A Review of the Empirical Literature on FDI Determinants

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Abstract: This paper surveys the recent burgeoning literature that empirically examines the foreign direct investment (FDI) decisions of multinational enterprises (MNEs) and the resulting aggregate location of FDI across the world. The contribution of the paper is to evaluate what we can say with relative confidence about FDI as a profession, given the evidence, and what we cannot have much confidence in at this point. Suggestions are made for future research directions.

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1. Introduction

It is well known that the growth of multinational enterprise (MNE) activity in the form of foreign direct investment (FDI) has grown at a faster rate than most other international transactions, particularly trade flows between countries. In many ways, MNEs are the control centers for a large portion of international transactions other than FDI. For example, almost half of trade flows are intrafirm; i.e., trade within an MNE.[1]

These real-world trends have led to substantial recent interest by the international economics literature to empirically investigate the fundamental factors that drive FDI behavior. This paper provides a critical review of this literature with a discussion of future research areas. The literature is large enough that a comprehensive review is not possible. Instead this paper highlights what the author considers the more important and novel papers in the empirical literature on the determinants of FDI. The topic of the effects of MNE activity on host and home countries will not be addressed, but could easily be the focus of its own literature survey. On a final note, this survey's focus will be more recent papers, and the interested reader should refer to Caves (1996) for a broader discussion of earlier papers in the literature.

To organize ideas, we first examine the literature that motivates and tests its analysis of FDI determinants from a partial equilibrium view of the MNE. After briefly discussing the internal firm-specific factors that motivate a firm to become an MNE in the first place, we then examine the external factors that are likely determinants of the location and magnitude of FDI by MNEs. These external factors range from exchange rates and taxes, to factors that are likely more endogenous with FDI activity, such as trade protection and trade flows. These latter "determinants" of FDI, such as trade flows, opens up the larger issue of the quite varying motivations for FDI which are ignored to a large degree by the partial equilibrium literatures on

the effects of exchange rates and taxes. Such questions are key in the literature reviewed in the second half of the paper – the recent work to develop the theory and estimation of general equilibrium models of MNE behavior.

2. Firm Characteristics that Affect the MNE Decision

The most fundamental question about FDI activity is why a firm would choose to service a foreign market through affiliate production, rather than other options such as exporting or licensing arrangements. The standard answer revolves around the presence of intangible assets specific to the firm, such as technologies, managerial skills, etc. Such assets are public goods within a firm to the extent that using such assets in one plant does not diminish use of the asset in other plants. This explains why firms with such assets are more likely to have multiple plants, ceteris paribus, but not necessarily why they would be multinational. To explain why such assets lead to an MNE decision, we often note the potential for market failure connected with these assets. A standard hypothesis is that it is difficult to fully appropriate rents from such assets through an arrangement with an external party. For example, a licensee will not offer full value in negotiations over a contract if the intangible asset is not fully revealed, but the licensor will not want to reveal the asset fully until a contract is finalized. In such situations, the optimal decision may be for the firm to internalize the market transaction, which would mean establishing its own production affiliate in the market. Early conceptualization of this notion includes Oliver Williamson's work on transactions costs, and the development of the ownership-location-internalization (OLI) paradigm (e.g., see Rugman, 1980, and Dunning, 2001). Recent work has applied more formal theory of the firm, such as hold-up issues and agency theory, to

[1] For example, Census (2001) finds that 47% of the U.S.'s trade with other countries was intrafirm in 1999.

provide more formal frameworks for understanding market failures that lead to a firm becoming an MNE (e.g., see chapter 5 of Navaretti and Venables, 2004, for an overview).[2]

Testing these hypotheses is difficult because the firm-specific factors leading to the FDI decision are inherently unobservable. As a result, R&D intensity (the ratio of research and development expenditures to assets or sales) and advertising intensity have been primarily used as proxies for the presence of intangible assets and then used as explanatory variables in firm-level studies of whether firms are "multinational" or not. In fact, it has become standard to include such variables in any firm-level analysis of the FDI decision. My own experience and reading of the literature suggests that R&D intensity is almost invariably positively correlated with multinationality regardless of the data sample, while the evidence for advertising intensity is much more mixed. An alternative test is provided by Morck and Yeung (1992) which found that publicly-traded U.S. firms announcing foreign acquisitions experienced positive abnormal returns to their stock only if they had a significant level of R&D and advertising intensity.

In the final analysis, however, it is not possible to suggest that these empirical analyses irrefutably confirm the internalization hypothesis. Such measures as R&D and advertising intensity may be proxying for other forces that lead to FDI, rather than those connected with the internalization hypothesis. In addition, there is evidence that firms that are "lacking" R&D intensity (or innovation) relative to their industry competitors are the ones more likely to engage in FDI. For example, Kogut and Chang (1991) and Blonigen (1997) provide evidence that Japanese firms' acquisition FDI in the US was motivated by accessing firm-specific assets, not necessarily due to internalization of their own firm-specific assets. These motivations may or may not be contradictory to internalization motivations for FDI.

[2] Feenstra and Hanson (2004) provides an important empirical contribution to this mainly theoretical literature where they find that the choice of ownership by a multinational firm in a Chinese factory is related to "thickness" of

In the rest of this literature review the focus is much more on the exogenous and policy factors that affect the magnitude of FDI that we observe, not whether FDI will occur or not in the first place. Industry and country-level studies of partial equilibrium specifications either ignore such micro-level factors or assume they are controlled for though an average industry- or country-level fixed effect. The general equilibrium work on the other hand models it directly, but then ties it back to country-level features (primarily country endowments) to again generate a country-level average effect. For example, FDI is more likely to originate in countries abundant in capital and skilled-labor which are necessary for generating the firm-specific assets that create the need to internalize through FDI.

3. Partial Equilibrium Analysis of External Factors Affecting FDI Decisions and Location

A large body of literature examining determinants of FDI begins with a partial equilibrium firm-level framework based in industrial organization and finance to motivate empirical analysis. These studies then typically examine how exogenous macroeconomic factors affect the firm's FDI decision, with the primary focus on exchange rate movements, taxes, and to a more limited extent, tariffs. Earlier studies often then use industry-level (or even country-level) data to explore these hypotheses, while more recent work has had firm- and plant-level data available to more appropriately match the firm-level theory.

3.1. Exchange Rate Effects

The effect of exchange rates on FDI has been examined both with respect to changes in the bilateral level of the exchange rate between countries and in the volatility of exchange rates.

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the export market and the extent to which this affects the relationship-specificity between the multinational firm and the Chinese factories.

Until Froot and Stein (1991), the common wisdom was that (expected) changes in the *level of the exchange rate* would not alter the decision by a firm to invest in a foreign country. In rough terms, while an appreciation of a firm's home country's currency would lower the cost of assets abroad, the (expected) nominal return goes down as well in the home currency, leaving the rate of return identical.[3]

Froot and Stein (1991) presents an imperfect capital markets story for why a currency appreciation may actually increase foreign investment by a firm. Imperfect capital markets mean that the internal cost of capital is lower than borrowing from external sources. Thus, an appreciation of the currency leads to increased firm wealth and provides the firm with greater low-cost funds to invest relative to the counterpart firms in the foreign country that experience the devaluation of their currency. Froot and Stein (1991) provides empirical evidence of increased inward FDI with currency depreciation through simple regressions using a small number of annual US aggregate FDI observations, which Stevens (1998) finds is quite fragile to specification. Klein and Rosengren (1994), however, confirms that exchange rate depreciation increases US FDI using various samples of US FDI disaggregated by country source and type of FDI.

Blonigen (1997) provides another way in which changes in the exchange rate level may affect inward FDI for a host country. If FDI by a firm is motivated by acquisition of assets that are transferable within a firm across many markets without a currency transaction (e.g., firm-specific assets, such as technology, managerial skills, etc.), then an exchange rate appreciation of the foreign currency will lower the price of the asset in that foreign currency, but will not necessarily lower the nominal returns. In other words, a depreciation of a country's currency may very well allow a "fire sale" of such transferable assets to foreign firms operating in global

[3] McCulloch (1989, p. 188) provides a simple sketch of this argument.

markets versus domestic firms that may not have such access. Blonigen uses industry-level data on Japanese mergers and acquisition FDI into the US to test this hypothesis and finds strong support of increased inward US acquisition FDI by Japanese firms in response to real dollar depreciations relative to the yen. As predicted, Blonigen finds that these exchange rate effects on acquisition FDI are primarily for high-technology industries where firm-specific assets are likely of substantial importance.

Other studies have generally found consistent evidence that short-run movements in exchange rates lead to increased inward FDI, including Grubert and Mutti (1991), Swenson (1994), and Kogut and Chang (1996), with limited evidence that the effect is larger for merger and acquisition FDI (see, e.g., Klein and Rosengren, 1994). Thus, the evidence has largely been consistent with the Froot and Stein (1991) and Blonigen (1997) hypotheses. One serious issue in the literature is that these exchange rate effects have been tested almost exclusively with US data, though some studies have focused on US outbound FDI, while others have used US inbound FDI.

These previous studies have also made the implicit assumption that exchange rate effects on FDI are symmetric and proportional to the size of the exchange rate movement. The financial crises of the late 1990s have just begun to spur a small nascent literature on the effects of large sudden exchange rate swings on a variety of economic variables, including FDI by MNEs. Lipsey (2001) studies U.S. FDI into three regions as they experienced currency crises (Latin America in 1982, Mexico in 1994, and East Asia in 1997) and finds that FDI flows are much more stable during these crises than other flows of capital. Desai, Foley and Forbes (2004) compares the performance of U.S. foreign affiliates with local firms when faced with a currency crisis and find that U.S. foreign affiliates increase their investment, sales and assets significantly more than local firms during and subsequent to the crisis. They attribute the differences to

MNEs abilities to finance investment internally to a larger extent than local firms. While these papers are quite informative, there are clearly more questions to be answered in this literature.

A final related strand of the literature studies how uncertainty and expectations about future exchange rate movements may affect FDI decisions. An early paper by Cushman (1985) lays out a very nice firm-level model of international investment that depends on the interaction of exchange rate expectations, trade linkages, and financing options the firm may have. Specifically, the paper examines four possible regimes for an MNE: 1) Foreign production and sales, either financed by foreign or domestic sources, 2) Direct investment financed domestically, but foreign production and sales with a imported input from the home country, 3) Direct investment financed domestically, but domestic production and sales with an imported input from the foreign country, and 4) Domestic financing of investment for production at home with export sales to foreign market or domestically-financed foreign investment for production and sales in foreign market.

The paper's treatment of both the MNE's financing options and its trade linkages is the strength of the paper. However, this is a weakness as well, since the effect of the exchange rate and its expected movements varies considerably across models and is often ambiguous in sign for a given model. In addition, his firm-level modeling shows that if firms are heterogeneous in their financing options and trade linkages, then examination of aggregate data (industry- or country-level) may very well show ambiguous results that hide these very real firm-level effects. Cushman, however, tests his firm-level model with data on U.S. bilateral country-level FDI, though data availability in the 1980s makes this understandable.[4] Cushman's empirical analysis finds evidence that an expected real appreciation of the home currency increases FDI, whereas

[4] The final sample includes 16 yearly observations for five U.S. partners – Canada, France, Germany, Japan, and the United Kingdom.

the current level of the exchange rate has no consistently significant impact. These results with respect to the expected exchange rate effect are consistent with certain versions of models 3 and 4 noted above. The firm-level modeling of the Cushman paper is impressive, but there is a clear need for more updated work using firm-level data to accurately test its hypotheses.

Campa (1993) lays out a much simpler and (perhaps more) elegant approach than Cushman (1985) to examine how exchange rate uncertainty affects FDI based on options theory in Dixit (1989). Greater exchange rate uncertainty increases the option for firms to wait until investing in a market, depressing current FDI. Campa finds evidence for this using data on FDI into the US in the wholesale industry. Again, a broader firm-level database would be likely preferred to test these hypotheses and Tomlin (2000) also points out that the Campa (1993) estimates are sensitive to empirical specification. A related paper by Goldberg and Kolstad (1995) alternatively hypothesizes that exchange rate uncertainty will increase FDI by risk averse MNEs if such uncertainty is correlated with export demand shocks in the markets they intend to serve. They confirm this hypothesis with empirical analysis relying on quarterly bilateral data on US FDI with Canada, Japan, and the United Kingdom.

In summary, the literature has derived important and interesting firm-level models of how exchange rate uncertainty can affect FDI flows, depending on firm characteristics. Ironically, the modeling is much stronger than the empirical work, and there has been very little firm-level empirical analysis of these hypotheses. In addition, two of the main papers in the area – Campa (1993) and Goldberg and Kolstad (1995) – have apparently contradictory hypotheses which both confirm using US data on FDI. Thus, the topic of exchange rate effects on FDI is an area rich for future work. One related issue that likely deserves more attention is how one measures expected exchange rate levels, uncertainty, or even volatility. Each of these papers has their own way of

measuring these variables, but further investigation into appropriate measures and sensitivity of results to alternative measures deserves some attention as well.

3.2. Taxes

Interest in the effects of taxes on FDI has been considerable from both international and public economists. An obvious hypothesis is that higher taxes discourage FDI with the more important question one of magnitude. De Mooij and Ederveen (2003) provides an even more detailed discussion of the literature than that provided here and finds a median tax-elasticity of FDI of -3.3 across 25 studies. However, some of the more well-placed articles in the literature have highlighted why such a number may be quite misleading. As these papers point out, the effects of taxes on FDI can vary substantially by type of taxes, measurement of FDI activity, and tax treatment in the host and parent countries. Another important issue is that a MNE potentially faces taxes in the host and the home countries. Countries have different ways of addressing this double taxation issue, which further complicates expected effects of taxes on FDI.[5]

Most of the literature on taxation effects of FDI point to Hartman's papers (1984;1985) as the starting point of the literature, as these were the first to point out a way in which certain types of FDI may surprisingly not be very sensitive to taxes. The key insight by Hartman is that earnings by an affiliate in foreign country will ultimately be subject to parent and host country taxes regardless of whether it is repatriated or reinvested in the foreign affiliate to generate further earnings. There is no way to ultimately avoid foreign taxes on these earnings. On the other hand, new investment decisions consider transfers of new capital from the parent to the affiliate that do not originate from the host country and, thus, have not yet incurred any foreign

[5] There is also a significant literature on transfer pricing (shifting income via intrafirm pricing to minimize tax burden) which is beyond the scope of this review, but is likely endogenous with decisions of FDI.

taxes. This has a number of important implications. First, it means that firms will want to finance new FDI through retained earnings as much as possible, before turning to new infusions from the parent. Second, this means that FDI through retained earnings should only respond to host country tax rates, not parent country tax rates or the parent country's method of dealing with double taxation issues. FDI through new transfers of capital, on the other hand, will potentially respond to both parent and host country taxes and rates of return available in both the parent and host markets.

Hartman (1984) tests this by examining behavior of foreign affiliates in the United States. Important for the empirical analysis, Hartman is only able to gather data on host country (US) tax rates and returns, but not parent (foreign) country tax rates and returns. Thus, he separately regresses retained earnings FDI and new transfer FDI on the host country (US) tax rate, not controlling for these unobservable parent country tax rates. He finds that retained earnings FDI responds significantly to the host country tax rate as hypothesized. Transfer FDI, however, does not respond significantly to host country tax rates which can then be explained by not controlling for parent country tax rates (and differences in returns across the countries).

This estimation strategy by Hartman is clearly not ideal for identifying the hypotheses. Ideally one would want information on the parent country tax rates and explicitly control for these in the estimation, rather that assuming that their omission will bias a current observable variable's coefficient to insignificance. Slemrod (1990) goes a step in this direction by using disaggregated country-level panel data and controlling for the system used by the parent country to deal with double taxation (those that allow MNEs to use foreign repatriated income as a credit on their parent tax liability and those that allow for exemptions), which he argues should matter

for the tax response.[6] His results are decidedly mixed often revealing an insignificant tax response for retained earnings FDI or even a negative response. This study has clearly cast doubt on the Hartman model, yet there have been no significant attempts since to re-estimate with better data or approaches.

Slemrod's (1990) idea that policies to deal with double taxation may affect tax responsiveness did take hold in the literature. The common distinction is between territorial countries that do not tax any income outside of the parent country, exempting foreign-earned income from tax liability, and a worldwide tax method which considers all earned income by its parent firms potentially taxable, but may treat foreign income in a number of ways to avoid double taxation of the MNE. Two standard treatments to deal with this double taxation issue are for the home country to offer a credit or a deduction of foreign tax payment made by the MNE.

The potential for these tax treatments to affect the analysis of FDI and taxation first played a large role in the literature as researchers began to examine the impact of a significant US tax reform in 1986 on inward US FDI. Scholes and Wolfson (1990) hypothesizes that US FDI from MNEs under worldwide systems would likely increase when US tax rates increased! This seemingly counterintuitive notion comes from the realization that with a credit system, for example, the MNE would not see any increase in its tax liability under a worldwide taxation system. On the other hand, the US domestic investors (and MNEs under a territorial tax system) would bear the full brunt of the added US tax liabilities. With firms all bidding for the same assets in the US, the worldwide-tax MNEs would be advantaged and invest more.
While Scholes and Wolfson (1990) performs only very simple statistical tests to show that US FDI goes up after 1986 without controlling for other factors, Swenson (1994) does a more

[6] A number of previous studies to Slemrod (1990) had explored other issues with Hartman's results, but continued to confirm his findings. See de Mooij and Ederveen (2003) for a discussion of these studies.

careful examination of the Scholes and Wolfson hypothesis by examining the differential impact that the U.S. 1986 tax reform had on FDI across industries that had varying changes in tax rates after the reform. Specifically, Swenson examines industry panel data from 1979 through 1991, exploiting the industry variation in tax changes from the 1986 tax reform, and finds that FDI did indeed increase with greater average tax rates, particularly for worldwide taxation countries. One worrisome issue with Swenson's study is that confirmation of the Scholes and Wolfson hypothesis is shown when using data on average tax rates, but rejected when using effective tax rates. Auerbach and Hassett (1993) provides further evidence against the Scholes and Wolfson hypothesis by developing a model of FDI that predicts the *types* of US investments that should be encouraged by the tax reform for territorial-tax MNEs versus worldwide-tax MNEs. In particular, their model shows that territorial-tax MNEs should have incentives to focus more on merger and acquisition (M&A) FDI, whereas worldwide-tax MNEs should have been discouraged from such FDI relative to investment in new equipment. The data, however, suggest that the substantial increase in FDI after the 1986 US tax reform was through M&A FDI by MNEs from worldwide-tax countries (mainly Japan and the United Kingdom).

Thus, in many ways, the effects of the 1986 tax reform on FDI are very much an open question to this day. However, while the particular question is now somewhat dated, the notion that FDI from worldwide taxation countries that offer their parent firms credits should be relatively insensitive to tax rates is of continuing interest. This is best represented by Hines (1996) which creatively brought the issue of the territorial- versus worldwide-tax treatment issue to the pre-existing literature by examining whether state-level taxes affect location of US inward FDI. Previous studies examining the effect of state taxes on state location of FDI found

insignificant results (see, e.g., Coughlin, Terza and Arromdee, 1991).[7] Like federal taxes, MNEs facing state-level taxes may differ in their responses based on whether they face a territorial-tax or worldwide-tax system in their parent country. Hines' (1996) empirical strategy is to investigate the distribution of FDI across U.S. states and examine the tax sensitivity of FDI into a state of "non-credit-system" foreign investors relative to that of "credit-system" foreign investors. He finds that higher tax rates of 1% are associated with a 9% larger FDI decrease by the non-credit-system investors relative to the credit-system investors.

In summary, the literature has pointed out quite nicely that there is more than meets the eye initially when considering the effects of taxes on FDI.[8] MNEs face tax rates at a variety of levels in both the host and parent country and policies to deal with double taxation can substantially alter the effects of these taxes on a MNEs incentive to invest. As has been alluded to above, empirical approaches and data samples have differed a fair amount, so that there are still significant questions about how much taxes (and tax reforms such as that in the US in 1986) affect FDI. The evidence seems more convincing that a credit system to deal with foreign taxes by an MNE makes taxes in the host country relatively inconsequential.

There are other weaknesses with the literature that clearly need to be addressed. First, all the studies mentioned above examine (at best) industry-level data for models that are typically of firm-level activity. This can create an issue with interpreting the empirical evidence back to the theory. The most obvious example of this is the use of average tax rates as the variable of interest which has obvious errors-in-variables issues. Whether average or effective tax rates are

[7] As Hines (1999) points out, the evidence that state taxes affect domestic investment is likewise mixed.

[8] This paper is focused only on studies of taxation on the decision to FDI and the accompanying location decision. There is an extensive related literature that also examines how tax laws affect financing decisions, repatriation decisions (e.g., Foley, Desai, and Hines, 2001), and mode of FDI (e.g., Desai and Hines, 1999).

preferred as a measurement of tax liability is rarely discussed, but can show quite different effects on FDI as exemplified by the Swenson (1994) study.

The literature has also only recently begun to examine other related taxes beyond corporate income taxes. For example, a recent working paper by Desai, Foley and Hines (2004) finds evidence that indirect business taxes have an effect on FDI that is in the same range as corporate income taxes. In a similar vein, the effect of bilateral international tax treaties on FDI activity has been an unexplored issue empirically until just recently. There are thousands of such tax treaties which negotiate reductions in countries' withholding rates among other things.[9] Hallward-Dreimeier (2003) and Blonigen and Davies (2004) find little evidence that these treaties affect FDI activity in any significant fashion.[10]

3.3 Institutions

The quality of institutions is likely an important determinant of FDI activity, particularly for less-developed countries for a variety of reasons. First, poor legal protection of assets increases the chance of expropriation of a firm's assets making investment less likely. Poor quality of institutions necessary for well-functioning markets (and/or corruption) increases the cost of doing business and, thus, should also diminish FDI activity. And finally, to the extent that poor institutions lead to poor infrastructure (i.e., public goods), expected profitability falls as does FDI into a market.

[9] Withholding tax rates are applied to repatriated income above and beyond the corporate income taxes that have been the focus of the discussion so far.

[10] It is not always clear that promotion of FDI is a natural goal of the participants of these negotiations, as some have suggested that these treaties are more about uncovering tax evasion by MNEs. In a related vein, Chisik and Davies (2004) examine the expected outcomes of bilateral tax treaties when one of the countries has substantially more FDI in the other country. Their theory and statistical evidence suggests that such asymmetric bilateral partners are not able to negotiate as large of reductions in withholding tax rates as more symmetric pairs of countries.

While these basic hypotheses are non-controversial, estimating the magnitude of the effect of institutions on FDI is difficult because there are not any accurate measurements of institutions. Most measures are some composite index of a country's political, legal and economic institutions, developed from survey responses from officials or businessmen familiar with the country. Comparability across countries is questionable when survey respondents vary across the countries. In addition, institutions are quite persistent, so there is likely to be little informative variation over time within a country.

For these reasons, while cross-country FDI studies often include measures of institutions and/or corruption, they do not often have it as a focus of the analysis. Wei's papers (2000a; 2000b) are exceptions that show that a variety of corruption indices are strongly and negatively correlated with FDI, though other studies can be found that did not find such evidence (e.g., Wheeler and Mody, 1992). Hines (1995) provides an interesting "natural experiment" approach by examining how the 1977 U.S. Foreign Corrupt Practices Act which stipulated penalties for U.S. multinational firms found to be bribing foreign officials. His estimates find a negative impact on U.S. FDI in the period following this Act. Analysis of such natural experiments hold out the hope of even more convincing evidence in the future, though finding such natural experiments is often difficult.

3.4. Trade protection

The hypothesized link between FDI and trade protection is seen as fairly clear by most trade economists – higher trade protection should make firms more likely to substitute affiliate production for exports to avoid the costs of trade production. This is commonly termed tariff-jumping FDI. Perhaps because the theory is fairly simple and general, there have been few studies to specifically test this hypothesis. Another possible reason is data-driven. It is difficult

to quantify non-tariff forms of protection in a consistent fashion across industries. Many firm-level studies have controlled for various trade protection programs using industry-level measures, but often with mixed results, including Grubert and Mutti (1991), Kogut and Chang (1996), and Blonigen (1997). An alternative to industry measures is provided by antidumping measures which apply *firm-specific* antidumping duties that are often quite large. Using these more precise measures of changes to a trade protection faced by a firm, Belderbos (1997) and Blonigen (2002) both find more robust evidence of tariff-jumping FDI, though Blonigen's results strongly suggest that such responses are only seen from multinational firms based in developed countries. This may be another reason why support for tariff-jumping of other measures of trade protection have been mixed – FDI requires substantial costs that many small exporting firms may not be able to finance or find profitable. Indeed, trade protection may explicitly target such import sources where FDI is less likely.[11] This would suggest one way in which FDI and trade protection may be endogenous, an issue that has been hardly explored empirically. An exception is Blonigen and Figlio (1998) that finds evidence that an increase in FDI into a U.S. Senator's state or U.S. house representative's district increases their likelihood to vote for further trade protection.

3.5. Trade Effects

The previous partial-equilibrium studies discussed to this point have largely ignored trade effects of FDI which are intimately connected with underlying motivations of FDI behavior.[12] Perhaps the most commonly cited motivation for FDI is as a substitute for exports to a host country. As laid out by the model of Buckley and Casson (1981), one can think of exports as

[11] See Ellingsen and Warneryd (1999) for a theoretical analysis that derives an optimal tariff as one that does not cross a level that would lead to FDI by the foreign firms.

involving lower fixed costs, but higher variable costs of transportation and trade barriers. Servicing the same market with affiliate sales from FDI allows one to substantially lower these variable costs, but likely involves higher fixed costs than exports. This suggests a natural progression from exports to FDI once the foreign market's demand for the MNE's products reach a large enough scale (size).[13]

Early papers by Lipsey and Weiss (1981;1984) find a positive coefficient when regressing US outbound FDI measures to host countries on exports to the host countries, which is inconsistent with the notion of FDI replacing exports. However, these papers ignore the endogeneity that comes from the characteristics of the host market that would generally tend to increase or decrease MNEs' desire to FDI and export to the market in the same direction. Grubert and Mutti (1991) instrument for export sales and estimate a negative coefficient using similar data to Lipsey and Weiss (1981), though it is statistically insignificant.

Blonigen (2001) considers the issue that trade flows may be either finished products that are substitutes for the product that would be produced by an MNE's affiliate in the same country or intermediate inputs that would be used by the MNE's affiliate to produce a finished product. The former situation would suggest a negative correlation between "trade" and "FDI", whereas the latter would see a positive association between the two. Blonigen uses product-level trade and FDI data for Japanese 10-digit Harmonize Tariff System (HTS) products in the United States to show that new FDI in the US by Japanese firms increases Japanese exports of related intermediate inputs for these products, whereas new FDI leads to declines in Japanese exports of the same finished products. Head and Ries (2001) and Swenson (2004) show similar evidence when using data on Japanese firm-level data or US industry level data, respectively.

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[12] An obvious exception is Cushman (1985).

An underlying issue to the discussion above is that relationships between firms (such as suppliers of inputs to assemblers) have the power to affect FDI decisions. Japanese firms often have much more formal and public connections between suppliers and assemblers, which are called vertical *keiretsu*. Head, Ries and Swenson (1995) explores whether location of other Japanese firms in a US state or neighboring states by firms of the same vertical *keiretsu* affects subsequent FDI for a Japanese MNE. They find that it does, particularly for the automobile sector, and assign this as evidence for agglomeration economies between such firms with formal supplier-assembler relationships.

Other studies have considered the impact of *horiztonal* keiretsu on Japanese FDI activity. Horizontal *keiretsu* are conglomerate groupings of firms across many industries, but centered around a major Japanese bank. Three potential effects of such groups for FDI activity have been suggested. The primary potential effect is use of the horizontal *keiretsu*'s bank as a source of cheaper funding, which would increase the firm's total, as well as foreign investment. As argued by Hoshi, Kashyap, and Scharfstein (1991), such relationships with a member's *keiretsu* bank can reduce monitoring costs and lowering the cost of capital. Their analysis of Japanese manufacturing firms finds evidence that those in horizontal *keiretsu* are less liquidity-constrained in their investment activity than other firms. Subsequent studies examined whether membership in such horizontal *keiretsu* increases a Japanese firm's FDI, but often found insignificance or sensitive results (see, e.g., Belderbos and Sleugwaegen, 1996).[14]

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[13] As we will discuss below, an entire literature beginning with Markusen (1984) has developed a similar model of "horizontal" FDI in a general equilibrium framework.

[14] These insignificant results may not be surprising in light of Miwa and Ramseyer (2002) which argues that the possibility of such economic effects from *horizontal* groupings is unlikely, particularly the lower cost of capital story. Their main argument is that financing from non-*keiretsu* sources accounts for the majority of total investment financed by *keiretsu* firms and that this share has been increasing over time. Although this does not rule out that *keiretsu* financing has an important impact on the margin!

Blonigen, Ellis and Fausten (2005) focuses on another possible effect of these horizontal *keiretsu* – exchange of information. Executives of the largest firms in a *keiretsu* often participate in "Presidential Council" meetings, where surveys find that information exchange is the primary activity. Blonigen, Ellis and Fausten (2005) hypothesizes that such exchanges may lower the costs of acquiring information on sites for future affiliates and lead to a positive effect of previous FDI by horizontal *keiretsu* firms on a firm's FDI location decision. Using a data on Japanese firm FDI locations across the world from 1985 through 1991, they find that recent FDI by fellow horizontal *keiretsu* firms of at least 100 employees increases the probability of a firm locating in that same region by 20%. They also confirm the findings of Head, Ries and Swenson (1995) on the agglomeration effects of vertical *keiretsu* FDI for a world sample of locations, not just US location.

4. General Equilibrium Analysis of FDI Decisions and Location

Ideally, the FDI literature would have an established model and empirical specification that lays out the primary long-run determinants of FDI location. This would enable sound empirical analysis of how such worldwide FDI patterns are affected by government intervention, such as taxation and trade policies, while controlling for underlying changes in long-run determinants of FDI activity. As we will see, the literature's focus on partial equilibrium frameworks discussed above is due to the difficulty of building a model that accounts for general equilibrium features that is tied back to microeconomic decision making. The concern with evidence from partial equilibrium models is that they ignore important long-run general-equilibrium factors that affect FDI decisions and locations. This can then lead to omitted variable bias in the empirical specification. This is particularly a concern when studies run cross-sectional data only (which a number of studies discussed above do), since this has an

implicit assumption that the data represent some (long-run) equilibrium.[15] The alternative is to examine time series data, assuming that omitted variables reflecting long-run determinants are not changing significantly over the time period of the sample – i.e., focus only on the short-run factors, assuming long-run factors are constant. This is probably not reasonable for samples that span more than a few years in length. Thus, there is a real need for an empirical specification that can encompass both short- and long-run factors, whereas the literature surveyed above (with the exception of papers surveyed in section 2.4) is concerned only with short-run activity. After first discussing why it is difficult to generate such an empirical framework, this section then describes the literature's efforts to construct such an empirical model and what determinants of FDI appear to be robust long-run determinants in the literature to this point.

To understand the evolution of studies on the general-equilibrium determinants of FDI, it is informative to look at the parallel literature examining similar issues in trade. In the latter half of the 20th century until the 1990s, trade theory and trade empirics rarely crossed paths. The period was dominated until the 1980s by the elegant general equilibrium theory of Heckscher-Ohlin where trade flow predictions are based primarily (exclusively) on differences in relative endowments of production factors between countries. However, attempts to reconcile the theory with the data were often unsuccessful, including the Leontief paradox that U.S. exports appeared to be more labor-intensive than its imports.[16] A huge hurdle for generating an exact testing equation out of the Heckscher-Ohlin model is the possible indeterminancy of trade flow predictions from the model when there are more that two countries and more than two factors of production.

[15] Without this assumption, the possibility of various cross-sectional units displaying out-of-equilibrium behavior makes the interpretation of the econometric estimates difficult at best.

[16] This paradox remained in the literature for 30 years until Leamer (1980) found a resolution. This resolution did not address, however, a way in which one could get a general empirical specification from the Heckscher-Ohlin framework to model trade flows between countries that could perform as well as the gravity model.

During this time, however, there was an empirical literature that was able to successfully fit and predict trade flows between countries. This specification is known as the gravity model of trade, which specifies trade flows between countries as primarily a function of the GDP of each country and the distance between the two countries. Unfortunately, the gravity model appeared to have no theoretical foundation and was not held in very high standing by most of the profession for decades.

Recent trade literature has led to a melding of theory and empirics. First, there has been the realization that the gravity specification characterizes basic predictions by many various models of trade, including variations of Heckscher-Ohlin (see Deardorff, 1998). Second, theoretical foundations for the gravity model have been established by a series of papers, the most recent of which is Anderson and van Wincoop (2003). As a result, a gravity empirical specification for trade flows is now back in fashion, this time with theoretical foundations to support it.[17]

Studies of FDI flows are considerably behind the parallel trade literature, but face even more daunting issues. As with trade flows, a gravity specification actually fits cross-country data on FDI reasonably well. However, there is no similar paper to Anderson and van Wincoop (2003) that lays out a tractable model that specifically identifies gravity variables as the sole determinants of FDI patterns. In fact, intuition and theory suggests that MNE and FDI behavior is likely much more complicated to model than trade flows. First, since Markusen (1984) and Helpman (1984), MNE general equilibrium theory has suggested two very distinct motivations for FDI: To access markets in the face of trade frictions (horizontal FDI) or to access low wages for part of the production process (vertical FDI). More recently, a number of papers have begun

[17] The development of new trade theory no doubt was helpful in this process as it broke the monopoly that Heckscher-Ohlin trade theory had on a generation of ideas in the profession and made researchers open to

to sketch out more complicated patterns of FDI. For example, an important possibility is export platform FDI (Eckholm, Forslid, and Markusen, 2003, and Bergstrand and Egger, 2004) where a MNE places FDI into a host country to serve as a production platform for exports to a group of (neighboring) host countries. Another important example is a more complicated vertical interaction (or fragmentation) result where affiliates of an MNE in a variety of hosts are shipping intermediate goods between them for further processing before shipping a (more) finished product back to the parent (see, e.g., Baltagi, Egger and Pfaffermayr, 2004).

Suggestive evidence of these various channels can be seen from US MNE statistics collected by the U.S. Bureau of Economic Statistics. Table 1 provides illustrative data from the 1999 Benchmark Survey of US MNE activity. The first column provides data on affiliates' local sales in the country in which they are located. This presumably matches up with horizontal motivations for FDI. The next column provides data on sales back to the US which is connected with vertical motivations for FDI. The third column of data shows sales by affiliates *to unrelated parties* in other foreign countries which should gauge export platform FDI activity. And the final column shows sales by affiliates *to affiliates* in other foreign countries which could be consistent with vertical fragmentation across multiple hosts if these sales are of intermediate goods, or more in the spirit of export platform FDI if these are final goods being shipped to a related wholesaler in the foreign country.

One way to interpret Table 1 is that the assumption that FDI is simply horizontal FDI is perhaps not a bad one. Sales to the local market account for about 2/3 of U.S. affiliate sales, and this is true even for the Latin America region that is comprised solely of less-developed countries with substantially lower wages than the US. On the other hand, there is reasonable activity in

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considering a variety of alternative theoretical models of trade, one of which underlies the theoretical modeling for the gravity empirical specification.

these other types of activities listed in Table 1, suggesting that other motivations play a role as well. As one would expect, affiliate sales back to the US (evidence for vertical motivations of FDI) are higher than average for the Latin America region and, interestingly, even higher for Canada, where almost 28% of US affiliates there ship back to the US. Sales to other foreign countries as a percent of total sales are largest for Europe, suggesting export platform FDI plays a reasonably significant role there.

The primary issues with translating MNE general equilibrium theory to an empirical specification is the complexity of the theoretical models that generally do not have closed form solutions and a multitude of dirty data issues connected with country-level measures of MNE activity. One of the first attempts to match predictions of a general equilibrium model of MNE behavior to data is Brainard (1993a; 1997). Brainard (1993a) develops a two-country, two-factor general equilibrium model of horizontal MNE activity with a differentiated sector of monopolistically competitive firms, where MNEs may arise, and a perfectly competitive homogeneous goods sector. With sufficient assumptions on the model and parameter values, Brainard (1997) derives an equation for the proportion of sales by the MNE that are exports to total foreign sales (affiliate sales plus exports). This variable is inversely related to the frictions incurred with exporting, such as transport and tariff costs, and directly on the significance of plant-level fixed costs.[18] Brainard (1997) uses a cross-section of US affiliate sales and export activity by country and industry to test her hypotheses and finds evidence that trade frictions and plant level fixed effects have their expected impacts on the ratio of exports to total foreign sales. Brainard's studies were a crucial (first) step, but had a few weaknesses. First, the assumption in the model of symmetrically identical countries precluded analysis of how country "size" matters

[18] Brainard labels this a "proximity-concentration trade-off" model because of these relationships though the more recent literature labels this "horizontal" MNE activity.

for cross-country FDI, much less how factor endowment differences may matter. The focus on plant-level fixed costs also makes this more a model to examine cross-industry differences than cross-country differences.

A parallel path of developing ever-more sophisticated models of MNE behavior was undertaken by James Markusen and co-authors in the 1990s. Building first off of Markusen (1984) to clarify the horizontal model of MNEs, a "knowledge-capital model" was developed in Markusen, Venables, Eby-Konan and Zhang (1996) and Markusen (1997) that unified horizontal and vertical motivations of MNEs. Similar to Brainard's studies, these Markusen models have typically been two-country, two-factor, two-sector models. However, unlike Brainard, the imperfectly competitive sector is Cournot oligopolists and there is added complexity in assumptions of differing factor requirements for headquarter services of MNEs, production, and transportation of goods. The added complexity and more flexible assumptions means simulations, rather than closed-form solutions, are necessary to explore the role of various factors on MNE behavior. An important result of these models is that factor endowments may matter significantly for FDI patterns, in addition to the traditional gravity variables, such as trade and FDI frictions (that may be proxied by distance) and parent and host market sizes (proxied by GDP).

Carr, Markusen and Maskus (2001) provided the first empirical examination of the knowledge-capital model's hypotheses. From numerical simulations of the model they conjecture an empirical specification where affiliate sales in a host country is a function of GDP of the two countries, trade costs of the two countries, FDI costs, and differences in factor endowments between the parent and the host. The last term is labeled "skill differences" as the prediction comes from a two-factor model of skilled and unskilled labor. The complexity of the model gives rise to nonlinearities in the simulated results which the authors capture with a GDP

sum and GDP difference term and interactions between the skill difference, the host country's trade costs, and the GDP difference. In rough terms, the horizontal side of the model predicts a positive coefficient on the GDP sum term, a negative coefficient on the GDP difference term, and a positive sign on the host trade cost variable. The identifying coefficient on the vertical side is on the skill difference variable which should be positive.[19] The authors use a panel dataset of bilateral country-level US outbound and inbound affiliate sales from 1986-1994, and find empirical evidence for both the horizontal and vertical motivations for FDI, consistent with this unified "knowledge-capital" model.

A number of issues are a concern with these important, but initial, attempts to estimate general-equilibrium determinants of FDI patterns. The most specific critique was that of Blonigen, Davies, and Head (2003) which points out a significant error in variable specification in Carr, Markusen and Maskus (2001). For US inbound affiliate sales, the skill difference variable is always negative (foreign countries are always less skilled than the US in the data). Thus, a positive coefficient for this variable on these observations is suggesting that affiliate sales goes up when skill differences *decline*![20] This contrasts with observations of US outbound where the skill difference variable is always positive in value and a positive coefficient suggests that affiliate sales increases as skill differences increase. The obvious alternative fixes for this are to either estimate a separate coefficient for outbound and inbound observations or specify the skill variable as an absolute difference from zero. Blonigen, Davies and Head (2003) show that regardless of how you fix this error, it completely switches the sign from the original Carr,

[19] The interaction terms muddy the waters somewhat on expected signs and it is more exact to say that the marginal effect of an increase in skill difference between parent and host on affiliate sales should be positive to be consistent with vertical motivations.

[20] In other words, an increase in this variable is moving from a negative number to another value close to zero where there is no skill difference between the parent and host country.

Markusen and Maskus (2001) paper and no longer supports the vertical motivations for MNE activity.[21]

The issue of whether there is evidence for significant vertical FDI is an interesting one. An earlier empirical paper by Brainard (1993b) examined whether US affiliate sales back to their US parents were sensitive to factor proportion differences using bilateral country data and also found little support of this. Yeaple (2003b), however, runs a specification similar in spirit to Brainard with US MNE affiliate activity, but interacts factor endowment differences with industry factor intensities and then uncovers vertical motivations (as well as horizontal motivations). Namely, he finds that factor endowment differences increase FDI for industries that intensively use the factor in which the host country has the comparative advantage. Looking for the effects of factor endowment differences specifically in the "right" industries is the key. These results are also in line with recent micro-level evidence on US affiliate activity by Hanson, Mataloni, and Slaughter (2003) and Feinberg and Keene (2001; 2003) that finds substantial vertical activity going on for certain manufacturing sectors and host countries and for which factor prices and trade costs have the signs one would expect with vertical FDI activity. It seems clear that vertical motivations are not prevalent in the general FDI patterns. Rather, such motivations for FDI show up as important for only a few particular manufacturing sectors, such as machinery and electronics.

Other more general issues with the general-equilibrium models concern data quality and characteristics of the data. As discussed in Blonigen and Davies (2004), residuals from estimating the Carr, Markusen, Maskus (2001) empirical specification on a sample of bilateral

[21] Carr, Markusen and Maskus (2003) objects to using an absolute difference of the skill variable because it imposes symmetry that the model suggests is incorrect. Thus, allowing a separate coefficient for negative ranges and positive ranges of the variable, which in this dataset corresponds to inbound and outbound FDI, respectively, is likely the best way to handle this specification issue. Blonigen, Davies and Head (2003) shows that all these alternative specifications lead to a sign reversal of the skill difference coefficient.

observations of FDI to developed and less-developed countries are far from white noise. In fact, the model substantially under-predicts affiliate sales to developed countries and over-predicts affiliate sales in less-developed countries even after allowing for interactions of a less-developed country dummy with the other independent variables and country fixed effects.[22] There are likely two contributing and related factors here. First, the FDI data are highly skewed with most of the activity confined to OECD countries. One simple way to statistically control for this is to log the data, which interestingly is the typical practice with "gravity" models, whereas Carr, Markusen and Maskus (2003) used interactions of variables in levels to deal with non-linearities.[23] In Blonigen and Davies (2004), logging the variables goes a long way toward generating white noise residuals, but not completely. This suggests that the factors that determine FDI into developed countries is simply much different than into less-developed countries, and that these differences are still not captured adequately in the empirical specifications that we currently estimate.

A final important issue with these previous MNE models and resulting empirical examination of their hypotheses is the modeling of a two-country framework with testing done on bilateral country pairings. This assumes that the FDI decisions by MNEs in a parent country into a particular host country *are independent of their FDI decisions to any other host country*. But clearly this is not a good assumption for the variety of MNE motivations mentioned above. A vertical FDI decision by an MNE involves picking the "best" low-cost host at the expense of other potential host locations. An export platform strategy likewise involves picking the "best" host country and presumably leaving other "neighboring" countries in a low-FDI "shadow." To

[22] The specification is also controlling for FDI costs, which include expropriation risks, etc., which may be a large concern with FDI into less-developed countries.
[23] An alternative, and more sophisticated, statistical correction is modeling the non-FDI observations (or zeroes) as a different first-level process from the decision of how much to FDI conditional on the decision to invest some positive amount. This is the approach in Razin, Rubinstein, and Sadka (2004).

what extent these interdependences still show up in the estimates after aggregating individual firm decision-making is an open question. However, theoretical modeling of such MNE decisions will clearly be affected by having more than two countries and one would guess that estimation on data reflecting the aggregation of these decisions also needs to account for such host-market interdependencies.

Work on this in the literature is extremely recent, with a number of recent papers applying spatial econometric techniques to allow for interdependence of FDI activity (the dependent) variable across host countries. Coughlin and Segev (2000) estimated that FDI into neighboring provinces increases FDI into a Chinese province and assign this as evidence of agglomeration externalities.[24] In contrast, Blonigen, Davies, Waddell, and Naughton (2004) estimate a negative effect of neighboring-country FDI on the amount of US FDI received by a European country, while finding that neighboring GDPs increase FDI. These two effects provide evidence for export-platform FDI.[25] Baltagi, Egger, and Pfaffermayr (2004) develop a model of MNE activity in a multi-country world that predicts how a variety of neighboring country characteristics (GDP, trade costs, endowments, etc.) should affect FDI into a focus country depending on MNE motivations (horizontal, vertical, export-platform, etc.). Using data on US outbound FDI in seven manufacturing industries they find mixed evidence that mildly supports export-platform and vertical fragmentation MNE motivations in the data. These studies show that spatial interdependence matters for FDI patterns, but that the sample one chooses in geographic space to estimate these relationships can substantially affect the estimated interdependencies.

[24] These models typically develop measures of "neighboring" countries' variables though a matrix of weights inversely related to the distance of other countries in the sample.

5. Conclusion

The literature on the determinants of MNE decisions and FDI location is quite substantial, though arguably still in its infancy. Our theoretical hypotheses come out of modeling firm-level decisions. A large body of literature takes these partial equilibrium predictions of a MNE's FDI decisions and examines how (exogenous) factors, such as taxes and exchange rates, affect these firm-level decisions. A more recent body of literature has begun to frame such MNE decisions in a general equilibrium framework and generates predictions of how fundamental country-level factors affect aggregate country-level FDI behavior. Regardless of the approach, the interconnectedness of FDI behavior with trade flows and the underlying motivation for MNE behavior complicates analysis. Many strands of the partial equilibrium FDI literature have largely ignored this issue, while the general equilibrium models have begun to grapple with this issue.

In the final analysis, the empirical literature on determinants of FDI is still young enough that most hypotheses are still up for grabs. Thus, it is perhaps not surprising that Chakrabarti (2001) finds that most determinants of cross-country FDI are fairly fragile statistically. However, as this survey of the literature reveals, the issues are complicated enough that broad general hypotheses – such as taxes generally discourage FDI – simply should not be expected once one takes a closer look. The more insightful and innovative papers in the literature have developed hypotheses about when a factor should matter and when it should not matter, and then find creative ways to test these hypotheses in the data. The ever greater availability of micro-level data should also help in the future to clear some of the muddy waters. Again, the better

[25] Head and Mayer (2004) focuses exclusively on the impact of neighboring regions' GDP (or "market potential") on Japanese FDI into Europe and find it has a significant positive correlation with FDI.

papers in the literature have been cognizant of how data issues affect interpretation of their results, and this will be a key issue as the literature moves forward.

Table 1: Composition of Sales of US Affiliates Abroad, 1999, in Millions of Dollars.

	Local Sales in Host Country		Sales Back to US		Sales to Unaffiliated Parties in Other Foreign Countries		Sales to Related Affiliates in Other Foreign Countries	
	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total	Dollars	% of Total
All US Activity	1,494,903	67.4%	230,975	10.4%	216,613	9.8%	276,904	12.5%
Manufacturing	651,982	58.9%	165,731	15.0%	110,119	9.9%	179,533	16.2%
Non-Manufacturing	842,921	75.8%	65,244	5.9%	106,494	9.6%	97,371	8.8%
Canada	197,222	70.1%	78,081	27.8%	3,600	1.3%	2,348	0.8%
Europe	803,860	65.9%	53,629	4.4%	159,130	13.0%	203,850	16.7%
Asia and Pacific	304,177	71.4%	47,255	11.1%	30,944	7.3%	43,904	10.3%
Latin America	165,678	65.9%	43,544	17.3%	18,620	7.4%	23,722	9.4%

Source: Table III.F.1, US Bureau of Economic Analysis

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