data on U.S. and Japanese FDI. This paper, on the other hand, exploits a new dataset on disaggregated FDI inflows into Mexico to shed light on the empirical determinants of FDI in a developing rather than a developed country, based on a model of multinational activity that is grounded in general-equilibrium trade theory.

The contribution of this paper is threefold. First, it provides evidence on determinants of FDI in a developing as opposed to a developed country. Second, it further explores the empirical relevance of recent models of the multinational firm which provide a unified framework that includes horizontal, vertical and "knowledge-capital" type multinationals (Markusen et al. 1996; Markusen and Maskus 2001c). Empirical tests of this model have found little support for vertical multinationals, while the model appears to work well for horizontal ones. Given that a developed country is usually either the host or the source country of investment in the data

and horizontal multinationals would be expected to prevail among developed countries, this is not surprising. With a developing recipient country, on the other hand, more support might be expected for the vertical multinational model. Third, in contrast to studies that use aggregated FDI data, the data used here not only identifies the source country of investment, but is highly disaggregated by sector. This feature of the data allows us to gauge the importance of industry characteristics relative to aggregate determinants of FDI flows.

Early theoretical analyses of the multinational firm considered FDI as determined by ownership, location, and internalization advantages (introduced by Dunning, 1977). Recent theoretical treatments have instead built general equilibrium models in which multinationals arise endogenously. While the early literature has treated horizontal (Markusen 1984) and vertical (Helpman 1984) multinationals separately, recent work has provided a unified framework (Markusen et al., 1996; Markusen, 1997; see Markusen and Maskus, 2001b, for a review). The theory appears to work well empirically for FDI that either originates or is targeted at the U.S. (Carr, Markusen, and Maskus, 2001), but the vertical model is rejected in favor of the horizontal one (Markusen and Maskus, 2001a).[1]

While these models are well-grounded in general-equilibrium trade theory, it has been argued that they offer an explanation of determinants of FDI in the long run, but cannot explain well short-run fluctuations. One important explanation for the latter is the exchange rate, which has no role in real trade models. Empirically, both real exchange rate levels and fluctuations have been found to matter in explaining FDI and there is a sizable literature addressing the short run issue.[2] Other researchers have used the gravity model, which has been shown to work well in

[1] Researchers interested in related questions are starting to use the empirical implications of this theory in their work, e.g. Blonigen and Davies (2000) who examine the effect of tax treaties on FDI.

[2] Examples include Cushman (1985), Froot and Stein (1991), Campa (1993), Blonigen (1997), and Goldberg and Klein (1997). All of these studies examine FDI with the U.S. or other industrialized countries as either the host or the source country.

explaining trade flows among countries, and adapted it to the study of the determinants of FDI (e.g. Brenton et al., 1999; Brainard, 1997). The latter emphasizes the importance of economies of scale at the plant and the corporate level in determining multinational activity versus trade.

The FDI data used in this study are inward flows into Mexico between 1994 and 2000, disaggregated at the 4-digit Mexican industry classification.[3] The detail available on both the sectoral and country level allows a more profound testing of the empirical relevance of the recent comprehensive theories of the multinational firm in a setting that differs fundamentally from that of other studies such as Carr, Markusen and Maskus (2001) and Markusen and Maskus (2001a).

In addition, the sectoral dimension of the data allows examination of specific hypotheses. First, since Mexico has a comparative advantage in the production of goods that are relatively labor-intensive, investment should flow into industries with relatively low capital-labor and/or skilled-unskilled labor ratios. On the other hand, Mexico's development level has increased rapidly recently, particularly since the inception of NAFTA. Thus, there is some evidence that production on average is becoming more capital-intensive and that some recent investments exhibit a larger degree of capital intensity and require more skilled labor than investments from just a decade earlier.[4] Second, the reduction in trade barriers due to NAFTA increases the opportunity for exploitation of economies of scale. Industries characterized by economies of scale should thus receive more FDI, ceteris paribus.

The results of the empirical analysis suggest that neither the horizontal nor the vertical

[3] The Mexican industry classification (CMAP) is different from the U.S. standard industry classification (SIC) and the international industry classification adopted in 1988 (SIC88), though very similar to the international industry classification from 1968 (SIC68). Where necessary, translation to data disaggregated according to these other classifications was done using various concordance tables.

[4] There is some anecdotal evidence for this, such as General Motors' recent opening of an automatic transmission plant, which is relatively skilled-labor intensive.

model of multinationals can be rejected for this data. On a sectoral level, most FDI flows into industries that are characterized by relatively low capital-labor ratios and/or skilled-labor intensities, that are large with large average firm size and relatively concentrated. This suggests that while factor endowment differences give rise to vertically integrated firms, the opportunity to exploit economies of scale also prompts firms to expand internationally, even into a developing country.

The paper proceeds as follows. The next section describes the main features of the FDI data and provides some additional information on FDI in Mexico. Section 3 lays out the conceptual framework guiding the empirical estimation, which is described in more detail in section 4, followed by a discussion of the results. Section 5 offers some concluding remarks.

2 FDI in Mexico

Data on FDI come from the Mexican Ministry of Trade and Industrial Development (SECOFI). These are nominal FDI inflows into Mexico in U.S. dollars from 1994 to 2000. The data are at the 4-digit sectoral level, using the Mexican Industrial Classification System (CMAP), which is very similar to the 1968 International Standard of Industrial Classification. Table 1a shows summary statistics, broken down by major sector, while Table 1b shows the corresponding shares. Just over 60 percent of FDI has gone into the manufacturing sector during this seven-year period. Wholesale and retail trade as well as financial services also received substantial amounts. Table 2 shows that within the manufacturing sector, the bulk of FDI goes into production of metal products, including automobiles. Thus not surprisingly, many automobile manufacturers, such as General Motors, Ford, DaimlerChrysler and Volkswagen, are among the largest foreign investors.

For the entire sample period, FDI inflows fluctuate around $10 billion per year. This is con-

siderably more than Mexico received on an annual basis prior to 1994. Foreign investment flows were low for much of the 1980s. In the mid-1980s, Mexico substantially lowered trade barriers pursuant to joining the GATT. The first substantial increase in FDI in the late 1980s and early 1990s coincided with a major overhaul of Mexico's investment laws in 1989. Many obstacles to foreign investors, such as licensing requirements and restrictions pertaining to majority ownership, were removed. This change reversed Mexico's long-standing policy of reserving ownership in many sectors to Mexican nationals or the Mexican state and encouraging foreign investment only in sectors that were deemed crucial to the pursuit of import substitution policies.[5] At the same time, and earlier than in many other countries in the region, substantial privatizations occurred. By 1994, the number of state-owned enterprises had decreased to only 80, down from 1155. However, foreign investors participated in this sale only to a small degree. FDI from privatization constituted only 7.9 percent of total FDI between 1990 and 1995 (Franko, 1999: 158-61). Yet, during the first half of the 1990s, Mexico was the major recipient of FDI in Latin America, with a big surge occurring in 1994 after the inception of the North American Free Trade Agreement (NAFTA).

Since Mexico joined both NAFTA and the OECD in 1994, it is likely that a break occurs in the FDI series in that year.[6] Hence, having 1994 as the beginning of the sample avoids any bias arising from such a break. Moreover, the reason the same kind of detailed information on inward FDI in Mexico is not available prior to 1994 is that Mexico changed the way FDI information is recorded, now complying with World Bank standards.

Despite the large sustained increase after 1994, Brazil subsequently surpassed Mexico as the major destination country of FDI into Latin America, mainly because most of Brazil's privati-

[5] Multinational corporations were welcomed as providers of technology. In 1970, their share exceeded 50 percent in the transportation equipment, electrical machinery, and chemical industries (Franko, 1999: 62).

[6] Waldkirch (2001), who examines the effect of NAFTA on Mexican FDI, finds evidence of such a break.

zations occurred in the second half of the 1990s. Lately, greenfield investment and acquisitions of local firms have dominated in Mexico and FDI due to privatizations play a negligible role in the data covering the sample period of the present paper.

Table 3 shows the source country shares of FDI inflows. Most FDI comes from the United States, with European Union countries a distant second. The only other major source countries of FDI are Japan and South Korea. Not surprisingly, investments from developed countries vastly dominate Mexican inward FDI with negligible amounts from developing countries.[7]

3 Conceptual Framework

This section discusses the conceptual framework that forms the basis for the empirical estimation. It first outlines the unified general equilibrium approach to modeling the multinational enterprise as pioneered by Markusen et al. (1996) and Markusen (1997) and put to an empirical test in Carr, Markusen, and Maskus (2001) and Markusen and Maskus (2001a), henceforth MM. It then discusses its implications for determinants of FDI on a sectoral level.

MM refer to their unified approach as the "knowledge-capital model" of the multinational enterprise. This model entails as special cases those of horizontal and vertical multinationals, as well as purely national firms. It draws its name from the assumption that headquarter services (e.g. R&D) can be geographically separated from production activities and that they can be supplied simultaneously to several production facilities at low cost. Additionally, it is assumed that they are skilled-labor intensive relative to production. In the two-country model, horizontal multinationals are then firms with production plants in both countries, but headquarters located

[7] The data show the volatile nature of FDI flows, which in a given year can be dominated by just one outlier. The large share of developing countries in 1994 is almost entirely due to the acquisition of the steel company SICARTA by the Indian company ISPAT for more than $1.5 billion. The low share of EU countries in 2000 is due to the French Telekom selling its $2.5 billion stake in the Mexican telephone company TELMEX which it had acquired ten years earlier.

in only one. Vertical multinationals have a single plant in the country that does not host the headquarters. Finally, national plants maintain a single plant and headquarters in the same country and may or may not export to the other country.

Some additional assumptions are necessary to make the model operational. First is the existence of multiplant economies of scale, since headquarter services can be supplied to multiple production facilities at low cost. This implies that production is characterized by increasing returns to scale. Hence, a horizontal multinational with one headquarter, but a production facility in each country, has less than twice the fixed cost of a national firm. Second, the ordering of skill-intensities in the economy is such that headquarter services are more skilled-labor intensive than production, which in turn is more skilled-labor intensive than the rest of the economy. Finally, it is assumed that national goods markets are segmented.[8]

Simulations then show what type of multinational will dominate in equilibrium, which is a function of relative country characteristics. A pure trading equilibrium is also possible. Horizontal multinationals will be dominant if countries are similar in size and relative endowments and transport costs are high. This is intuitive. If transport costs are low, a firm might rather export than produce in both countries. If countries are very different with respect to their endowments, the skilled-labor abundant country would be the headquarter site, while the unskilled-labor abundant country would have a comparative advantage in hosting the production facility. If countries are of different sizes, national firms might dominate since it would be relatively costly to have an additional production facility in the small country. Conversely, vertical multinationals should be the dominant type when countries are different in size and/or relative endowments, with transport costs not too high.

The simulations also reveal a number of nonlinearities. For example, multinational activity

[8] See Markusen et al. (1996) for full details of the model.

is highest when a country is both small and skilled-labor abundant. If a country is too small, however, plants located in the larger country will have an advantage due to the larger size of the home market. Hence, size and endowment differences are likely to interact in a very particular way.

Larger combined market size will encourage both knowledge-capital and horizontal type multinationals, but should have no independent effect on vertical multinationals since these are based on differences in relative endowments among countries. The more unequal countries are in size, the less FDI would be expected since size differences encourage exporting rather than investing. This result obtains due to the scale economies assumption. Smaller country markets are too small to allow an efficient scale of plants in all countries. Relative factor endowment differences interact with differences in country size if the parent country is the skilled-labor abundant one. Multinationals are discouraged if skill and GDP differences are too large since the market of the small country is too small and the skilled labor abundant parent country has the comparative advantage in (skill-intensive) headquarter services.

Relative factor endowment differences and combined country size interact as well. Skill differences encourage vertical differentiation of the production process, but discourage horizontal multinationals. For the latter, skilled labor becomes too expensive, but headquarter services located in the skilled-labor abundant country and production in the skilled-labor scarce country takes full advantage of these endowment differences. They interact with combined country size because again, if a country becomes too small, the home market is too small to support home production by foreign firms.

The final elements that impact FDI in this framework are trade and investment costs. Parent country trade costs should have a negative effect on multinational activity of all types since

exporting back to the home country from a foreign country would be more costly relative to home production. Host country trade costs, on the other hand, should encourage multinational activity, the well-known tariff-jumping argument. Host country investment costs should clearly have a negative effect.

The Markusen-Maskus framework relates multinational activity to country characteristics. However, even relatively capital or skilled-labor scarce countries often exhibit substantial heterogeneity in capital- or skill-intensity across industries. Industry measures of factor intensities should thus impact foreign investment in addition to or even instead of aggregate ones. If the vertical model of the multinational enterprise is applicable, for instance, one would expect FDI to flow mainly into industries with a low capital-labor ratio and a relatively low degree of skilled labor relative to unskilled labor. The empirical specification will thus include such measures on a sectoral level.

Other sectoral controls include measures of the degree of concentration, the size of the industry and average firm size. In particular, firms engage in FDI rather than exporting in order to exploit firm-specific assets which give them an advantage over local firms. This suggests that multinational activity should be more prevalent in more concentrated sectors of the economy. This conclusion is reinforced by the presence of economies of scale on the firm and the plant level. Firm-level economies of scale encourage FDI as headquarter services are spread across plants in different countries. Plant-level scale economies, on the other hand, discourage multinational production as this implies a relatively inefficient plant scale.

The next section describes the empirical implementation of the theory, the data and presents the estimation results.

4 Empirical Tests

4.1 Empirical Specification

The first econometric specification closely follows the one used in Markusen and Maskus (2001a). They specify the following estimating equation:

$$FDI = f\left(\begin{array}{c} sumgdp, gdpdifsq, d2skdgdpd, d2skdsumg, d1skdsumg, \\ \\ invcostmex, topenmex, topensrc, distance \end{array}\right) \tag{1}$$

The regressors specified operationalize the theory from the unified model of multinational activity laid out in the previous section. The first term, *sumgdp*, is expected to be positive for the knowledge-capital and horizontal, and zero for the vertical model. Larger combined market size will encourage the first two types of multinationals, but have no effect on the third. The second term, *gdpdifsq*, squared differences in GDP between the host and the parent country of foreign investment, is expected to be negative for the first two types of multinationals as unequal-sized countries should encourage exporting rather than setting up a plant in the foreign market.

The next three terms are more complicated interaction terms. The third term, *d2skdgdpd*, interacts skill differences with GDP differences, but is only positive if the skilled labor abundant country is the parent country. Multinationals are discouraged if skill and GDP differences are too large since the market of the small country is too small and the skilled labor abundant parent country has a comparative advantage in (skill-intensive) headquarter services. The final two terms are interactions of GDP sums and skill differences. The fourth term, *d2skdsumg*, is again positive if the parent country is skilled-labor intensive. This term is the one that most clearly allows us to distinguish between the different models of the multinational enterprise. Skill differences encourage vertical differentiation of the production process, so its sign would

be positive if vertical multinationals are dominant, but negative if horizontal multinationals dominate, since skill differences make skilled labor too expensive in that case. The next term, $d1skdsumg$, is positive if the skilled labor abundant country is the host country of investment. If this is the case, inward FDI is discouraged for all types of multinationals since the skilled labor abundant country would be expected to be the parent, but not the host country of investment. Note how the controls specified in (1) permit us to discriminate between the different models of the multinational, the knowledge-capital, the horizontal, and the vertical model as discussed in the previous section.

Four additional controls are included. First is a measure of the cost of investing in Mexico. It accounts for both formal investment barriers as well as the overall economic climate that affects the decision where to invest. Clearly, higher investment costs deter FDI and hence a negative sign is expected for this regressor. Parent country and host country (Mexican) trade costs are measured by the ratio of exports plus imports to GDP, an often used measure for the trade openness of a country. This measure is used over others since it is also available for the entire sample period.[9] Since greater openness corresponds to lower trade costs, a positive sign is expected for parent country, but a negative sign for host country trade costs. Finally, distance is measured as the distance between country capitals. Its sign is theoretically ambiguous since it can proxy for both trade and investment costs. It is included since it usually performs well in gravity-type models.

One point of departure from Markusen and Maskus (2001a) is that their dependent variable is real sales of foreign affiliates, which is more closely related to stocks of FDI than flows. However, such information is not available for the Mexican data. Although the length of the sample period

[9]Results are virtually identical when using a measure of trade costs taken from the *Global Competitiveness Report* of the World Economic Forum instead.

means that aggregate flows approach the (unobservable) magnitude of stocks, there is more heterogeneity in the data. This will be apparent in the empirical fit of the regressions below. On the other hand, flows are less likely than stocks to be non-stationary, which usually complicates the empirical analysis. This is especially true when non-stationary independent variables such as GDP are included, which may be cointegrated with a non-stationary dependent variable.

The data distinguish 109 sectors into which FDI is flowing in the sample period. A simple way to control for heterogeneity across sectors in the MM framework is to include sector-specific fixed effects. However, the availability of a number of specific sectoral variables makes it possible to investigate whether features such as economies of scale and market structure help determine which sectors FDI is flowing to. Moreover, sector-specific measures of factor intensity can tell us whether aggregate factor abundance as a determinant of FDI into a developing country is reflected in the actual factor intensity of the sectors that receive it.

Clearly, it would be desirable to add sector-specific information with the same frequency as the data on multinational activity. However, this is precluded by data availability. The sector-level data come from the Mexican Industrial Census, which is conducted only every five years. Data refer to 1998, close to the middle of the sample period considered here. Data are available on a wide variety of industry characteristics, such as net fixed assets, total gross production, the number of firms, and the number of workers, broken down by blue collar, white collar and other workers. There is also limited information from the previous census, pertaining to 1993, the year just before the start of the sample period.

FDI is now taken to be a function of the following:

$$FDI = f\left(\begin{array}{c} sumgdp, sumgskdpos, sumgskdneg, skillint, klratio, nufiind, \\ indsize, firmsize, invcostmex, topenmex, topensrc, distance \end{array}\right) \tag{2}$$

The first term is the same as in (1). The next two terms are the interactions between GDP sums and skill differences, once for positive (*sumgskdpos*), once for negative observations (*sumgskdneg*). Note that the GDP difference squared and the skill and GDP difference interaction term are omitted. Initially, regressions below will include these terms. However, they are all highly correlated with *sumgdp*, so multicollinearity is a concern and only one of them is selected to be included. Generally, the signs and significance levels of other variables are robust with respect to which of the correlated variables is included.

There are five sector-specific variables. First, a measure of skill intensity, *skillint*, is constructed. Skill intensities exhibit substantial heterogeneity across sectors, ranging from just under 5 to over 55 percent skilled labor. If FDI in Mexico is indeed driven by relative factor abundance differences between countries, it should flow into sectors whose skill intensity roughly corresponds to the aggregate relative skilled-labor abundance, i.e. into skilled-labor scarce sectors.

A second measure of factor intensity included in the empirical specification is the average capital-labor ratio of a sector, *klratio*, defined as net fixed assets per occupied person, taken directly from the Census. If Mexico's abundance of unskilled labor is the source of its attractiveness to foreign capital, FDI is expected to be directed to sectors with a relatively low capital intensity.

Average firm size of an industry is measured as the value of total gross production divided by the total number of firms operating in that sector. Recall that while firm-level economies of scale are positively correlated with multinational activity, plant-level scale economies have the opposite effect. It is not necessarily clear which type of scale economies *firmsize* controls for. This variable should only matter for horizontal multinationals. The total number of firms in an

industry is included separately as a measure of the competitive nature of an industry. A smaller number of firms may indicate a less competitive environment. Clearly, it would be desirable to include a more precise measure of industry concentration, such as the Herfindahl-Hirschman index, but such measures are unavailable at the level of disaggregation considered here.

Finally, a measure of industry size, defined as the value of total production of a sector, is included. Larger industries may offer more potential for foreign investment, but may also indicate the presence of positive externalities, e.g. the presence of upstream firms producing important intermediate inputs in production. Note that these controls are not available for all sectors for which FDI data is available and hence the sample size in regressions according to (2) is smaller.

The next subsection briefly discusses some details of variables construction, which is followed by the empirical results of the empirical specifications just discussed. Next is a series of robustness checks. First, some of the regressors are changed and others added to ensure that neither outliers nor the particular nature of the data give rise to the results. Second, the econometric robustness is checked by re-estimating the basic specification with techniques other than OLS.

4.2 Data

The data on foreign direct investment inflows into Mexico come directly from the Mexican Ministry of Trade and Industrial Development (SECOFI) and span the period 1994 to 2000. They are expressed in thousands of U.S. dollars. In the main specification, they are converted to real flows using the Bureau of Economic Analysis' price deflator for private fixed investment in equipment and software. It would be preferable to use sector-level deflators. The only information available, however, is the producer price index by industry from the U.S. Bureau of

Labor Statistics. Moreover, the industry classification used by the BLS differs considerably from the Mexican Classification System (CMAP). Using industry concordances put together by Jon Haveman[10] and information collected from Cremeans (1999), the codes for many industries are translated to construct a sector-specific deflator. Since many industries cannot be translated, however, the number of observations using this deflator is considerably smaller than using a global deflator. No sector-level deflators are available for Mexico.

The information on the capital-labor ratio, the skill intensity in a particular sector, the size of the industry, the average firm size, and the number of firms in an industry all come from the Mexican Industrial Census of 1999, with data values pertaining to 1998. The breakdown of workers by industry and the number of firms in an industry is also available from the 1994 census, with the information referring to 1993.

In order to construct a measure of skilled-labor intensity, information is available on the number of blue collar workers (obreros), white collar workers (empleados) and "other workers" in each sector. Other workers include proprietors and working family members, often unpaid. The workers included in this third category may clearly include highly skilled small business owners or very low-skilled family members and could thus be counted as either skilled or unskilled workers. Unfortunately, the data do not allow to distinguish these two types within that category. Also, in some sectors the number of workers that fall into that category is very high, e.g. in retail stores or tortilla production.[11] Instead of counting these other workers as either skilled or unskilled, they are omitted and skill intensity in a sector is defined as the ratio of white collar workers to the sum of white and blue collar workers. Effectively, this assumes that the skill intensity

[10] They can be found on the web at http://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeConcordances.html

[11] Although in the latter, foreign investment is still prohibited and thus this sector is not included.

among the other workers is the same as the skill intensity as defined.[12]

GDP data come from the *International Financial Statistics* and are expressed in constant 1995 U.S. dollars, with exchange rate and price information taken from the same source. These are used to construct the sum of GDP, GDP differences, and the associated interaction terms. Information on aggregate skilled-labor abundance is taken from the 2001 issue of the International Labor Organizations's Yearbook of Labor Statistics. Skilled labor is measured as professional, technical and associated professionals, other professionals and managerial workers.

The measure of investment costs comes from the Heritage foundation's "Index of Economic Freedom", which is available for all years of the sample. The index for overall economic freedom is used, since more than just formal investment barriers should matter for investors, although using the latter gives very similar results. Export and Import data necessary to construct a measure of trade openness are taken from the World Bank's *World Development Indicators.* See the Data Appendix for more details and Table 4 for summary statistics for the basic extended sample used in the estimation.

4.3 Results

4.3.1 Basic Specifications

The results of basic specifications are shown in Tables 5 and 6. Table 5 contains regression results using MM controls as specified in equation (1). The first three columns are from ordinary least squares regressions with heteroscedasticity-robust standard errors. Column four adds sector fixed effects. Table 6 contains results from specification (2), which takes into account special features of the data used in this paper, in particular the fact that Mexico as the recipient country

[12] Including other workers as unskilled does not change the results. They are, however, affected when defining other workers as skilled. This seems the least appropriate since the vast majority of these other workers are low-skilled, low-paid family members. See fn 15.

of FDI in all observations can be relatively skilled-labor scarce or skilled-labor abundant and is almost equally likely to be economically larger as it is to be economically smaller than the source country of FDI. In addition, sector-specific regressors are included.

Regression (1) in Table 5 includes the basic MM variables, but no trade and investment costs. Both the coefficients on the sum of GDPs (*sumgdp*) and squared GDP differences have the opposite of the expected sign. *Sumgdp* is expected to be positive for the horizontal and the knowledge-capital model, while it should have no effect if the vertical model is the one adequately describing the data. Squared GDP differences are expected to have a negative sign as there is less investment between unequal-sized countries, except again in the vertical model. The apparent reason for these signs is a collinearity problem. The correlation coefficient in the sample between these two regressors is 0.97.[13] Hence, the squared GDP differences term is dropped in subsequent regressions.

In column (2), then, *sumgdp* is significantly positive, consistent with either the knowledge-capital or the horizontal model. The remaining three regressors, the interaction terms, are all positive, though only two are statistically significant. For a given joint country size, greater skill differences are positively correlated with vertical FDI, but only when the parent country is relatively skilled-labor abundant. The positive sign on *d2skdsumg* thus lends support to the vertical model. However, the signs of the other interaction terms are inconsistent with any of the models. Mexican relative skill abundance should not encourage FDI in Mexico, as suggested by the positive sign on *d1skdsumg*, and should also discourage FDI for large GDP differences, which is not supported by the positive sign on *d2skdgdpd*. However, this effect is expected for very large differences, depending on parameter values. It may be the case that Mexico's size

[13] Ostensibly, this is due to the nature of the data where Mexico is relatively small and more than half of all observations are with larger countries. In Carr, Markusen and Maskus' (2001) data, the correlation is -0.6.

and relative skill differences are never large enough so that there are no data points in these extreme regions.

Including trade and investment costs does not change the signs of the four MM regressors, although *d2skdsumg* becomes insignificant, while *d2skdgdpd* is now significant. Only the coefficient on openness of the source country of investment is statistically significant and positive, which is the expected sign, as greater openness to trade facilitates establishing production facilities abroad and exporting the output back to one's own country. It should be noted that *distance* does not lose its statistically significant negative sign. Finally, when including sector fixed effects for the 109 sectors included in this specification, only joint country size and distance retain statistically significant coefficients, while all interaction terms as well as trade and investment costs are insignificant.

For each specification, the fit of the regression is similar, with an R-squared of about 0.11. Overall, the MM specification does not work very well for this data, especially if sector fixed effects are included. If anything, it suggests that multinationals of both the horizontal and vertical type account for Mexican inward FDI.

Table 6 shows regression results including the sector-specific information that theory suggests might help determine FDI in particular industries. Initially, the GDP difference squared term and two GDP-skill differences interaction terms are included.[14] The first column exhibits the same collinearity problem evident in the original MM specification. Thus, squared GDP differences are excluded in columns (6) through (8). Again, the coefficient on *sumgdp* switches from a negative to the expected positive sign. However, the skill and GDP difference interaction terms also switch signs. These interaction terms are also highly correlated with *sumgdp* and the

[14] Since both skill and GDP differences may be either positive or negative, including four different interaction terms (two cases for each sign) would be appropriate. However, collinearity concerns are exacerbated, which is why these interaction terms are dropped in any case.

interaction of *sumgdp* with skill differences. Hence, column (7) omits both of the interaction terms as well. Finally, the last column omits all MM terms except GDP sums.

There are a number of robust results emerging from this table. First, the signs and statistical significance of the five included sector-specific regressors are robust across all specifications. Note that their inclusion also considerably improves the fit of the regression compared to the MM specification, as evidenced by the higher R-squared. While sector-specific skill intensities do not appear to be important determinants of FDI flows[15] (even when aggregate skill differences are omitted), the sector-specific capital-labor ratios are. The results indicate that FDI flows more into sectors with a low capital-labor ratio, consistent with the factor endowment theory of multinational activity. The coefficient on the number of firms in an industry is consistently significantly negative, indicating that FDI tends to flow into more concentrated industries. Both industry size and firm size positively affect FDI, suggesting that FDI flows both into large industries and large firms. Joint country size exerts a robust positive influence on FDI flows once the GDP difference term is dropped. The interaction of joint country size with skill differences is positive and statistically significant in regression (7) for skill abundant source countries, which is consistent with the vertical model of the multinational. The negative sign on the coefficient for skilled-labor scarce source countries, on the other hand, is not consistent with the theory. Source country trade openness and distance appear with a positive and negative sign, respectively, as before.

One can conclude from these results that there is some indication that inward Mexican FDI can be explained better by the vertical rather than the horizontal or the knowledge-capital model

[15] This result is robust to including the self-employed and family workers in the total work force. If, however, that latter category is included as skilled labor, the coefficient on sectoral skilled-labor intensity is significantly negative, while the coefficient on the capital-labor ratio becomes insignificant in the equivalent of column (8). These results are available upon request.

of the multinational enterprise, which is intuitive as Mexico, despite recent changes, continues to have a comparative advantage in the production of low-skilled labor-intensive goods. However, the MM-model does not fit this developing country, disaggregated data as well as it has been shown to fit U.S. inward and outward FDI data. Including sector-specific regressors improves the fit and confirms that FDI flows into sectors whose factor intensity is similar to Mexico's overall endowment. Investments are made in large, fairly concentrated industries, lending support to the hypothesis that economies of scale matter in determining location of production. Since according to theory only firm-level economies of scale should be positively correlated with higher FDI, while plant-level scale economies should have the opposite effect, *firmsize* is a proxy for firm- rather than plant level economies of scale, as it is consistently significantly positive

The next subsection conducts a battery of robustness checks which focus on some further data and econometric issues.

4.3.2 Robustness Checks

Table 7 presents results from several robustness checks that consider a number of further data issues, using as the benchmark specification the set of regressors that excludes GDP differences. The first column includes year dummies for 1999 and 2000. Total FDI for these years is higher than for other years in part because in these two years the data include the amounts of reinvested earnings and intercompany transfers if they were reported to the foreign investment commission (RNIE). Mexico committed to adhere to the data collection standards set forth by the World Bank starting in 1994, which required the inclusion of reinvested earnings and intercompany transfers into FDI data. However, until 1998, these amounts were merely estimated and not included in final FDI numbers. Only starting in 1999 were these numbers included.[16] Including

[16] The new items account for over 30 percent of reported FDI.

year dummies attempts to control for the upward bias thus introduced. While both year dummies are positive, and the 1999 dummy is statistically significant, none of the previous results change. GDP sums and their interaction with skill differences continue to be significantly positive and all sector-specific variables retain their signs and significance levels. There are some minor differences with respect to the coefficients on the trade and investment costs, but these are not significant.

Column (10) additionally includes a dummy for the U.S. Results could be skewed since over 60 percent of FDI flows come from Mexico's neighbor to the north. While the U.S. dummy is positive, large, and statistically significant, again all other results are unchanged. Some of the coefficients, such as *sumgdp*, are smaller in magnitude, as would be expected, but all retain their signs and significance level.

As mentioned above, sector-specific deflators for FDI are available only for a limited number of sectors. All of these are in manufacturing. A number of the sectors included thus far are in wholesale and retail trade, in financial and other services, most of which produce non-traded goods and services. Columns (11) and (12) consider manufacturing only. Since this is a tradeable sector and the theory applies to traded goods, confining the analysis to that sector might in fact be a better test of the theory. FDI flows are now deflated using sector-specific producer price indices.[17] Note that, of course, the number of observations drops considerably. However, the fit of the regression, as indicated by the R-squared, improves dramatically. Column (11) reestimates the basic specification, while column (12) adds the year and U.S. dummies. Both the sum of GDP and its interaction with skill differences remain significantly positive (except for the interaction term when dummies are included) and are greater in magnitude than when all sectors

[17] Results are virtually identical when using the same deflator as before and restricting the sample to manufacturing only.

are included. Interestingly, sector-specific skill intensity now appears significantly negative, indicating that FDI flows more into manufacturing subsectors that are relatively unskilled-labor intensive. However, the capital-labor ratio is now insignificant. Industry size retains its significant positive sign while firm size becomes insignificant. It is also worth noting that the magnitude and significance level of source country openness has increased.

Focusing on tradeable goods production should indeed constitute a better test of the theory as it applies to sectors in which there is a choice between exporting and local production. The results more firmly support the hypothesis that for a country with Mexico's factor endowments vertical multinational activity should dominate FDI. Moreover, the case for the importance of firm-level economies of scale is weakened as firm size does not appear to play an important role. Note also the larger coefficient on source country trade openness, highlighting the importance of low trade cost as presumably a sizable part of output is exported back to the multinational's home country.

Table 8 shows the results from a number of different econometric specifications. One concern about the sectoral regressors is that at least some of them may be endogenous. FDI inflows increase the number of firms when foreign entrants do not take over an existing firm. If FDI flows are sufficiently large, both the skill intensity and the capital-labor ratio of the entire industry may be affected. Finally, foreign entrants may be larger and hence affect average firm size in the industry. Information from the Industrial Census conducted for 1993, the year before the beginning of the sample period, can be used to instrument for the potentially endogenous variables. For sector-specific skill intensity and the number of firms in the industry, their corresponding 1993 values can serve as instruments. Firm size is not available for 1993. Instead, a proxy, the number of workers divided by the number of firms, is used as an instrument

for 1998 firm size as the two are highly correlated. No corresponding instruments are available for the remaining sectoral variables. Since only information for the manufacturing sector is available for 1993, the last regression is rerun by two-stage least squares. The results in the first column of Table 8 are almost identical to those in the last column of Table 7, indicating that endogeneity does not appear to be a concern. All signs and significance levels (except for distance, which just becomes insignificant) remain the same.

Another concern is the dominance of the data by U.S. FDI which may not be adequately controlled for by a simple dummy. Moreover, size differences among FDI source countries are considerable. Hence, the basic specification is rerun using weighted least squares, using real GDP as weights. Comparing the results from that regression with the basic OLS regression from Table 6 (column (7)), it is evident that virtually all of the previous results hold.

The last two columns of Table 8 exploit the panel structure of the data. Column (15) presents results from a fixed effects regression. Using country-specific fixed effects, the coefficients on *sumgdp* and its interaction with skill differences derive solely from their time series variation since the cross-sectional variation is controlled for by the fixed effects. The magnitude of the coefficient on the GDP sums increases considerably, though so does its standard error. The coefficients on the interaction with skill differences are now insignificant. However, while the magnitude of the coefficients on the sectoral variables changes as well, all their statistically significant signs hold.

Instead of including sector-specific fixed effects, which would preclude the inclusion of any of the sectoral variables as they have no time variation, the last column presents results from a sector random effects regression. This permits the inclusion of the sectoral variables. A Hausman test indicates that the random effects specification is indeed appropriate over a fixed

effects regression. All sector-specific controls retain their signs, though the capital-labor ratio and the number of firms per industry lose their statistical significance, while firm and industry size retain it. The signs and significance level of the GDP terms remain intact, except that the coefficient for skilled-labor scarce parent countries becomes insignificant, which is more in line with the theory. It can thus be concluded that the main results of the paper do not depend on the econometric technique chosen and that neither specific features of the data nor endogeneity concerns drive the results, which thus appear robust.

5 Conclusion

Foreign direct investment flows into developing countries have been increasing tremendously over the last decade or so. Yet, rigorous empirical testing of their determinants has been largely nonexistent. In part, this was due to lack of reliable investment data. The second impediment was the lack of a comprehensive theory of multinational activity that is grounded in general-equilibrium trade theory and has clear testable implications. The Markusen-Maskus framework is an important step forward and is taken as the basis for the empirical tests of the determinants of FDI in Mexico carried out in this paper. Certain data issues, such as the fact that for a relatively small country like Mexico GDP sums and differences with other countries are highly correlated, and the data detail available, necessitated a modification of that model. The data used come from the Mexican Ministry of Trade and Industrial Development (SECOFI) and have detailed source country and industry destination information. Hence, sector-level variables were added to provide a better understanding of the sectoral characteristics that are conducive to FDI.

The results suggest that factor-endowment differences between Mexico and the source coun-

tries of its foreign investments as well as joint market size are important in explaining inward FDI. Neither the horizontal nor the vertical model can be rejected. Including industry characteristics such as the capital-labor ratio, average firm as well as overall industry size and the degree of concentration of an industry suggest that FDI flows to large industries and firms that are fairly concentrated. Hence, the opportunity to exploit substantial economies of scale contributes to the proliferation of multinational firms.

The development of a unified theory of multinational activity with clear testable implications is an important step forward in analyzing the determinants of FDI. However, empirical testing of the ability of the theory to explain a wide variety of multinational activity is still in its infancy. Moreover, all testing thus far has involved the United States as either the source or the host country of investment. This study has attempted to make a significant step forward by exploiting a dataset from a developing rather than a developed FDI host country, with FDI data on a much more disaggregated level than previously available. However, further testing is needed as better and more disaggregated data is becoming available for an increasing number of countries, both developed and developing.

Data Appendix

Real FDI are FDI inflows in thousands of 1995 U.S. dollars, by 4-digit sector (Mexican classification system CMAP), from the Mexican Ministry of Trade and Industrial Development (SECOFI). Aggregate deflators come from the Bureau of Economic Analysis, while sector-specific producer price indexes come from the U.S. Bureau of Labor Statistics.

GDP Sum is the sum of source country and Mexican gross domestic product in billions of 1995 U.S. dollars. GDP and exchange rate information are from International Financial Statistics.

GDP Difference (Squared) is the (squared) difference between source country and Mexican GDP in billions of 1995 U.S. dollars.

Skill Difference is the difference between the ratio of skilled labor to total labor force in the source country and Mexico; skilled labor is measured as professional, technical and associated professionals, other professionals and managerial workers. This information is taken from the 2001 issue of the International Labor Organization's Yearbook of Labor Statistics.

Sector-Specific Skill Intensity is the ratio of white collar to the sum of white collar and blue collar workers ("obreros" and "empleados") by sector.

Capital-Labor Ratio is the ratio of net fixed assets (in thousands of 1995 U.S. dollars) per employed person, from the Mexican Industrial Census of 1999.

Number of Firms in Industry is the actual number of firms in that sector, from the 1999 Census.

Industry Size is total gross production, in thousands of 1995 U.S. dollars, of the sector.

Firm Size is *Industry Size* divided by *Number of Firms in Industry.*

Investment Costs Mexico is an index of overall economic freedom, ranging from 0 to 100, from the Heritage Foundation.

Trade Openness Mexico is the ratio of Exports and Imports to GDP (in percent), taken from

the World Bank's World Development Indicators (WDI).

Trade openness Source is the ratio of Exports and Imports to GDP (in percent) for FDI source countries, also from WDI.

Distance is the distance in kilometers from Mexico City to an FDI source country's capital.

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Table 1a: FDI Inflows (Millions of US$)

	1994	1995	1996	1997	1998	1999	2000	Total
Agriculture	8.1	8.9	31.2	10.3	28.2	76.8	81.4	245.0
Mining	88.5	77.9	72.2	106.0	40.3	121.5	161.2	667.6
Manufacturing	5,667.1	4,687.3	4,641.9	7,220.4	4,800.1	8,600.4	7,542.6	43,159.9
Electricity / Water	15.2	2.1	1.1	5.2	26.6	139.5	51.9	241.6
Construction	244.0	21.6	22.2	101.7	64.5	106.5	40.8	601.2
Trade	1,395.2	952.0	644.2	1,842.1	855.0	924.9	1,689.6	8,303.0
Transportation / Communication	719.3	876.3	425.8	291.1	325.1	153.2	-2,588.8	201.9
Financial Services	896.5	1,062.9	1,206.6	999.6	632.6	674.7	4,326.7	9,799.6
Other Services	907.1	364.2	448.1	709.3	698.5	1,006.5	981.4	5,115.0
Total	9,941.0	8,053.3	7,493.2	11,285.8	7,470.9	11,803.9	12,286.8	68,334.8

Source: SECOFI and author's calculations

Table 1b: FDI Inflow Shares (in percent)

	1994	1995	1996	1997	1998	1999	2000	Average
Agriculture	0.1	0.1	0.4	0.1	0.4	0.7	0.7	0.4
Mining	0.9	1.0	1.0	0.9	0.5	1.0	1.3	1.0
Manufacturing	57.0	58.2	61.9	64.0	64.3	72.9	61.4	63.2
Electricity / Water	0.2	0.0	0.0	0.0	0.4	1.2	0.4	0.4
Construction	2.5	0.3	0.3	0.9	0.9	0.9	0.3	0.9
Trade	14.0	11.8	8.6	16.3	11.4	7.8	13.8	12.2
Transportation / Communication	7.2	10.9	5.7	2.6	4.4	1.3	-21.1	0.3
Financial Services	9.0	13.2	16.1	8.9	8.5	5.7	35.2	14.3
Other Services	9.1	4.5	6.0	6.3	9.3	8.5	8.0	7.5
Total	14.5	11.8	11.0	16.5	10.9	17.3	18.0	100

Source: SECOFI and author's calculations

Table 2: FDI Inflow Shares, Manufacturing Subsectors (in percent)

	1994	1995	1996	1997	1998	1999	2000	Average
Food and Beverages	18.1	8.7	2.4	33.7	13.2	9.1	9.0	14.1
Textiles and Apparel	0.1	0.1	0.2	0.1	2.0	0.4	0.2	0.4
Wood Products	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.1
Paper and Printing	0.1	0.4	0.1	0.1	0.7	0.6	1.8	0.6
Chemical	6.4	8.2	21.1	7.5	19.5	10.6	11.8	11.6
Clay, Glass, Cement	0.0	1.2	0.6	0.0	0.0	2.1	1.7	0.9
Iron and Steel	21.2	1.8	6.4	1.4	0.3	2.7	1.5	4.7
Metal, incl. Automobiles	29.2	54.1	41.8	33.7	40.7	54.2	40.7	42.3
Miscellaneous	24.9	24.9	27.4	23.5	23.7	20.3	33.3	25.3

Source: SECOFI and author's calculations

Table 3: FDI Source Country Shares (in percent)

	1994	1995	1996	1997	1998	1999	2000	Average
US	46.1	65.5	67.4	61.4	66.1	55.8	78.8	62.9
Canada	7.0	2.1	6.7	1.9	2.4	5.1	4.8	4.3
EU	18.1	22.2	14.4	26.2	25.4	25.6	9.0	20.0
Non-EU Europe	0.5	2.5	1.1	0.3	0.3	0.9	0.9	0.9
Asia	17.7	4.2	7.6	5.1	3.0	11.5	4.3	7.9
Latin America	3.4	1.2	0.4	0.7	0.6	0.3	0.3	1.0
OECD	78.0	95.4	92.6	94.4	96.2	98.0	96.9	93.1
Developing	15.8	2.8	5.2	1.3	2.0	1.0	1.3	4.1

Source: SECOFI and author's calculations

Table 4: Summary Statistics for the Basic Extended Sample (4,068 observations)

Variable	Mean	Standard Deviation	Minimum	Maximum
Real FDI	11,014	71,894	-427,131	1,760,125
GDP Sum	1,196	1,886	290.6	9,424
GDP Difference	550,0	1,884	-370.6	8,674
GDP Difference Squared	3,849,321	1.33e7	0.548	7.52e7
Skill Difference	0.111	0.103	-0.097	0.303
Sector-Specific Skill Intensity	0.208	0.096	0.046	0.553
Capital-Labor Ratio	38.86	53.13	3.740	318.2
Number of Firms in Industry	58,277	135,880	27	744,440
Industry Size	9,825,718	1.02e7	61,171	4.14e7
Firm Size	4,036	12,830	9.677	94,327
Investment Costs Mexico	62.01	3.089	57	66
Trade Openness Mexico	58.68	8.543	38.48	65.33
Trade Openness Source	75.33	55.91	16.44	339.1
Distance	8,274	3,805	1,236	16,641

For variable definitions and units of measurement, see the Data Appendix.

Table 5: FDI Estimates - MM Specifications

	Dependent Variable: Real FDI flows in thousands of U.S. dollars			
	(1)	(2)	(3)	(4)
Regressors	Basic MM Regression	Excluding diffgdpsq	Including Trade and Investment Costs	Sector Fixed Effects
GDP Sum	-7.543**	3.429***	3.756***	3.788***
(sumgdp)	(3.236)	(1.243)	(1.251)	(1.232)
GDP Difference Squared	0.002***			
(gdpdifsq)	(0.0006)			
Skill * GDP Differences	-34.29**	25.37	46.18**	38.78
(d2skdgdpd)	(17.22)	(17.19)	(19.02)	(26.96)
GDP Sum * Skill Differences (pos.)	65.45***	33.88***	13.38	24.46
(d2skdsumg)	(13.04)	(10.43)	(11.54)	(22.43)
GDP Sum * Skill Differences (neg.)	126.4***	145.8***	109.6**	-46.74
(d1skdsumg)	(43.23)	(45.12)	(47.47)	(200.2)
Investment Costs Mexico			-543.6	-523.0
(invcostmex)			(532.1)	(393.3)
Trade Openness Mexico			152.4	143.4
(topenmex)			(170.9)	(142.8)
Trade Openness Source			44.44***	19.54
(topensrc)			(10.40)	(25.21)
Distance	-0.228*	-0.485***	-0.684***	-0.791**
(distance)	(0.127)	(0.115)	(0.149)	(0.368)
R-squared	0.12	0.11	0.11	0.11
F test	21.94***	23.73***	14.60***	100.78***
Observations	6,265	6,265	6,069	6,069

Notes: Robust standard errors in parentheses; All regressions include a constant (not reported).
***, **, * denote significance at the 1%, 5%, 10% level, respectively;

Table 6: FDI Estimates - Basic Industry Specifications

Regressors	Dependent Variable: Real FDI flows in thousands of U.S. dollars			
	(5)	(6)	(7)	(8)
	Basic Regression	Excluding diffgdpsq	Excluding all GDP Difference Terms	Excluding all Skill Difference Terms
GDP Sum (sumgdp)	-10.40**	5.560**	6.903***	14.59***
	(4.53)	(2.118)	(1.977)	(1.635)
GDP Difference Squared (gdpdifsq)	0.003***			
	(0.001)			
Skill * GDP Differences (positive) (skdgdpdpos)	-55.59**	60.47**		
	(27.64)	(26.93)		
Skill * GDP Differences (negative) (skdgdpdneg)	222.8***	-34.72		
	(57.19)	(42.69)		
GDP Sum * Skill Differences (pos.) (sumgskdpos)	85.37***	7.942	55.75***	
	(21.81)	(17.84)	(12.99)	
GDP Sum * Skill Differences (neg.) (sumgskdneg)	11.09	-64.31	-253.2***	
	(56.28)	(55.74)	(76.04)	
Sector-Specific Skill Intensity (skillint)	1,885	1,257	-235.0	100.8
	(12,219)	(12,336)	(12,491)	(10,376)
Capital-Labor Ratio (klratio)	-65.05***	-61.37***	-61.67***	-40.73*
	(23.40)	(23.33)	(23.04)	(21.04)
Number of Firms in Industry (nufiind)	-0.026***	-0.027***	-0.028***	-0.023***
	(0.006)	(0.006)	(0.006)	(0.005)
Industry Size (indsize)	0.001***	0.001***	0.001***	0.001***
	(0.0002)	(0.0002)	(0.0002)	(0.0001)
Firm Size (firmsize)	0.483***	0.466***	0.454***	0.552***
	(0.147)	(0.148)	(0.150)	(0.159)
Investment Costs Mexico (invcostmex)	-351.0	-239.1	-197.0	-157.2
	(521.5)	(511.9)	(514.2)	(426.9)
Trade Openness Mexico (topenmex)	100.4	93.08	62.86	-12.48
	(151.0)	(151.5)	(151.0)	(134.9)
Trade Openness Source (topensrc)	-9.564	21.03**	24.62**	45.77***
	(8.171)	(8.65)	(10.46)	(14.14)
Distance (distance)	0.102	-0.727***	-1.033***	-1.271***
	(0.218)	(0.172)	(0.200)	(0.243)
R-squared	0.20	0.19	0.19	0.17
F test	9.87***	10.09***	10.71***	11.59***
Observations	4,068	4,068	4,068	4,982

Notes: Robust standard errors in parantheses; All regressions include a constant term (not reported).
***, **, * denote significance at the 1%, 5%, 10% level, respectively;

Table 7: FDI Estimates - Data Robustness Checks

	Dependent Variable: Real FDI flows in thousands of U.S. dollars			
	(9)	(10)	(11)	(12)
Regressors	Including Year Dummies	Including U.S. Dummy	Manufacturing Only	Manufacturing Only
GDP Sum (sumgdp)	6.919*** (1.989)	4.420** (2.052)	10.71*** (2.926)	6.586** (3.018)
GDP Sum * Skill Differences (pos.) (sumgskdpos)	55.58*** (13.06)	25.36** (11.95)	75.61*** (19.04)	27.71 (17.30)
GDP Sum * Skill Differences (neg.) (sumgskdneg)	-251.6*** (74.70)	-14.64 (57.46)	-628.7*** (112.7)	-197.1** (85.92)
Sector-Specific Skill Intensity (skillint)	-266.5 (12,486)	2,322 (12,281)	-19,501* (10,354)	-20,203** (10,015)
Capital-Labor Ratio (klratio)	-61.68*** (23.08)	-62.41*** (23.43)	27.55 (34.70)	43.96 (37.05)
Number of Firms in Industry (nufiind)	-0.028*** (0.006)	-0.026*** (0.006)	-0.101 (0.079)	-0.144* (0.075)
Industry Size (indsize)	0.001*** (0.0002)	0.001*** (0.0002)	0.001*** (0.0003)	0.001*** (0.0003)
Firm Size (firmsize)	0.455*** (0.150)	0.478*** (0.150)	-0.210 (0.154)	-0.248 (0.165)
Investment Costs Mexico (invcostmex)	1,536 (1,300)	1,579 (1,296)	-67.15 (580.4)	1,003 (1,301)
Trade Openness Mexico (topenmex)	-530.4 (400.2)	-512.8 (398.9)	28.93 (194.6)	-289.7 (421.7)
Trade Openness Source (topensrc)	24.32** (10.53)	0.528 (7.923)	66.91*** (15.46)	18.83 (12.00)
Distance (distance)	-1.033*** (0.199)	-0.339*** (0.120)	-1.725*** (0.308)	-0.431** (0.212)
Dummy for 1999 (d1999)	12,525** (6,388)	13,688** (6,320)		12,673* (7,395)
Dummy for 2000 (d2000)	11,297 (8,371)	13,167 (8,317)		6,005 (9,040)
U.S. Dummy (dus)		70,886*** (19,850)		117,791*** (26,691)
R-squared	0.19	0.20	0.38	0.40
F test	9.53***	9.16***	10.38***	8.99***
Observations	4,068	4,068	1,696	1,696

Notes: Robust standard errors in parantheses; All regressions include a constant term (not reported).

***, **, * denote significance at the 1%, 5%, 10% level, respectively;

Table 8: FDI Estimates - Econometric Robustness Checks

	Dependent Variable: Real FDI flows in thousands of U.S. dollars			
	(13)	(14)	(15)	(16)
Regressors	Instrumental Variables	Weighted Least Squares	Country Fixed Effects	Industry Random Effects
GDP Sum (sumgdp)	6.535** (3.011)	9.758*** (2.193)	41.6*** (15.39)	6.619*** (1.128)
GDP Sum * Skill Differences (pos.) (sumgskdpos)	29.64* (16.16)	47.70*** (16.58)	37.92 (60.78)	58.55*** (6.788)
GDP Sum * Skill Differences (neg.) (sumgskdneg)	-188.6** (87.85)	-1,191*** (331.6)	22.96 (1,046)	-175.4 (166.4)
Sector-Specific Skill Intensity (skillint)	-28,555* (16,972)	-22,577 (99,485)	3,262 (12,526)	833.6 (28,151)
Capital-Labor Ratio (klratio)	112.6 (131.3)	-246.4*** (83.75)	-65.07*** (24.85)	-76.41 (60.11)
Number of Firms in Industry (nufiind)	-0.196*** (0.065)	-0.144*** (0.040)	-0.026*** (0.009)	-0.035 (0.024)
Industry Size (indsize)	0.001*** (0.0004)	0.005*** (0.0008)	0.001*** (0.0001)	0.001*** (0.0004)
Firm Size (firmsize)	-0.521 (0.524)	1.212** (0.507)	0.496*** (0.099)	0.378* (0.207)
Investment Costs Mexico (invcostmex)	1,002 (1,304)	-2,026 (3,321)	229.8 (435.2)	-206.7 (395.1)
Trade Openness Mexico (topenmex)	-288.7 (423.2)	1,003 (947.3)	-183.9 (173.4)	67.24 (142.9)
Trade Openness Source (topensrc)	21.16 (15.12)	148.7*** (53.37)	-15.64 (156.3)	9.975 (22.32)
Distance (distance)	-0.384* (0.232)	-3.538*** (1.369)		-0.803** (0.319)
Dummy for 1999 (d1999)	12,626* (7,416)			
Dummy for 2000 (d2000)	5,727 (9,210)			
U.S. Dummy (dus)	119,353*** (26,469)			
R-squared	0.40	0.25	0.17	0.19
F test (Wald for Random Effects)	9.27***	11.37***	13.16***	862.4***
Observations	1,696	4,068	4,068	4,068

Notes: Robust standard errors in parantheses; All regressions include a constant term (not reported).

***, **, * denote significance at the 1%, 5%, 10% level, respectively;

Table A1: FDI source countries included in the basic extended sample (7)

United States	Austria	Bolivia	Israel
Canada	Belgium	Chile	Egypt
Australia	Denmark	Colombia	Hongkong
New Zealand	Germany	Costa Rica	South Korea
	Italy	Ecuador	Malaysia
	Netherlands	El Salvador	Pakistan
	Norway	Honduras	Philippines
	Sweden	Panama	Singapore
	Switzerland	Paraguay	Thailand
	United Kingdom	Peru	
	Japan	Uruguay	
	Finland	Venezuela	
	Greece		
	Iceland		
	Ireland		
	Portugal		
	Spain		
	Turkey		
	Czech Republic		
	Slovac Republic		
	Romania		