Determinants and Consequences of Foreign Direct Investment in Services

A Theoretical and Empirical Investigation with a Particular Emphasis on Retailing

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Für meine Familie.

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Preface

In 2010, cross-border trade in services accounted for 20 percent of world trade. In addition, in 2005, more than 60 percent of world-wide inward foreign direct investment (FDI) stocks could be attributed to the service sector compared to 30 percent to the manufacturing sector. Moreover, between 2009 and 2011, the service sector accounted for approximately one third of international assets of the top 5,000 non-financial multinational enterprises (MNEs) (UNCTAD, 2007, 2009, 2011a). Despite the economic importance of international trade in services in general and of FDI in services in particular, there is little we know about the determinants of the location choice for a firm's affiliate in the service sector. At the same time, FDI in manufacturing is a thoroughly explored field.

Today, we are familiar with market-seeking horizontal FDI (HFDI) in manufacturing attracted by high host-country GDP, efficiency-seeking vertical FDI (VFDI) looking for low factor costs, and the more complex form of export-platform FDI. With regard to HFDI economists have been asking the question, under which circumstances a firm seeking to serve a foreign market will find it profitable to establish a foreign affiliate in that market (thus incurring fixed investment costs) instead of exporting its goods to the same market (thus bearing the variable distance costs). In case of VFDI the question economists seek to answer is why a firm striving to minimize its production costs chooses one country as a production location over another. Export-platform FDI, finally, exploits the proximity of a particular production location to export to markets in third countries. Common to all of these forms of FDI is the general notion that FDI, while expensive in terms of the fixed cost of establishing a production site abroad, enables a firm to generate economies of scale by spreading headquarter costs over multiple affiliates, and to retain control over its proprietary assets (tangible as well as intangible) as was conceptualized by Dunning

(1981) in his eclectic paradigm of ownership, location and internalization advantages.

Services are somewhat different in these respects: first of all, many of them such as retail services, or after-sales services simply are not tradable *per se*. Hence, providing these services in another country is only possible through FDI. Second, the fixed cost of establishing a foreign service affiliate is conceivably lower than that of a new production site. An example could be the establishment of a consulting firm's office versus a production plant requiring elaborate machinery. Therefore, an important question to pose in this context is, e.g., whether the traditional theories on manufacturing FDI also apply to the service sector. More precisely, do the same host-country characteristics that determine a manufacturing firm's affiliate location decision also apply to the location decision for a service affiliate? When seeking to answer the latter question one has to take into account the pronounced heterogeneity within the service sector. The World Trade Organisation identifies a total of twelve distinct service sectors, among which are business services (such as engineering, real estate, IT, etc.), distribution services (e.g., wholesale and retail trade), financial services (such as banking and insurance), and construction and transport services (WTO, 1991).

Among these different sectors, wholesale services have started to catch the attention of researchers in international economics as FDI in this sector has become a sizable phenomenon. In 2009, 7.2 percent of world inward FDI stocks were in the wholesale and retail sector (ITC, 2011, and own calculations). Recent research has explored the motivations for wholesale FDI conducted by manufacturing firms in terms of parent-firm characteristics (e.g., Akerman, 2010; Bernard et al., 2010b; Felbermayr & Jung, 2009; Krautheim, 2010). Retail services are related to wholesale services in that retail firms typically do not produce the final goods they sell but rather contract with vertically non-integrated suppliers. The Organisation for Economic Cooperation and Development (OECD) defines retailing as "... a form of trade in which goods are mainly purchased and resold to the consumer or end-user, generally in small quantities and in the state in which they were purchased (or following minor transformations)" (OECD, 2011a). Wholesale and retail services differ in the sense that wholesale agents do not interact directly with consumers but rather supply retailers who then sell the final goods in smaller quantities. Hence, while wholesale FDI may be a substitute for exports, retailing is a non-tradable

service if we abstract away from mail-order shopping or e-commerce. As such, a retailer has to be 'on the ground' in order to serve consumers who typically neither buy goods at the factory door nor produce clothing, groceries, etc. themselves. Therefore, when a retail firm seeks to serve a foreign market it has to be through direct investment. It is precisely these specificities of retail firms, i.e., their direct contact to consumers as well as the non-tradability of their services, which turn them into appealing research objects.

Retailing is a sizable sector in economic terms. In 2005, total global retail sales amounted to US$ 9780 billion, which is about four times the German GDP in the same year (Dawson, 2007; OECD, 2011b). This figure includes sales on both, domestic and on foreign markets. The internationalization of retail firms via the opening of foreign affiliates has been observed since the early 1990s, and in 2008, the top 250 retail companies generated 22.9 percent of their total sales through foreign operations (Deloitte, 2010). And indeed, purchasing furniture at IKEA (of Sweden) or clothing at Zara (of Spain) in various countries around the world has become mundane. At the same time, the face of retail markets (at least in industrialized countries) has changed. Instead of a large number of small businesses (e.g., the traditional 'mom-and-pop' stores) most retail sub-sectors today are dominated by a decreasing number of ever larger companies operating retail outlets in numerous countries. The drivers of this internationalization are of both, the 'push' and the 'pull' type. Push factors include the consolidation in the retail sector, which gives large retail firms increasing degrees of market power in the vertical supply chain, saturated home markets, restrictive legal provisions concerning access to and operation in established retail markets, but also technological innovations such as the computerization of supply and distribution systems. Examples of pull factors include the continuous liberalization of the world trading system, which reduces the cost of operating stores in foreign markets, and the emergence of new markets in transformation and developing economies that have relaxed their legislation prohibiting foreign market entry but are also characterized by a growing consumer base with a demand for modern retail formats (as opposed to the aforementioned mom-and-pop stores as well as street vendors, wet markets etc.).

Modern retail firms have not only exported their formats to industrialized countries but also increasingly to emerging economies in regions such as South America, (South) East Asia as well as some African countries. The liberalization of retail trade but also growing

urbanization have been conducive to this development (Reardon, 2005). The entry of retail firms has raised concerns among the governments of the destination countries as they fear that small farmers and processors could be crowded out because they are not equipped to meet the competition and requirements from the entrant retailers (Reardon & Gulati, 2008). At the same time, modern retailers can present opportunities to farmers and processors by transferring technology to them, granting them access to their distribution networks, and giving them access to higher value markets. In addition, production for the retail sector as well as the retail activities themselves impact employment, and the availability of more efficiently produced goods as well as increased competition in the retail sector drive down consumer prices — an unambiguously positive effect of retail FDI. Therefore, the *a priori* effect of retail FDI on welfare in general and on the supply sector in a destination country in particular is unclear.

Based on the stylized facts presented above, there are three questions that I seek to answer in the three chapters of this dissertation: first, how do the determinants of the FDI location choice differ between manufacturing and service affiliates? Second, which factors are conducive or obstructive to retail FDI? And third, when a retail firm has decided to conduct FDI in an emerging economy, what are the ramifications for the manufacturing sector in the destination country? The remainder of this preface consists of an overview of the chapters, in which I highlight the contributions to the literature and the main results.

In Chapter 1, which is joint work with Martina Engemann, we seek to answer the question of whether the same FDI location determinants for manufacturing affiliates also apply to the service sector. FDI is conducted for different reasons (market access or cost-reduction), and in different sectors (manufacturing and services). Each type is potentially motivated by different host-country characteristics. Nevertheless, while empirical researchers have distinguished between horizontal and vertical FDI they have failed to make the same distinction between manufacturing and service FDI. We argue, however, that it is precisely the inherent differences between services and manufacturing that have led to blurry empirical results for the determinants of the FDI location decision in the past. We therefore strive to fill this gap.

We use a panel (years 1999-2008) of firm-level data on the universe of German multina-

tionals and their foreign affiliates provided by the Deutsche Bundesbank in the Micro-Database Direct Investment (MiDi) (Deutsche Bundesbank, 2011). We add data on a number of host country characteristics, which we consider to be relevant for the location decision. Indeed, our summary statistics as well as regression analyses indicate that there are no differences in the conduciveness of host-country characteristics when we distinguish between HFDI and VFDI. For example, horizontal affiliates are as concentrated in high-income economies as vertical affiliates, which is counter-intuitive with respect to the cost-saving motive of VFDI. However, drawing the distinction between services and manufacturing we see that service affiliates are more concentrated in high-income economies than manufacturing affiliates.

Our subsequent two-part estimation of the extensive and intensive margin of FDI yields interesting results: an increase in the host country's average wages has a statistically significantly negative effect on VFDI and on HFDI. At the same time, higher host-country GDP increases the investment probability of both types. This is not in line with the predictions of traditional theories on VFDI and HFDI. Conversely, we find that while average wages in the host country have a negative and statistically significant effect on manufacturing FDI, they are insignificant for service FDI. Institutional variables such as the protection of intellectual property rights or contract enforcement matter for the location decision in case of service FDI but not for manufacturing FDI. Moreover, we also estimate the coefficients of the same set of covariates (except for the exclusion restriction) for the intensive margin of FDI. There is again no difference between HFDI and VFDI while there exist significant differences between the determinants of the amount invested in the manufacturing and in the service sector. All of these results hold for a number of robustness checks. One possible explanation may be given by the fact that manufacturing and service firms differ in terms of the skill level of the required work force. Indeed, our summary statistics show that, on average, service affiliates are more high-skill intensive than manufacturing affiliates, which may lead to different location-choice determinants. At the same time, service affiliates are more concentrated in high-income OECD countries than manufacturing affiliates. Hence, one may hypothesize that skill-intensive sectors consider the education-level of a country's workforce as being of greater importance than average wages.

Our study is the first attempt to explore the differences between manufacturing and service FDI location decisions using a firm-level dataset. The empirical findings indicate that manufacturing and service FDI are indeed driven by divergent factors. The main result is that factor costs in terms of average host-country wages are statistically negatively significant for manufacturing FDI but insignificant for service FDI. This finding may explain why past research on VFDI that failed to distinguish between services and manufacturing sectors has mostly produced blurry results.

Chapter 2, which is joint work with Prof. Dr. Carsten Eckel, explores the determinants of FDI in the retail sector in a two-country partial equilibrium framework. Several scholars have recognized the non-negligible role of retail firms, especially in the context of the effects of trade liberalization on welfare when retailing as an intermediary between producers and consumers is taken into account (e.g., Eckel, 2009; Raff & Schmitt, 2009a; Richardson, 2004). However, we are the first to construct a model of retail FDI. There exists strong stylized evidence of the continuous consolidation in the retail sector, which has turned formerly stand-alone national retail firms into companies operating international chains of stores giving them a mounting degree of market power (e.g., Competition Commission, 2000).

We account for this fact by assuming full bargaining power on the retailer's part vis-à-vis the producers of final goods. Combined with the assumption of supplier prices being responsive to the quantity produced (e.g., due to economies of scale in the production of these goods) this is one of the key features of our model. Accordingly, the retailer's bargaining power allows him to push supplier prices down to average costs. Further, we include trade costs which accrue to the retailer who, after having invested abroad, is assumed to still procure his entire product range from the home-country supplier. Once a retail firm has invested in a foreign country we observe a duopoly and, thus, include an exogenous parameter measuring the degree of competitiveness of a given retail market, which also influences a retailer's market-entry decision. Furthermore, we assume that retailers incur variable costs of distribution whose inverse may be interpreted as a measure of productivity, which also determines the profitability of international expansion. Finally, we interpret the consumers' willingness to pay in a given country as a measure of that

country's retail market size and examine its impact on retail FDI.

The comparative statics with respect to these parameters yield very rich results: an increase in trade costs is, per construction, unambiguously detrimental to the investment decision since they increase a retailer's marginal costs of provision on the foreign market. However, there are levels of trade costs for which a retail company finds it profitable to invest abroad despite the fact that it makes losses on the foreign market. This is due to lower supplier prices in the home country which offset the losses. The effect of an increase in the intensity of competition (e.g., due to an exogenous change in competition policy) on the profitability of entry into a retail market depends on the relative size of the retail rivals measured in terms of their sales quantities on that market. The larger the difference in quantities, the more an increase in the degree of competition tends to benefit the relatively large retail firm. It will sell even more on the foreign market because the larger quantity translates into a lower supplier and final goods price and, hence, the more the firm tends to find foreign investment profitable. Also, retailers headquartered in larger home markets as well as retailers with lower distribution costs (i.e., more efficient retailers) tend to find FDI profitable. The latter result is in line with findings of other studies that relate the international growth of a retail chain in terms of the number of stores to technological improvements (e.g., Basker & Hoang, 2011). In conjunction with the intensity of competition we are able to show that retailers headquartered in larger home-markets as well as more productive retailers tend to benefit from an increase in competition and, thus, tend to find expansion via FDI profitable. Finally, our investigation yields the interesting result that retail FDI may contain a first-mover advantage: in our two-country setting, a retail firm may actually foreclose entry into its home market when it is the first to conduct FDI in the foreign market.

Our results may be informative to policy makers seeking to shape their country's regulatory provisions with regard to market competition: on the one hand, antitrust laws aiming at an increase in competition in a given retail market may actually be detrimental for smaller business while the already large retail firms receive incentives to invest abroad, can quote lower prices and, thus, extend their market shares. On the other hand, our results with regard to strategic market entry may enable national governments in general and antitrust agencies in particular to understand why certain retail markets do

not receive (more) foreign entry even if it is considered desirable. In addition, albeit not part of the formal analysis, it is conceivable that foreign retail investment could augment consumer welfare in terms of lower prices and an increased number of goods varieties.

In Chapter 3, I theoretically analyze the impact of retail FDI on the host-country manufacturing (i.e., supply) sector. In fact, retailers may be both, 'friends' and 'foes' to local manufacturers. They are foes in the sense that they may act as "Trojan horses" (Reardon et al., 2007, p. 416), i.e., they pose a competitive threat to local manufacturers as they import foreign goods and, thus, crowd out local varieties. At the same time, a retailer may be a local manufacturer's benefactor in that he may provide financial assistance for investments into production technology or could teach him how to comply with quality and efficiency standards (i.e., undertake technological upgrading). In addition, once the goods produced by local manufacturers comply with the retailer's standards they may find their way into his international distribution network, hence creating a gateway which spurs exports and gives access to higher-value markets. Obviously, this topic is particularly relevant for emerging economies lagging behind in terms of the best available technology and integration into the world economy. A vast amount of anecdotal evidence supports the notions of import competition, upgrading, and export gateways (e.g., Reardon et al., 2007; Coe & Wrigley, 2007; Minten et al., 2009). The fear of the Trojan horse effect of retail FDI has brought the subject to the policy agenda of international organizations such as the United Nations Conference on Trade and Development (UNCTAD, 2004) or the OECD (Nordås et al., 2008). However, in the economics literature there seem to be no theoretical approaches formalizing these perceptions which would enable us to better evaluate the impacts of retail FDI on the host economy. Hence, I am the first to analyze in a partial equilibrium framework the tradeoff between the Trojan horse effect of retail FDI and the efficiency increasing effect of technological upgrading as well as the effect of increased exports through a retailer's international distribution network.

In the partial equilibrium framework I account for larger retailers' buyer power, for technological differences between home and host country of the entrant retailer, and also for the availability of import tariffs as a policy option. My analytical results show that in terms of manufacturer profits the Trojan horse effect is unambiguously detrimental for

the local manufacturer and outweighs the other effects. In terms of production quantities, however, the overall effect is not as clear-cut: while the Trojan horse effect reduces the quantity produced, the upgrading and gateway effect both increase production. In a discussion of the potential impacts on welfare I note *inter alia* that higher production quantities may be interpreted in terms of positive effects on employment as was shown by Bjorvatn & Eckel (2006). In a next step, I examine the impact of import tariffs, which a government may impose in case it is afraid of the Trojan horse effect becoming too strong. As the comparative statics yield ambiguous analytical results I employ numerical exercises to gain an understanding of the repercussions of import tariffs. In terms of the Trojan horse effect, I find that tariffs reduce the import competition. The protective effect is stronger the less local and imported varieties are differentiated. The positive upgrading effect is reduced by the imposition of tariffs. The protective effect of tariffs is larger the higher the initial marginal cost of the manufacturer. Finally, the gateway effect of retail FDI is diminished by the levying of import tariffs — even more so when the export market is relatively large.

My model may inform governments deciding whether to open their country's retail market to foreign entry as well as their decision about the imposition of import tariffs. For example, the well-known infant industry argument would be in favor of import tariffs as they can protect an economic sector while it is still gaining competitive strength. Also, the imposition of tariffs generates government revenue, which could be used to subsidize investments by local manufacturers improving their productive capacities. However, tariffs imposed on imports brought in by retailers may eventually avert retail FDI altogether. This could also impede technological upgrading, the potential positive employment effects, reduce the product varieties available to consumers, and create an anti-competitive retail market environment which tends to increase consumer prices. Therefore, as is ever so often the case in economics, this decision is subject to thorough weighting of options and consequences, perhaps even more so in case of an emerging economy.

All three chapters of this dissertation are self-contained and include their own introductions and appendices such that they can be read independently.

Chapter 1

On the Differences between FDI in Services and in Manufacturing[0]

1.1 Introduction

The service sector plays an important role in global foreign direct investment (FDI). In 2005, more than 60 percent of worldwide inward FDI stock could be attributed to the service sector compared to 30 percent in the manufacturing sector (UNCTAD, 2007).[1] However, until recently most studies on FDI have focused only on the manufacturing sector (see Blonigen, 2005, for a review of the literature). In addition, the traditional distinction between horizontal FDI (HFDI) and vertical FDI (VFDI) is hard to detect in empirical studies (see Blonigen, 2005). Traditional theories explain HFDI by market-seeking motives (e.g., Markusen, 1984). In order to serve a larger market a firm replicates its home-country activity in a foreign country. VFDI is explained by cost-saving motives (e.g., Helpman, 1984). Due to the availability of modern communication technologies and lower transport costs a firm is able to fragment its vertical production process and off-shore part of the production to countries with lower factor costs. Hence, diverging

[0]This chapter is based on joint work with Martina Engemann. It was partly written during visits of the authors at the research centre of the Deutsche Bundesbank. The hospitality of the Bundesbank, the kind support of the staff as well as access to its Microdatabase Direct investment (MiDi) (Deutsche Bundesbank, 2011) are gratefully acknowledged.

[1]In 2010, the share of service FDI amounts to 30 percent. This is because service FDI decreased sharply during the financial crisis, more so than manufacturing FDI (UNCTAD, 2011b).

host-country characteristics should determine the location decision of each type of FDI. However, most empirical studies have failed to find evidence of VFDI. Exceptions are Hanson et al. (2005) and Feinberg & Keane (2001, 2006) who argue that the cost-saving motivation only seems to hold for a few particular manufacturing sectors.

We acknowledge this fact and argue that the real difference in the determinants of FDI location decisions stems from differences between manufacturing and service affiliates. Failing to take this divergence into account or to treat services separately might have led to the blurry results that were produced by earlier studies (e.g., Eicher et al., 2011). We argue that different country characteristics matter for the manufacturing and the service sector as these sectors also differ in several respects. First, some services simply cannot be traded such that the decision between whether to export a service or to conduct FDI does not apply. Retail services are a good example of such non-tradable services. Second, the fixed costs of establishing a foreign affiliate may differ dramatically between the service and the manufacturing sector. Take, for example, the cost of establishing an entire production site including machines, logistics, etc. versus the cost of setting up a lawyer's office. Therefore, we argue that theories on manufacturing FDI may not be applicable to service FDI. For example, we raise the question of whether the traditional theory explaining vertical FDI by Helpman (1984) also applies to the service sector. More precisely, do host-country average wages matter for the FDI location decision in the service sector? And if they do, can we also detect differences in the determinants of FDI for different service sub-sectors?

In order to analyze the differences between service and manufacturing FDI we use firm-level data on the universe of German multinationals and their economic activities abroad, which is provided by the Deutsche Bundesbank in the Micro-Database Direct Investment (MiDi). This is a panel dataset for the years of 1996 to 2009 of which we use the years 1999 to 2008. German parents owning a foreign affiliate are required by law to report information to the Deutsche Bundesbank on the sector, legal form as well as the number of employees and balance sheet information of the foreign affiliate (Lipponer, 2009). We estimate the impact of various country characteristics on the decision where to locate FDI (extensive margin) and how much to invest (intensive margin) using a two-part model.

Our summary statistics and the estimation results show that there is no difference in the determinants of the FDI location decision between HFDI and VFDI. Note at this point that earlier studies have applied something that can be described as "backward" identification strategies to distinguish between VFDI and HFDI: if an affiliate is set up in a low-wage country relative to the home country, it is assumed to be VFDI and vice versa for HFDI. We, however, are able to *a priori* distinguish between the two types of FDI. HFDI is identified when both, parent and affiliate have the same sectoral categorization, VFDI when the classifications differ. In doing so we follow Alfaro & Charlton (2009).

Instead, we find significant differences in the determinants of manufacturing and service FDI. For manufacturing FDI average wages do have a significantly negative impact on the location decision whereas for services they do not matter. Furthermore, institutional variables such as the protection of property rights and legal contract enforcement influence the service FDI location decision but not the location decision in manufacturing. Taking the heterogeneity of the service sector into account we separately analyze the wholesale sector and the business service sector. For these two sectors we also find different country-level determinants. In particular, we observe the average wage being important for the wholesale sector but playing no role for the business service sector. This may be explained by skill differences, namely the wholesale sector being low-skill intensive and the business service sector employing mainly highly skilled persons. In addition, we also estimate the impact of country characteristics on the amount invested in different countries conditional on a firm already having decided to invest. Here, the results are very similar to the ones for the extensive margin. Again, we find that there is no difference in the determinants of HFDI and VFDI. However, the amount invested in services is driven by other factors than the amount invested in manufacturing: just as for the extensive margin, higher host-country wages decrease manufacturing FDI but do not matter for service FDI, and intellectual property right protection attracts larger amounts of investment in services but not in manufacturing.

These findings provide opportunities for policy makers. In the public debate, FDI becomes an issue once a plant is relocated to a low-wage country because of the fear of job-losses in the previous host country. A recent example is the Finnish mobile phone company Nokia. In 2008, Nokia moved one of its plants from Germany to Romania and now leaves

Romania in favor of Asia (Financial Times Deutschland, 2011). Both relocations have most likely been driven by lower factor costs in the destination country. However, we find that the location choice of service FDI is not driven by a country's average wages. Hence, high-income economies could be advised to focus on attracting service FDI rather than trying to compete with low-wage countries in attracting manufacturing firms via subsidies.

Studies of FDI in the service sector are a very recent strand within the vast body of literature on FDI. The ones most related to ours use either firm-level or industry-level data and can be grouped into three rough areas: first, studies testing the applicability of existing FDI theories to FDI in services; second, studies making a general distinction between FDI in manufacturing and in services while taking third-country effects into account; third, theories looking for differences between manufacturing and service FDI but using industry-level data.

In the first strand, Markusen & Strand (2009), for example, adapt the knowledge-capital-model of Markusen (1998) to the business service sector. In contrast to them, we do not only focus on one specific service sector but analyze the difference between service and manufacturing FDI in general. Kelle et al. (2010) test whether the self-selection mechanism of Helpman et al. (2004) (the most productive firms conduct FDI, less productive firms export, and the least productive firms are only active domestically) can also be found for the service sector. Combining the MiDi data on German outward FDI with data on service exports from the Deutsche Bundesbank they find that the same sorting pattern holds for service firms. Wagner (2011) uses data collected by the German Federal Statistical Office on business services to examine the same question. He finds that *less* productive service firms tend to conduct FDI while *more* productive firms export services.[2] We do not focus on the exports-versus-FDI decision, which only applies to HFDI, but on the FDI decision in general. In addition, we do not consider firm characteristics but concentrate on country characteristics determining the location choice, and we do find differences for manufacturing and service affiliates.

[2]This is in line with the theoretical predictions of Patnaik et al. (2010) derived for the case of tradable services where transportation costs are assumed to be near zero, and where buyers of services face uncertainty about product quality, especially when production is located far away.

In the second strand of literature, Guillin (2011) investigates differences in the FDI motivations between goods and services taking third-country effects into account. Using data provided by the U.S. Bureau of Economic Analysis (BEA) she does not find much variation in the motivations for FDI across activities but rather across regions: vertical motives are most prevalent in both, services and manufacturing, for the location choice in non-OECD regions. In OECD countries, however, it is mostly horizontal FDI motives that dominate the location choice for both, service and manufacturing affiliates. Similarly, in a study on service FDI in space Davies & Guillin (2011) find that across different measures of distance, the traditional determinants of outbound FDI activity remain valid for services. They "backwardly" identify VFDI through the signs on the covariates in their regressions. E.g., negatively significant average wages are interpreted as evidence for VFDI. We, however, are able to directly identify HFDI and VFDI via the NACE sectoral classifications as explained earlier. In contrast to Guillin (2011) and Davies & Guillin (2011) we do not apply a spatial approach and we find that VFDI is as concentrated in high-income economies as HFDI. Moreover, we find that the determinants of the FDI decision do not differ between the two types, while they differ between manufacturing and service affiliates.

In the third strand, there are studies by, e.g., Kolstad & Villanger (2008) and Ramasamy & Yeung (2010). Both use industry-level data to examine the determinants of FDI in services. Neither one of these studies finds differences in the determinants of the location decision for FDI in services compared to FDI in manufacturing. Conversely, using firm-level data we do find such divergences.

The remainder of this chapter is organized as follows. In Section 2 we present summary statistics to gain a first impression of the data, and elicit potential differences between service and manufacturing FDI. In Section 3 the dataset it described. Section 4 explains our empirical strategy, and in Section 5 we present our estimation results as well as the results of our robustness checks. Section 6 concludes our study.

1.2 Summary Statistics

1.2.1 General Overview

Using our firm-level data on German outward FDI we observe 47 percent of service parents and 53 percent of manufacturing parents. Figure 1.1 shows that, interestingly, service parents mainly have service affiliates (87 percent), and only 12 percent are manufacturing affiliates. Manufacturing parents, however, establish in 50 percent of the cases service affiliates and 50 percent manufacturing affiliates. Given that a service parent has a service affiliate 57 percent is HFDI, and 43 percent is VFDI. [3] Considering manufacturing parents with manufacturing affiliates, 79 percent is horizontal, and 21 percent is vertical FDI. Furthermore, 9 percent of all firms owning affiliates have them in both, the service and the manufacturing sector. This share is higher for manufacturing parents (14 percent) than for service parents (3 percent).

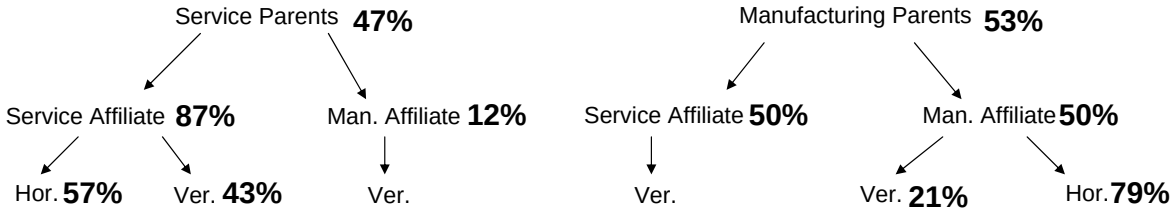


Figure 1.1: German Outward FDI (all affiliates)

1.2.2 Importance of Wholesale FDI

The aforementioned numbers already suggest significant differences between FDI activities in services and in manufacturing. Exploiting further the richness of the data at hand we see that wholesale is, by far, the most important service affiliate sector of manufacturing parents: 80 percent of all manufacturing parents that have affiliates in the service sector have a wholesale affiliate. The most important parent sectors are the manufacture of machinery and equipment (30 percent), the manufacture of medical, precision and optical

[3] Note again that HFDI is identified when both, parent and affiliate have the same sectoral categorization (Alfaro & Charlton, 2009).

instruments (12 percent), and the manufacture of chemicals and chemical products (10 percent). In all of these sectors we observe firms with wholesale affiliates. In order to be able to better evaluate the magnitude of this fact we exclude all wholesale affiliates from our data and compare the shares again. Without wholesale affiliates manufacturing parents only have in 12 percent of the cases a service affiliate. Instead, they have mostly manufacturing affiliates. These shares resemble the ones of service parents with service or manufacturing affiliates. This underlines the importance of wholesale FDI, which can be interpreted as export-supporting FDI (e.g., Krautheim, 2010). It is export-supporting in that it provides the service of intermediation between the producer of a good (located in one country) and the buyer of that good (located in another country) (Bernard et al., 2010b). As such, cross-border wholesale activities are market-seeking and, thus, in case of a foreign investment should be classified as HFDI.

Furthermore, focusing on service parents having manufacturing affiliates reveals that the most important parent sector is again the wholesale sector with nearly 65 percent. German wholesale parents have affiliates in the sectors of the manufacture of metal products, rubber and plastics, and chemicals and chemical products. In addition, within the service sector the wholesale sector is the most important parent sector for both, HFDI and VFDI, and it is also an important affiliate sector.

1.2.3 Skill Differences

In addition to the sectoral differences with respect to FDI activities the service and the manufacturing sector also differ in the skill-intensity of the required workforce. In order to see this in our data we categorize the different sectors at the NACE Revision 1.1 two-digit level according to the Eurostat categorization using the sectoral approach (Eurostat, 2011).[4] Accordingly, we observe that excluding wholesale affiliates, which are considered as less knowledge-intensive, service affiliates are on average more skill-intensive than manufacturing affiliates: roughly 80 percent of service affiliates and approximately 50 percent of manufacturing affiliates are high-skill intensive. However, including wholesale affiliates

[4]The sectoral approach is an aggregation of the manufacturing industries according to technological intensity (R&D expenditure/value added). Services are aggregated into knowledge-intensive services (KIS) and less knowledge-intensive services (LKIS) based on the share of tertiary educated persons.

the share of high-skill service affiliates amounts to only 30 percent.

These differences in skill-intensities may lead to different location choices. We hypothesize that skill-intensive sectors may consider the education-level of a countries' workforce as being of equal or of even greater importance than average wages (our proxy for variable production costs). Hence, for vertical service FDI skill-seeking considerations may dominate cost-saving ones.

1.2.4 Host-Country Differences

The summary statistics in the previous section have shown that manufacturing and service parents as well as their affiliates differ in some respects. These differences may then lead to diverging location choices. We examine the destination countries in order to gain some further intuition for the determinants of the FDI location decision, and whether they vary between service and manufacturing FDI. First, we categorize the economies according to their GDP per capita using the World Bank classification of country incomes (World Bank, 2011). According to this classification 16 percent of all countries are low-income countries, 26 percent are lower-middle income countries, 25 percent are upper-middle income countries, and 33 percent are high-income countries. We observe that service affiliates are more concentrated in the high-income OECD countries than manufacturing affiliates. Roughly 80 percent of service affiliates are located in high-income OECD countries compared to approximately 70 percent of manufacturing affiliates. The share of horizontal service affiliates in high-income OECD countries amounts to 85 percent but even for vertical service affiliates the share is 83 percent for those with service parents and 77 percent for those with manufacturing parents.

In Figure 1.2 we depict the distribution of affiliate sectors for all destination countries. First of all, the extraordinary role of the wholesale sector becomes obvious again. Furthermore, the importance of analyzing service FDI is also highlighted as nine of the 15 most important affiliate sectors are service sectors. In Figure 1.3 we only focus on low, lower-middle and upper-middle income countries. For these countries the dominant role of the wholesale sector, though still the most important affiliate sector, is significantly reduced. The manufacturing sector plays a much more important role. This may indi-

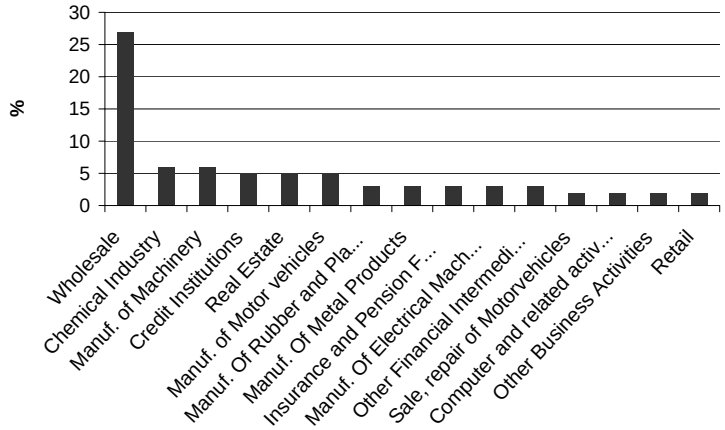


Figure 1.2: Distribution of Affiliate Sectors

cate that the cost-saving argument for vertical FDI through lower host-country wages is relevant for manufacturing FDI but not for service FDI. Conversely, service FDI is much more concentrated in high-income countries as can be seen in Figure 1.4. There, the three most important affiliate sectors are the service sectors wholesale, real estate, and credit institutions.

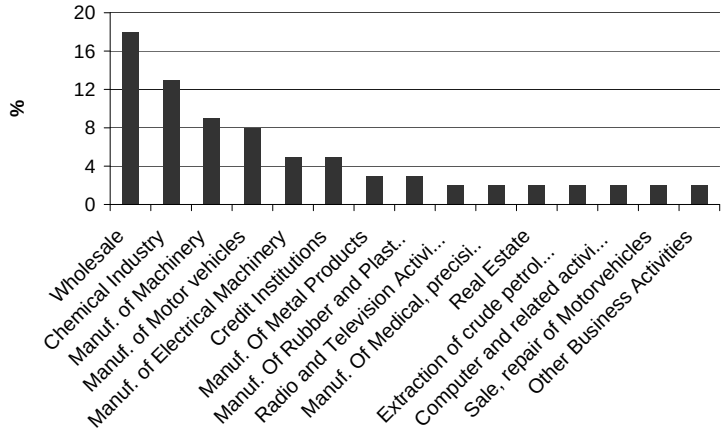


Figure 1.3: Distribution of Affiliate Sectors in Low, Lower-Middle and Upper-Middle Income Countries

As the bulk of FDI goes to OECD countries we also introduce a within-OECD categorization of country-incomes into *low*, *middle*, and *high* according to their GDP per capita. This allows us to highlight differences in the location decision within the group of high-income OECD countries. Even among these countries we observe a similar pattern as the one for all countries. Roughly 70 percent of all service affiliates are concentrated in

high-income OECD countries compared to approximately 60 percent of the manufacturing affiliates.

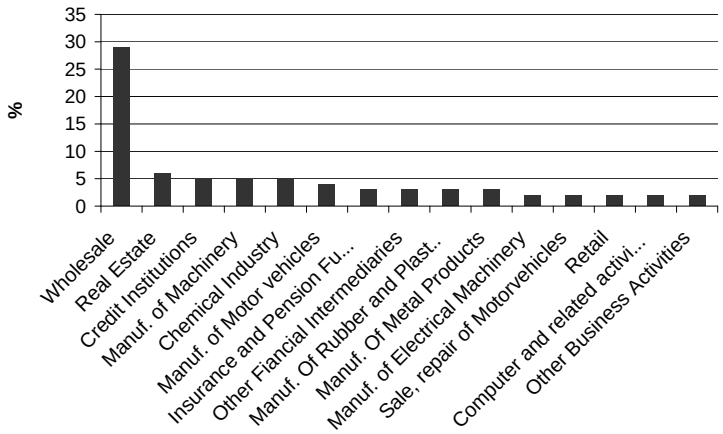


Figure 1.4: Distribution of Affiliate Sectors in High-Income OECD and Non-OECD Countries

Returning to the classical distinction between vertical and horizontal FDI, one would expect horizontal FDI to be more concentrated in the high-income countries due to market-seeking motivations while finding vertical FDI to be less concentrated in high-income economies due to the cost-saving argument. This pattern can, however, not be found in our data. Vertical FDI is as concentrated in high-income countries as horizontal FDI. Instead, the divergence between the theoretical predictions and our findings seems to be driven by the different affiliate sectors.

1.2.5 Core Competences of Countries

The pronounced concentration of service FDI in high-income countries may be driven by the fact that these countries generally have a more developed service sector. Conversely, the fact that manufacturing FDI is less concentrated in high-income countries may be the case because lower-income countries are still more specialized in the manufacturing sector. Therefore, we also look at the relation between a country's core competence and the inward FDI it attracts.

We measure the core competence according to an economic sector's share of GDP using World Bank data. We choose a threshold of 50 percent of GDP for the service sector

and of 30 percent of GDP for the manufacturing sector. According to this definition, 75 percent of the countries considered have a core competence in the service sector and 49 percent have a core competence in the manufacturing sector.[5] Due to data limitations we cannot construct a measure of core competence on a more disaggregated level. Therefore, we have to rely on the differentiation between primary, secondary and tertiary sector where we only use the latter two.

Subsequently, we see that service FDI is more concentrated in high-income countries given that these have a core competence in the service sector. In contrast, manufacturing FDI is less concentrated in high-income countries given that these have a core competence in manufacturing. These results may be driven by the fact that all countries with a core competence in the service sector are mostly high-income countries, whereas for countries with a core competence in the manufacturing sector the share of lower-income countries is considerably higher.

This fact may also explain the large differences in average wages between countries with a core competence in the manufacturing sector and countries with a core competence in the service sector. The monthly average wage for countries with a core competence in the service sector amounts to US$ 1387 on average. This is a lot higher than the wage in countries with a core competence in the manufacturing sector, where it lies at US$ 977.

Given these wage differences, the theory on VFDI tells us that high average wages should make the countries with a core competence in the service sector less attractive as a location for FDI. Thus, we may conclude that the fact that service FDI is more concentrated in high-income countries may be driven by their specialization in the service sector. Similarly, manufacturing FDI being less concentrated in high-income countries can be explained by the relatively high frequency of lower income countries having a core competence in the manufacturing sector.

[5]Note that on average the service and the manufacturing sector in the countries covered by the data account for 50 percent and 27 percent of GDP, respectively. Hence, so as to avoid assigning all countries a core competence in manufacturing and/or in services we chose the different thresholds for the two sectors. Obviously, according to this definition some countries may appear to have a core competence in both, services and manufacturing.

1.3 Data Description

We use firm-level data on the universe of German multinationals and their activity abroad, which is provided by the Deutsche Bundesbank in the Micro-Database Direct Investment (MiDi). This is a panel dataset for the years of 1996 to 2009 of which we consider the years 1999 to 2008. As the reporting thresholds have changed over this period of time, we consider all firms which hold 50 percent or more of the shares or voting rights of a foreign enterprise with a balance sheet total of more than 3 million Euro.[6] These firms are legally required to report to the Deutsche Bundesbank information on the sector, legal form as well as the number of employees and balance sheet information of the foreign affiliate (Lipponer, 2009). Our sample comprises a total of 4273 parent firms holding foreign affiliates in at least one of the 132 host countries and in at least one of the years from 1999 to 2008. Of these parent firms, 3242 have no wholesale affiliate versus 1774 that do. The countries included in our estimation sample are listed in Table 1.9 in Appendix A. With these we cover 74 percent of total German outward FDI activities.[7]

In order to identify the different determinants of the FDI location decision for firms in the different sectors, and for the different types of FDI we add several host country characteristics to the MiDi-Data. There exist many studies on the determinants of bilateral FDI using country-level data, which control for various country characteristics. In order to choose our controls we drew upon the studies by Blonigen & Piger (2011) and Eicher et al. (2011), who use Bayesian Model Averaging in order to find robust FDI determinants. These include GDP-related measures, geography measures, endowment measures, and institutional variables. For the GDP-related measures we include *GDP per capita*. As a geography measure we use a country's *remoteness*. This variable measures the distance of the host country from all other countries in the world weighted by those other countries' share of world GDP. It may capture export-platform motives where a firm invests in a country to export to other surrounding countries (Ekholm et al., 2007).[8] Moreover, to

[6] We also deflate the balance sheet total to make the data comparable over time.

[7] Unfortunately, due to data limitations with respect to country characteristics, the regression sample does not comprise, *inter alia*, the destination countries France, Switzerland, or the Netherlands.

[8] Note that we do not include the variable *distance* due to collinearity problems with the variable *remoteness*. The distance between countries tends to capture marginal trade costs, which is important for the decision between HFDI and exporting. We exclude this variable and include *remoteness* instead because we consider the latter to be of greater relevance for the research question at hand.

account for a country's endowment with human capital, we add *average years of schooling* for male and female persons aged older than 25 years from the Barro & Lee (2010) table of educational attainment. This data is available every five years between 1950 and 2010. In order to be able to use the data for our panel analysis, starting with 1995 we replace the missing two years before and after the year for which the data is available with the value of that year. We include average years of schooling in order to account for skill-seeking vertical FDI, which we assume to be of particular importance for service affiliates.[9] In addition, we include *monthly average wages* as a factor-cost measure. The wage dataset was prepared by Harsch & Kleinert (2011) making use of the October Inquiry database of the International Labor Organization (ILO). Average wages shall capture traditional cost-saving motives for vertical FDI. To control for a country's institutional environment we include the variable *rule of law*, which measures contract enforceability and protection of intellectual property rights, and a variable for *corruption control*. We also include a variable measuring the percentage of fixed broadband *internet subscribers* since we consider this type of infrastructure to be particularly relevant for services. As several studies have already stressed tax evasion motives for FDI, we also add countries' *statutory tax rate* (see, e.g., de Mooij & Ederveen, 2003, for a review). We obtain the tax rates from the European Tax Handbook (van Boeijen Ostaszewska, 2011) as well as the Global Corporate Tax Handbook (Gutiérrez et al., 2011). Further, we construct a control variable *core competence* indicating whether there is a match between the sector of an affiliate and the sector in a destination country (manufacturing or service) that is relatively economically important. Note again that the service and the manufacturing sector are considered to be economically important when their share is greater or equal to 50 percent or greater or equal to 30 percent of GDP, respectively. We include this control to test whether affiliates in services and manufacturing tend to be attracted by a relative degree of specialization in one of the two sectors. Finally, in order to control for the conventional fixed cost of setting up a foreign affiliate, we include the variable *market entry*. It is an index computed in 5-year intervals since 1970 and annually since 2000. The latest update is published in the 2011 Economic Freedom of the World annual report (Gwartney et al., 2011). It measures

[9]We are aware of the fact that average years of schooling are only an imperfect measure of human capital. Therefore, we also used the absolute number of tertiary school enrollment. This, however, did not yield more informative results.

the performance of countries in terms of the cost of starting a new business. As such, it captures the time (measured in days) necessary to comply with regulations when starting a limited liability company, money costs of the fees paid to regulatory authorities (measured as a share of per-capita income), and funds that must be deposited into a company bank account (measured as a share of per-capita income).

1.4 Empirical Strategy

The analysis of FDI involves two intriguing questions: first, which country characteristics determine where an affiliate is located? Second, which country-characteristics determine how much a parent firm decides to invest in a particular country? Hence, we estimate the extensive margin as a binary choice model and the intensive margin conditional on the investment having taken place. We use a two-part model, which allows us to estimate both margins separately. It assumes that conditional on a set of covariates the mechanisms determining the location decision and the amount invested are independent. Therefore, we inflate the dataset such that each firm can invest in each country in each year. Consequently, we have a lot of zeros in our dataset. Leung & Yu (1996) argue that two-part models are more appropriate than selection models if many zeros are observed in the participation decision.

Let y_{ijt} be the outcome of firm i in host country j in year t ($i = 1, ..., N$, $j = 1, ..., J$ and $t = 1, ..., T$). The two-part model for y_{ijt} is then given by

$$f(y_{ijt}|.) = \begin{cases} Pr(I_{ijt} = 0|\mathbf{z_{jt-1}}, \alpha_i) & \text{if } y_{ijt} = 0, \\ Pr(I_{ijt} = 1|.) f(y_{ijt}|I_{ijt} = 1, \mathbf{x_{jt-1}}, \alpha_i) & \text{if } y_{ijt} > 0. \end{cases} \tag{1.1}$$

I_{ijt} is a binary indicator variable taking on the value 1 if a firm i holds an affiliate in host country j in year t and 0 otherwise. $\mathbf{z_{jt}}$ is a vector of country-specific explanatory variables including an exclusion restriction, $\mathbf{x_{jt}} \subset \mathbf{z_{jt}}$ is a vector of country-specific explanatory variables not including the exclusion restriction and α_i is a time-invariant firm-specific effect. We control for countries' statutory tax rates, average years of schooling, GDP, yearly average wages, market entry costs, the percentage share of internet subscribers, a destination country's remoteness, the fit between affiliate sector and a country's core

competence, the measure of corruption control and rule of law. Further, we control for firm fixed effects. The costs of starting a business in a country serve as our exclusion restriction. We argue that it determines the market-entry decision. However, as these costs are sunk, once a firm has entered a country the costs of starting a business should not influence how much to invest in the country.

We estimate the extensive margin by specifying $Pr(I_{ijt} = 1|.)$ as a linear probability model (LPM) and as a probit. Using the linear probability model allows us to control for firm fixed effects by employing the *within* transformation. Note that this does not work in the probit model. However, we can also control for firm fixed effects by inserting the respective means of all covariates (following Mundlak, 1978; Chamberlain, 1980), which Chamberlain (1980) called a *random effects probit model*.[10] We cannot just include firm dummies in the probit model as all coefficients would be biased due to the incidental parameters problem (Wooldridge, 2010).

Unfortunately, we cannot include country fixed effects as we do not have enough variation in our country characteristics over time. However, we do think that we include the most important country characteristics such that the probability of an omitted variables bias due to unobserved country characteristics is sufficiently low. Furthermore, we include all country characteristics lagged once. First, this acknowledges the duration of an investment decision. From the point when the firm considers investing up to the actual effectuation of the investment it will probably take about a year. Therefore, the country characteristics at the time when the firm decides about the investment should matter, and not at the time of the realization of the investment. Second, using lags ensures that there are no year-specific shocks influencing both, the country's characteristics as well as the firm's investment in the country.[11]

The intensive margin of FDI, $f(y_{ijt}|I_{ijt} = 1, \mathbf{x_{jt-1}}, \alpha_i)$, is estimated using OLS. Similar to the LPM estimating the extensive margin we again control for firm fixed effects by applying the *within* transformation. We use standard errors clustered at the country-level for the estimation of both, the extensive and the intensive margin of the investment.

[10] We do not use a fixed effects logit model as the average partial effects cannot be estimated using this method (Wooldridge, 2010).

[11] As a robustness check we have also included year dummies in our specification. This does not change our results.

Hence, we account for the fact that the error terms will probably be correlated within a country but not across countries. Cameron & Miller (2010) have pointed out that cluster-robust inference asymptotics are based on the assumption that the number of clusters goes to infinity. In our sample we have 45 clusters. Therefore, we also use bootstrap standard errors proposed by Cameron & Miller (2010) as a finite-sample adjustment.

The assumption that conditional on a set of covariates the mechanisms determining the location decision and the amount invested are independent is quite restrictive. Hence, we also use a selection model to estimate the extensive and intensive margin jointly. Due to the panel structure of our data and as we seek to incorporate firm fixed effects we cannot use a standard Heckman selection model. Instead, we apply the procedure proposed by Wooldridge (1995). First, we estimate a binary choice model using standard probit for each year of our time period.

$$Pr(y_{ij}|\mathbf{z_j}) = \Phi(\mathbf{z_j}\gamma) \quad \text{for each } t = 1999, 2000, ..., 2008 \tag{1.2}$$

where $\mathbf{z_j}$ includes the exclusion restriction market entry costs. Note that to be in accordance with the extensive margin of the two-part model we also use the lags of the explanatory variables in the cross-sectional probit regressions. Using the ensuing estimation results we compute the value of the inverse Mills ratio for each year and each firm-country-observation ij, i.e.,

$$\hat{m}_{ij} = \frac{\phi(\mathbf{z_j}\hat{\gamma})}{\Phi(\mathbf{z_j}\hat{\gamma})} \quad \text{for each } t = 1999, 2000, ..., 2008. \tag{1.3}$$

Second, we estimate the intensive margin using a fixed effects estimation and by adding the inverse Mills ratios as regressors. This yields the estimation equation

$$y_{ijt} = \xi_0 + \beta\mathbf{x_{jt-1}} + \rho\hat{m}_{ijt} + \alpha_i + \eta_{ijt}. \tag{1.4}$$

The standard errors are again clustered at the country level. In order to test whether we can use the two-part model or whether we have to control for selection, we need to compare the coefficients of the intensive margin resulting from the two estimation procedures (once controlling for selection, once not controlling for selection). Therefore, we estimate

them again by using seemingly unrelated regressions (SUR). Finally, we conduct a Chow-test to compare the coefficients of the two regressions (not regarding the Mills ratios in the selection model) (Chow, 1960). Using the Chow-test we can determine whether the coefficients are significantly different from each other and we can tell if controlling for selection does influence the results. The results are reported in Section 1.5.3.

1.5 Results

1.5.1 Extensive Margin

Horizontal versus Vertical FDI

The classical distinction in the FDI literature is made between horizontal and vertical FDI. HFDI is driven by market-seeking motivations and can be seen as a substitute to exporting (Markusen, 1984; Brainard, 1993). Therefore, one would expect firms to invest in high-income countries. VFDI is driven by cost-saving motivations, where firms invest in low-wage countries (Helpman, 1984). Accordingly, we first estimate the location decision for HFDI and VFDI separately. We identify HFDI as those affiliates which are in the same sector as the parent and VFDI as those affiliates which are in a different sector as the parent according to the NACE Rev 1.1 classification at the 3-digit level (Alfaro & Charlton, 2009).[12] We expect GDP to play an important role for horizontal FDI while for vertical FDI the average wage should have a negative effect on a firm's investment probability with respect to a potential host country.

In Table 1.1 we report the results of the LPM and random effects probit estimation for HDFI and VFDI. For the probit estimation we always report the average marginal effects. Columns 1 and 2 show the results for HFDI and columns 3 and 4 show the results for VFDI. Note that due to the special role of the wholesale sector we exclude wholesale affiliates. Wholesale affiliates owned by manufacturing firms, for example, would be classified as

[12]Note that all of the regressions were also conducted with bootstrap standard errors as suggested by Cameron & Miller (2010). However, we do not report the results here as this method leads to a drastic reduction in standard errors and we prefer to use the more conservative method of clustering at the country-level.

VFDI. However, the literature on wholesale FDI (or export-supporting FDI) suggests that the determinants differ from those of traditional VFDI because it should be treated as a type of (horizontal) trade (e.g., Bernard et al., 2010b).

In the LPM as well as in the probit model GDP is positively significant for both, HFDI and VFDI while the average wage is negatively significant for either type of FDI. This is counter-intuitive to what traditional theory teaches us. Further, a destination country's remoteness is found to be detrimental again for both types of FDI. This likely captures the fact that among the parent firms conducting VFDI and HFDI are also some that conduct FDI for more complex reasons such as the aforementioned export-platform motive. The market-entry costs also reduce the investment probability for both types of FDI, yet only in the probit regression. Thus, we cannot find robust differences between HFDI and VFDI. Exceptions are the share of internet subscribers in a destination country which is positively significant for vertical FDI in the probit estimation. The match between affiliate sector and a potential host-country's dominant sector, i.e., core comp., is positively significant for VFDI. It may be positive for VFDI (which seeks an efficiency-enhancing production location) since it could mean that there is a certain degree of expertise in that sector. The other country characteristics do not make a difference for the FDI location decision, neither for HFDI nor for VFDI. Overall, these results are in line with our summary statistics where we observed that VFDI is as concentrated in high-income countries as HFDI. Also, Blonigen (2005) stresses that many empirical studies of the determinants of FDI have failed to find support for the traditional theory of VFDI.

Manufacturing versus Service FDI

Since the distinction between HFDI and VFDI has not produced satisfactory results, we test our hypothesis that the real difference in the determinants of the FDI location decision lies in the differences between manufacturing and service affiliates. Columns 1 and 2 of Table 1.2 report the results for service FDI and columns 3 and 4 contain the results for manufacturing FDI. Wholesale affiliates are not considered in the estimation.[13] Again we find GDP to be positively significant both for service and manufacturing FDI.

[13]Including the wholesale sector does not change our results significantly.

Table 1.1: Extensive Margin: Estimation Results I

	Horizontal FDI		**Vertical FDI**	
	(1)	(2)	(3)	(4)
VARIABLES	LPM	Probit	LPM	Probit
tax	-0.00005	-0.00040	0.00006	-0.00031
	(0.00053)	(0.00041)	(0.00052)	(0.00044)
education	-0.00027	-0.00187	0.00118	-0.00044
	(0.00287)	(0.00217)	(0.00287)	(0.00204)
gdp	0.01735***	0.01681***	0.01726***	0.01681***
	(0.00359)	(0.00381)	(0.00395)	(0.00191)
av. wage	-0.02093***	-0.02055**	-0.02212***	-0.02227***
	(0.00764)	(0.00880)	(0.00817)	(0.00809)
market entry	-0.00407	-0.00748**	-0.00303	-0.00675***
	(0.00275)	(0.00243)	(0.00275)	(0.00874)
internet subscr.	0.00610	0.00917	0.00857	0.01147**
	(0.00632)	(0.00577)	(0.00680)	(0.00603)
remoteness	-0.05125***	-0.06971**	-0.05082***	-0.07016***
	(0.01476)	(0.02597)	(0.01364)	(0.01972)
core comp.	-0.00051	0.00736	0.00740	0.01569**
	(0.00677)	(0.00515)	(0.00591)	(0.00511)
corruption contr.	-0.00019	-0.00041	-0.00019	-0.00024
	(0.00057)	(0.00068)	(0.00058)	(0.00064)
rule of law	0.00090	0.00117	0.00083	0.00096
	(0.00055)	(0.00074)	(0.00053)	(0.00066)
Firm FE	yes	yes	yes	yes
Observations	283547	283547	119880	119880
No. of countries	44	44	44	44
No. of parent firms	2206	2206	1168	1168
R^2	0.0284	0.1124	0.0285	0.1067

The dependent variable is the indicator variable I_{ijt} taking on the value 1 if a firm has invested in country j at time t and 0 otherwise. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *market entry* measures the cost of starting a new business. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

This time, however, for manufacturing affiliates a country's monthly average wage has a significantly negative effect but is insignificant for service affiliates. This is in line with Hanson et al. (2005) and Feinberg & Keane (2001, 2006) who argue that the cost-saving motivation only seems to hold for a few particular manufacturing sectors. The fact that a country's average wage does not have an effect on the investment probability of a service affiliate may be explained by the fact that excluding wholesale and retail affiliates the most important service sectors are financial services and business services. For these services a factor-cost reduction is unlikely to be the driving force of the location decision. Here, the institutional environment, tax and regulatory policies rather seem to matter. Thus, our estimation results and the summary statistics indicate that the real difference in FDI determinants is driven by the distinction between manufacturing and service affiliates.

Concerning the other coefficients, market-entry costs reduce the investment probability for both, service as well as manufacturing firms, but they are only statistically significant in the probit regressions. A destination country's remoteness is negatively significant for manufacturing and service FDI, and the core-competence match is positive for service and manufacturing FDI in the LPM and in the probit regression, respectively. Further, the prevalence of rule of law statistically significantly increases the investment probability for service FDI, while it does not matter for manufacturing FDI. This result seems intuitive since knowledge in the service sector is often intangible and, hence, requires strong intellectual property protection (e.g., think of engineering and R&D services). The remaining covariates statutory tax rate, education, internet subscribers, and corruption control do not make a difference for the investment probability. Overall, the results of the LPM and the random effects probit estimation are very similar, which underpins the robustness of our results.

In Table 1.3 we report the results for a linear probability estimation, which include the same covariates as before plus an interaction term of the core-competence dummy and average wages.[14] The assumption behind the inclusion of the interaction term is that if there is a match between the affiliate sector and a country's core competence (so the country has a certain degree of expertise in that sector) then the average wages prevailing

[14]We only estimate the LPM since in a probit regression the interaction effect in nonlinear models does not equal the marginal effect of the interaction term, which can even be of the opposite sign (Ai & Norton, 2003).

Table 1.2: Extensive Margin: Estimation Results II

	Service FDI		**Manuf. FDI**	
	(1)	(2)	(3)	(4)
VARIABLES	LPM	Probit	LPM	Probit
tax	0.00036	-0.00027	-0.00026	-0.00042
	(0.00046)	(0.00041)	(0.00057)	(0.00046)
education	-0.00284	-0.00354	0.00246	-0.00011
	(0.00284)	(0.00245)	(0.00293)	(0.0020)
gdp	0.01501***	0.01518***	0.01835***	0.01726**
	(0.00324)	(0.00381)	(0.00365)	(0.00855)
av. wage	-0.00921	-0.00942	-0.02708***	-0.02747*
	(0.00817)	(0.00834)	(0.00767)	(0.01564)
market entry	-0.00319	-0.00782**	-0.00449	-0.00744*
	(0.00288)	(0.00248)	(0.00284)	(0.00420)
internet subscr.	0.00637	0.00949	0.00814	0.012390
	(0.00636)	(0.00579)	(0.00658)	(0.00822)
remoteness	-0.05952***	-0.06784**	-0.04265***	-0.06840*
	(0.01533)	(0.02205)	(0.01340)	(0.04007)
core comp.	0.01944**	0.01988	-0.00742	0.00295**
	(0.00677)	(0.01611)	(0.00768)	(0.00694)
corruption contr.	-0.00061	-0.00023	-0.00019	-0.00041
	(0.00046)	(0.00051)	(0.00050)	(0.00043)
rule of law	0.00112**	0.00147**	0.00088	0.00115
	(0.00055)	(0.00064)	(0.00054)	(0.00077)
Firm FE	yes	yes	yes	yes
Observations	147084	147084	256852	256852
No. of countries	45	45	45	45
No. of parent firms	1244	1244	1866	1866
R^2	0.0317	0.1098	0.0288	0.1159

The dependent variable is the indicator variable I_{ijt} taking on the value 1 if a firm has invested in country j at time t and 0 otherwise. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *market entry* measures the cost of starting a new business. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

Table 1.3: Extensive Margin: Estimation Results III

	Service FDI	**Manuf. FDI**
	(1)	(2)
VARIABLES	LPM	LPM
tax	0.00038	-0.00026
	(0.00046)	(0.00056)
education	-0.00287	0.00223
	(0.00285)	(0.00299)
gdp	0.01502***	0.01799***
	(0.00324)	(0.00381)
av. wage	-0.00213	-0.02563***
	(0.01048)	(0.00834)
market entry	-0.00304	-0.00456
	(0.00292)	(0.00289)
internet subscr.	0.00611	0.00852
	(0.00636)	(0.00640)
remoteness	-0.06061***	-0.04306***
	(0.01577)	(0.02205)
core comp.	0.00857	0.00598
	(0.00865)	(0.00737)
wage-core	-0.01156	-0.00313
	(0.00943)	(0.00625)
corruption contr.	-0.00056	-0.00026
	(0.00047)	(0.00049)
rule of law	0.00109**	0.00093*
	(0.00048)	(0.00052)
Firm FE	yes	yes
Observations	147084	256852
No. of countries	45	45
No. of parent firms	1244	1866
R^2	0.0317	0.0289

The dependent variable is the indicator variable I_{ijt} taking on the value 1 if a firm has invested in country j at time t and 0 otherwise. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *market entry* measures the cost of starting a new business. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

in that country should matter less or not at all. In fact, we find this to be the case. As before, average wages are only statistically significant for manufacturing affiliates and reduce their investment probability. The interaction term, however, is insignificant for both, which supports our assumption: if the core competence dummy equals unity, wages do not matter for the investment decision. Other statistically significant regressors are GDP (positive for both sectors), remoteness (negative for both), and rule of law, which is also positive for both sectors but has a stronger impact on service FDI.

In summary, we have found that the determinants for manufacturing and service FDI differ. Wages seem to play a decisive role for manufacturing FDI while they are unimportant for service FDI. Also, institutional variables such as the protection of property rights and legal contract enforcement matter for the FDI location decision in services but not in manufacturing.

The Heterogeneity within the Service Sector

Figure 1.2 depicts that the nine service sectors which are among the 15 most important affiliate sectors are quite different. The dominant wholesale sector can be seen as export-supporting. Hence, it should target high-income countries. Additionally, it is a low-skill intensive sector. Therefore, skill-seeking arguments that apply to the IT sector for example, which strongly invested in countries such as India, should not play a role. Instead, we hypothesize that a combination of both, high purchasing power (a high-income country), and a low-wage workforce is optimal. Conversely, business services are high-skill intensive. Investment in these sectors may, thus, be driven by skill-seeking arguments.

Therefore, in this section we account for the heterogeneity of the service sector by analyzing the wholesale and the business service sector separately. We use the same controls as before. We think that the covariate remoteness is of particular relevance for wholesale FDI. Remoteness may capture export-platform FDI motivations as it measures a country's proximity to other potentially attractive high-income destination countries (Ekholm et al., 2007).

In Table 1.4 we report the estimation results for business services and for the wholesale

Table 1.4: Extensive Margin: Estimation Results IV

	Business Service FDI		**Wholesale FDI**	
	(1)	(2)	(3)	(4)
VARIABLES	LPM	Probit	LPM	Probit
tax	-0.00004	-0.00062	0.00057	-0.00008
	(0.00048)	(0.00042)	(0.00050)	(0.00055)
education	-0.00360	-0.00415*	0.00208	-0.00380
	(0.00310)	(0.00251)	(0.00337)	(0.00274)
gdp	0.01519***	0.01535***	0.02516***	0.02311***
	(0.00304)	(0.00112)	(0.00439)	(0.00308)
av. wage	-0.00658	-0.00389	-0.02108**	-0.01562
	(0.00760)	(0.00764)	(0.01000)	(0.01097)
market entry	-0.00302	-0.00708***	0.00093	-0.00338
	(0.00241)	(0.00188)	(0.00298)	(0.00269)
internet subscr.	0.00510	0.00753	0.00785	0.00941
	(0.00722)	(0.00748)	(0.00819)	(0.00900)
remoteness	-0.04370**	-0.03958**	-0.05952***	-0.04049**
	(0.01685)	(0.01921)	(0.01944)	(0.02018)
core comp.	0.01943**	0.01354	0.03348**	0.05045***
	(0.00916)	(0.01437)	(0.01281)	(0.01606)
corruption contr.	-0.00051	-0.00065	0.00049	0.00001
	(0.00047)	(0.00050)	(0.00064)	(0.00082)
rule of law	0.00087*	0.00101*	0.00038	0.00095
	(0.00046)	(0.00059)	(0.00057)	(0.00083)
Firm FE	yes	yes	yes	yes
Observations	24970	24970	242787	242787
No. of countries	45	45	44	44
No. of parent firms	279	279	1663	1663
R^2	0.0269	0.1026	0.0456	0.1218

The dependent variable is the indicator variable I_{ijt} taking on the value 1 if a firm has invested in country j at time t and 0 otherwise. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *market entry* measures the cost of starting a new business. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

sector.[15] GDP is positively significant for both sectors. This is in line with the idea that wholesale FDI is mostly driven by market-seeking motivations as it is export-supporting. The positive and significant sign, albeit possibly more indirect, is also conceivable for business services. These are often supportive activities for other firms that may benefit from a larger market. Average wages are negatively significant only for wholesale services and only in the LPM. Hence, for wholesale services average wages seem to have a negative impact. This may be explained by the low qualification needed for working in the wholesale sector. One may also argue that the wholesale sector is probably quite homogeneous and, thus, competing in prices rather than in quality. Market-entry costs statistically significantly reduce the investment probability for business services but only in the probit estimation. A country's remoteness is significantly negative for both sectors and in all estimations. In case of wholesale services this supports the idea that it is a form of export-platform FDI. For business services a similar argumentation as for the GDP variable may apply. The core-competence match is positively significant for business services (in the LPM) and for wholesale affiliates (LPM and probit). This relates to the result for service FDI in the previous section: service FDI — in this case business and wholesale services — seems to be attracted by a relatively large service sector in the destination country (while we saw that manufacturing FDI is rather repelled). A relatively large service sector could imply that there is a certain degree of expertise in services in the economy but also that incumbent service firms attract new entrants because they require their services. The latter is quite conceivable for business services which include legal counsel, real estate, IT, etc. The prevalence of rule of law is only positively significant for business services (in the LPM and in the probit), which supports the hypothesis that as these services are high-skill intensive there tends to be a greater amount of intellectual property worth protecting. The remaining covariates statutory tax rate, internet subscribers and corruption control do not play a role for either business service FDI or wholesale FDI.

These results underline that within the service sector different determinants for the FDI location decision play a role. These differences seem to be driven by skill-differences but

[15]Note that convergence was not achieved in the probit estimation for the wholesale sector. This could either imply that the results are valid, but that there is collinearity in the model which STATA did not catch. Or, the optimizer entered a flat region of the likelihood and prematurely declared convergence. In any case, the interpretation of the results reported here should be done cautiously.

also by special characteristics of each sector.

1.5.2 Intensive Margin

For policy makers it is not only important whether a firm invests in their countries but also how much it invests. Hence, we now analyze the determinants of the intensive margin. Our dependent variable is FDI stock. Since we use data from 1999 to 2008 we deflate the FDI stock to be able to compare it over time. Furthermore, we take the logarithm as the variable is highly skewed. As the dependent variable is continuous we estimate the intensive margin of investment using only OLS. In all of the following regressions we include the same covariates as in the analysis of the extensive margin except for our exclusion restriction, the market entry costs.

Horizontal vs. Vertical FDI

Again, we first analyze if there are significant differences in the location determinants for HFDI and VFDI. Table 1.5 reports the estimation results, column 1 for HFDI and column 2 for VFDI. We see that just as for the extensive margin of investment, there is no difference in the relevant determinants of how much a firm wishes to invest in a particular country when we distinguish between horizontal and vertical affiliates. GDP is highly positively significant for both types of FDI. Further, in both cases average wages are statistically negatively significant, albeit with a larger coefficient for vertical FDI. This is in line with the cost-saving motive postulated by traditional theories. Remoteness is also negatively significant for both types of FDI. The remainder of the covariates does not matter for a firm's decision on how much to invest.

Manufacturing vs. Service FDI

Since the intensive margin of investment of HFDI and VFDI seems to be determined by the same factors we now examine whether this is also the case for service and manufacturing FDI. Table 1.6 reports the estimation results of the intensive margin again only using OLS. In columns 1 and 2 we report the results for manufacturing and service FDI,

Table 1.5: Intensive Margin: Estimation Results I

	Horizontal FDI	**Vertical FDI**
	(1)	(2)
VARIABLES	OLS	OLS
tax	0.00778	0.01623
	(0.00577)	(0.01148)
education	0.03997	0.02197
	(0.02388)	(0.04990)
gdp	0.14410***	0.21909***
	(0.04005)	(0.06113)
av. wage	-0.19368***	-0.43313***
	(0.08045)	(0.15473)
internet subscr.	0.11973	0.11981
	(0.10050)	(0.19246)
remoteness	-0.82377***	-1.40881***
	(0.22229)	(0.41422)
core comp.	0.07652	0.00567
	(0.06943)	(0.09594)
corruption contr.	0.00414	0.00469
	(0.00515)	(0.00824)
rule of law	-0.00052	-0.00050
	(0.00412)	(0.00790)
Firm FE	yes	yes
Observations	13770	6269
No. of countries	48	46
No. of parent firms	2023	1075
R^2	0.0387	0.0605

The dependent variable is *fdi-stock* which we depreciate and take the logarithm from. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

respectively. Indeed, similar to the extensive margin, different host-country characteristics seem to influence the size of the investment in the two sectors. While average wages are statistically insignificant for services, they are statistically significantly reducing the amount invested in manufacturing. The core-competence match is positively significant only for manufacturing and the measure of corruption control is negatively significant only for services. Also, rule of law statistically significantly increases the amount invested in services, but it does not play a role for manufacturing. GDP is positive and significant for both sectors. However, it is of higher economic significance for the service sector than for the manufacturing sector. The host-country's remoteness is negative and significant for both. The latter again implies that the more a country is surrounded by high-income countries the more will be invested in this country. Statutory taxes and average years of schooling do not matter for the amount invested in either sector.

In Table 1.7 we repeat the OLS estimations for the intensive margin of service and manufacturing FDI where we include an interaction term. Just as in the regressions of the extensive margin of FDI the covariate interacts average wages with the core-competence match. The hypothesis is again that the wage of a country having a core-competence in the same sector as the sector of the affiliate should matter less for the amount invested. Indeed, we find that wages in countries without a core competence in the same sector are negatively significant for manufacturing FDI (this repeats the results from the previous regression). They are insignificant for services. However, as we see that the core-competence match is positively significant for manufacturing, the negative effect of wages is reduced in countries whose dominant sector matches that of the affiliate. This may hint at industrial clustering, which is perceived to be beneficial. Further, GDP is again highly positively significant for both sectors, remoteness is negatively significant for both, and the prevalence of rule of law is positively significant only for services.

In summary, these results show that diverging host-country characteristics not only determine the extensive margin of service and manufacturing FDI but also the intensive margin.

Table 1.6: Intensive Margin: Estimation Results II

	Service FDI	**Manuf. FDI**
	(1)	(2)
VARIABLES	OLS	OLS
tax	0.00959	0.00229
	(0.01110)	(0.00532)
education	-0.01680	0.03447
	(0.05601)	(0.02758)
gdp	0.28643***	0.09957***
	(0.08111)	(0.03078)
av. wage	-0.25088	-0.23569***
	(0.17494)	(0.07696)
internet subscr.	-0.05458	0.15190
	(0.20917)	(0.10750)
remoteness	-0.98828***	-0.83360***
	(0.36494)	(0.24966)
core comp.	0.37205	0.12022**
	(0.50671)	(0.04670)
corruption contr.	-0.01992*	-0.00508
	(0.01179)	(0.00369)
rule of law	0.02635***	0.00725
	(0.00921)	(0.00499)
Firm FE	yes	yes
Observations	9180	10716
No. of countries	47	47
No. of parent firms	1116	1716
R^2	0.0587	0.0421

The dependent variable is *fdi-stock* which we depreciate and take the logarithm from. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. wage-core interacts the wage and the core competence variable. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

Table 1.7: Intensive Margin: Estimation Results III

	Service FDI	**Manuf. FDI**
	(1)	(2)
VARIABLES	OLS	OLS
tax	0.00960	0.00281
	(0.01108)	(0.00500)
education	-0.01659	0.04662
	(.056008)	(0.02842)
gdp	0.28739***	0.10225***
	(0.08179)	(0.03040)
av. wage	0.15391	-0.31834***
	(0.45506)	(0.09118)
internet subscr.	-0.05508	0.14706
	(0.20842)	(0.10010)
remoteness	-0.99818***	-0.86000***
	(0.36643)	(0.23669)
core comp.	-0.30733	0.11944***
	(0.96004)	(0.04401)
wage-core	-0.41087	0.15985*
	(0.47048)	(0.09322)
corruption contr.	-0.01852	-0.00251
	(0.01193)	(0.00428)
rule of law	0.02512***	0.00451
	(0.00925)	(0.00572)
Firm FE	yes	yes
Observations	9180	10716
No. of countries	47	47
No. of parent firms	1116	1716
R^2	0.0588	0.0443

The dependent variable is *fdi-stock* which we depreciate and take the logarithm from. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

Heterogeneity within the Service Sector

Our final set of regression results with respect to the intensive margin of service FDI takes again the heterogeneity within the service sector into account. Columns 1 and 2 in Table 1.8 report the results for the OLS regressions estimating the intensive margin of FDI in business and in wholesale services, respectively. The estimates resemble those that we found for the extensive margin which were reported in Table 1.4. The host-country's GDP is positively significant for the amount invested in both service sectors. Average wages only statistically significantly reduce the amount invested in wholesale services. This can probably be explained by similar reasons as for the extensive margin. Contrary to the extensive margin, here the percentage share of broadband internet subscribers (a measure of infrastructure development) is positively significant for business services. This result is intuitive when we think of broadband internet as a major means for work in this sector. The host country's distance from other lucrative locations is again negatively significant for the amount invested in both sectors. The remaining covariates, statutory taxes, average years of schooling, corruption control, and rule of law appear not to play a role.

We have seen that the extensive and the intensive margin of investment are determined by diverging host-country characteristics. At the same time, at both margins the data reveals that against theoretical predictions there is no difference in the determinants of HFDI and VFDI: GDP positively affects the amount invested for both while higher wages reduce the investment size, and other coefficients are also similar for both types of FDI. Instead, the true difference seems to stem from the inherent differences between the manufacturing and the service sector.

1.5.3 Robustness Checks

Does the Parent Sector Matter?

In the summary statistics we saw that the affiliate sector makes a difference in the FDI location decision. Also, in the preceding estimation results we found that the real differ-

Table 1.8: Intensive Margin: Estimation Results IV

	Business Service FDI	**Wholesale FDI**
	(1)	(2)
VARIABLES	OLS	OLS
tax	-0.00087	0.00458
	(0.01173)	(0.00549)
education	0.00597	-0.02406
	(0.05793)	(0.02869)
gdp	0.36851***	0.29617***
	(0.08048)	(0.03959)
av. wage	-0.02761	-0.22065**
	(0.21222)	(0.08245)
internet subscr.	0.60067**	0.08496
	(0.22608)	(0.00577)
remoteness	-0.91654*	-0.48765*
	(0.50433)	(0.24306)
core comp.	-0.24244	-0.05218
	(0.48518)	(0.13435)
corruption contr.	0.00906	-0.00549
	(0.01287)	(0.00933)
rule of law	0.00538	0.01303
	(0.01457)	(0.00830)
Firm FE	yes	yes
Observations	1745	11247
No. of countries	37	45
No. of parent firms	330	1378
R^2	0.0925	0.0510

The dependent variable is *fdi-stock* which we depreciate and take the logarithm from. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

ence between FDI determinants seems to be driven by the affiliate sector. In this section, we look at the role of the parent sector. We estimate the extensive margin using the linear probability model with clustered standard errors for service affiliates that have either service or manufacturing parents, and for manufacturing affiliates with either service or manufacturing parents. For service affiliates with service parents and manufacturing affiliates with manufacturing parents we only consider VFDI in order to be able to compare them more appropriately.

Table 1.10 in Appendix A reports the results. Columns 1 and 2 show the results for service affiliates having service parents and manufacturing parents, respectively, and columns 3 and 4 show the results for manufacturing affiliates having service parents and manufacturing parents. The results show that the decision where to invest also differs slightly between the parent sectors. GDP has a significantly positive impact and remoteness has a significantly negative impact on the location decision for all affiliate and parent sector combinations. The only exception is the average wage as a determinant of the FDI location decision. For both, manufacturing and service parents of manufacturing affiliates the average wage has a significantly negative impact on the location decision. However, for service affiliates with a service parent a country's average wage does not matter but it has a significantly negative impact on manufacturing parents that want to set up a service affiliate. Further, a country's specialization in the service sector increases the investment probability for service affiliates with service parents. For service affiliates with a manufacturing parent the diffusion of broadband internet subscribers has a significantly positive impact on the location decision. Finally, market entry costs have a significantly negative impact on manufacturing affiliates with a manufacturing parent.

In summary, while the affiliate sector makes the more important difference, which we have already seen in the summary statistics, the parent sector also seems to matter. This again stresses the importance of distinguishing between sectors instead of making the classical distinction between vertical and horizontal FDI.

Controlling for Selection

The results obtained from the two-part estimation rely on the assumption that, conditional on a set of covariates, the decision whether to invest in a country and how much to invest in that country are independent. In this section we relax the assumption of conditional independence and control for selection applying the procedure proposed by Wooldridge (1995).

Table 1.11 in Appendix A shows the estimation results for the intensive margin once controlling for selection by inserting the inverse Mills ratios and once without controlling for selection. We have conducted the estimation for service affiliates and for manufacturing affiliates. Here we only report the results for service affiliates. In order to judge whether the assumption of conditional independence is justifiable, we test whether the coefficients of the two regressions are significantly different using a Chow-test (Chow, 1960). Although the test statistic is not very high, the Null hypothesis that the coefficients are equal cannot be rejected. Thus, using the two-part model is appropriate.

1.6 Conclusion

Traditional theories on FDI have almost exclusively focused on manufacturing FDI. In this chapter, we raise the question of whether these theories can be applied to service FDI or whether service FDI and manufacturing FDI are driven by different factors. We specifically focus on how a firm's decision where to locate an affiliate (extensive margin) and how much to invest once a location has been chosen (intensive margin) is driven by host-country characteristics. The summary statistics and estimation results show that there is no difference in the country determinants between horizontal and vertical FDI, but that there is a difference between service and manufacturing FDI.

A lot of research remains to be done if we seek to gain a better understanding of FDI in the service sector. For instance, in addition to differentiating between service and manufacturing FDI more research on the relation between the two is needed. In how far can manufacturing and service FDI be seen as complementary? Furthermore, one could also consider the complexity of today's production processes which involve both

manufacturing and service tasks. One idea could be to implement the O-Ring theory of Kremer (1993) into a model of FDI to motivate both, manufacturing and service FDI. In this case, the position in the production chain could be the relevant determinant for the FDI location choice. Take, for example, business services, which tend to come in at later stages of the production chain when a large amount of value-added has already been generated. This value added would be at risk if a firm decides to locate its business service affiliate in a foreign country with a high inherent failure rate because, for example, the local workforce lacks the necessary skill-level to adequately perform the business service task. According to this logic, the factor-cost argument of the traditional theory should clearly fail to explain VFDI. Fortunately, conducting this research is facilitated by increasing availability of data at more and more disaggregated levels such as the Bundesbank's MiDi database. Ultimately, with this investigation we hope to contribute to the development of new theoretical approaches tailored to the service sector.

A Appendix of Tables

Table 1.9: List of Countries in the Estimation Sample

Italy	Ukraine
United Kingdom	Moldova
Ireland	Russia
Denmark	Slovenia
Greece	Croatia
Spain	Algeria
Belgium	Mauritius
Luxembourg	United States
Norway	Mexico
Sweden	Costa Rica
Finland	Peru
Austria	Brazil
Turkey	Chile
Estonia	Argentina
Latvia	Pakistan
Lithuania	India
Poland	Thailand
Czech Republic	Singapore
Slovak Republic	China
Hungary	Japan
Bulgaria	Hong Kong
Albania	Australia

Table 1.10: Extensive Margin: Impact of Parent Sector

	Service FDI		**Manuf. FDI**	
	Service Parent	**Manuf. Parent**	**Service Parent**	**Manuf. Parent**
	(1)	(2)	(3)	(4)
VARIABLES	(LPM)	(LPM)	(LPM)	(LPM)
tax	0.00037	0.00097	-0.00052	-0.00015
	(0.00046)	(0.00074)	(0.00059)	(0.00074)
education	-0.00015	-0.00200	0.00302	0.00481
	(0.00278)	(0.00414)	(0.00247)	(0.00344)
gdp	0.01412***	0.02715***	0.01383***	0.01916***
	(0.00374)	(0.00524)	(0.00329)	(0.00432)
av. wage	-0.00828	-0.03174***	-0.02752***	-0.03271***
	(0.00868)	(0.01067)	(0.00832)	(0.00907)
market entry	-0.00109	-0.00294	-0.00381	-0.00522*
	(0.00331)	(0.00393)	(0.00281)	(0.00306)
internet subscr.	0.00316	0.01726*	0.00729	0.01243
	(0.00641)	(0.01017)	(0.00677)	(0.00760)
remoteness	-0.05587***	-0.08250***	-0.03297**	-0.04383***
	(0.01273)	(0.02249)	(0.01366)	(0.01453)
core comp.	0.01138*	0.02711	-0.00139	-0.01057
	(0.00672)	(0.02109)	(0.00658)	(0.00863)
corruption contr.	-0.00019	-0.00007	-0.00011	-6.63e-06
	(0.00058)	(0.00077)	(0.00058)	(0.00072)
rule of law	0.00073	0.00074	0.00077	0.00068
	(0.00049)	(0.00071)	(0.00055)	(0.00068)
Firm FE	yes	yes	yes	yes
Observations	46908	15207	32749	25179
No of countries	45	45	45	45
No of parent firms	474	171	318	240
R^2	0.0320	0.0490	0.0194	0.0335

The dependent variable is the indicator variable I_{ijt} taking on the value 1 if a firm has invested in country j at time t and 0 otherwise. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *market entry* measures the cost of starting a new business. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

Table 1.11: Intensive Margin: Selection Model vs. Two-Part Model

	Selection	**Two-Part**
	(1)	(2)
VARIABLES	FE	FE
tax	-0.02790	0.00139
	(0.02507)	(0.00414)
education	-0.11195	-0.01755
	(0.08921)	(0.01948)
gdp	-0.02934	0.06869***
	(0.84534)	(0.01939)
av. wage	1.37171	-0.10574
	(1.27142)	(0.07178)
internet subscr.	-1.91516*	0.06679
	(1.00372)	(0.07766)
remoteness	-5.96669*	0.03333
	(3.61225)	(0.27784)
core comp.	(omitted)	-0.05034
		(0.40885)
corruption contr.	-0.10986	-0.01026
	(0.09969)	(0.00683)
rule of law	0.00873	0.0005
	(0.06804)	(0.00598)
Inverse Mills ratios	yes	no
Firm FE	yes	yes
Observations	4681	4681
No of countries	42	42
Chow Test chi2	13.29	
Prob > chi2	0.1499	

The dependent variable is *fdi-stock* which we depreciate and take the logarithm from. *tax* is a country's statutory tax rate. *education* stands for a country's average years of schooling. *gdp* is the logarithm of a country's GDP per capita. *av. wage* stands for the logarithm of a country's monthly average wage in US$. *internet subscr.* is the percentage share of internet subscribers in the population. *remoteness* measures are country's weighted distance to other destinations. *core comp.* is a dummy indicating a match between affiliate sector and a country's core competence in manufacturing or services. *corruption contr.* and *rule of law* measure the institutional environment in a destination country. All the country characteristics are lagged once. In all of the regressions we control for firm fixed effects. In the random effects probit regressions we report average marginal effects. Standard errors clustered at the country-level are used.
*** p<0.01, ** p<0.05, * p<0.1.

Chapter 2

Retail FDI[0]

2.1 Introduction

Retailing is a business most people around the world encounter on a daily basis. Despite the fact that shopping at a H&M (of Sweden) clothing store in the United States or at Tesco's (of the U.K.) in Thailand does not strike us as unusual there is very little we know about the factors conducive or obstructive to retail foreign direct investment (FDI).

We are the first to conduct a theoretical analysis of retail FDI. We will show in a partial equilibrium setting that the market-entry decision hinges on four factors: First, there are the trade costs a retailer has to bear when he does business in the foreign country while sourcing his goods from a manufacturer in another country.[1] We find that reduced trade costs increase the profitability of a (potential) retail multinational enterprise (MNE). Furthermore, we are able to isolate parameter constellations under which FDI of a retail company serves as a strategic means to preclude rival FDI on its home market. Second, there is the size of a retailer's home market, which, the larger it is, tends to make FDI profitable. Third, retailers incur a variable cost of distribution, which can be interpreted as a measure of their productivity. Obviously, an increase in these costs makes FDI less likely. Finally, the competitive situation on the foreign and also on the home market determines whether a retailer engages in FDI. In this context we obtain the result that

[0] This chapter is based on joint work with Prof. Dr. Carsten Eckel.

[1] These may arise from either the actual process of shipping or from tariff barriers.

fiercer competition tends to increase the attractiveness of FDI for those retail firms that are headquartered in large markets and/or have high productivity (low variable distribution costs).

For a long time the retail sector was characterized by a large number of small businesses that were confined to a single country, a single town, and a particular district within that town. Today, however, most retail industries are dominated by a diminishing number of internationally operating companies whose networks of stores and supply span the globe and have changed the face of many consumer markets as well as trade volumes and trade patterns. In fact, internationalization by means of opening stores in a number of foreign countries appears to be a dominant strategy: in 2008, the top 250 retailers operated in an average number of 6.9 countries, the top 10 retailers even operated in an average number of 17 countries. In addition, sales from foreign operations of the leading 250 retailers accounted for nearly 23 percent of total sales (Deloitte, 2010). The competitive situation in retail markets has come to the attention of researchers as well as policy makers because the number of retail companies has shrunk whereby increasing the concentration measures in the sector (e.g., Dobson & Waterson, 1997, 1999; European Parliament, 2007; Bundeskartellamt, 2008). Consequently, the supply chain has changed from "supply push to demand pull in character" (Lowe & Wrigley, 2010, p. 2) implying that retailers have become bulk buyers able to dictate the terms of the supply contract. International activities increase a retail firm's sales and therefore the quantity it sources from its suppliers. Hence, in this context it can be argued that the retailer's bargaining position is further solidified and his competitiveness strengthened vis-à-vis (potential) rivals from inside and outside a market. Deloitte (2010) claim that on their list of 250 companies, those 50 retailers operating in more than ten countries realized profit margins twice as high as those of the firms operating in a single country, which can be seen as another stylized fact supporting this hypothesis.

This study on the FDI decision of retail firms picks up on the stylized facts presented above, especially incorporating the monopsonist power of retailers facing their suppliers. It contributes to the large body of literature on the determinants of FDI. The existing analyses are illustrative when it comes to a manufacturing firm's decision to establish a production facility in a foreign country. Markusen (1984) and Helpman (1984) made

seminal contributions to the explanation of horizontal and vertical manufacturing FDI, respectively. Yeaple (2003) or Ekholm et al. (2007) elicit the determinants of export-platform manufacturing FDI. However, these studies neglect the fact that consumers typically do not make their purchases at the factory but travel to local retail outlets instead. Furthermore, retail services are non-tradable. Hence, the decision between exporting to a particular country and investing in that country (a decision typically examined in the models mentioned above) is not faced by a retail firm. To our knowledge there is no literature specifically modeling the determinants of a retailer's market-entry choice. However, economics scholars have analyzed the effect of international trade on consumer welfare when the retail sector is taken into account: Eckel (2009) finds answers to the question of how international trade affects local retail markets structures, and how these adjustments in the retail industries alter the predictions regarding the welfare implications of international trade. Raff & Schmitt (2009a, 2011a) analyze the effect of international trade when contractual issues between retailers and manufacturers are taken into account. Inderst & Wey (2007), for example, pick up on the point of increased market concentration in the retail sector and model the determinants of buyer power. While all of these studies are related to individual points made in ours they do not address the question of under which circumstances a retail firm may find it profitable to enter a foreign country via direct investment. In addition to the theoretical literature there is a growing body of mostly empirical studies examining the general service FDI location choice (e.g., Kolstad & Villanger, 2008; Markusen & Strand, 2009; Ramasamy & Yeung, 2010). These studies, however, do not make a distinction between tradable services such as business services and non-tradable services such as retailing. A final and recent strand of literature is concerned with a service sector closely related to yet different from retailing, namely wholesaling. A wholesale firm operates as an intermediary between the producer of a commodity and the retailer selling it to final customers (private households or firms). Hence, a wholesale affiliate differs from a retail affiliate in the sense that wholesaling may be a substitute for or complement to exports while retailing is non-tradable *per se*. Contributions to this literature include *inter alia* those by Felbermayr & Jung (2009), Akerman (2010), Bernard et al. (2010a,b), and Krautheim (2010).

The remainder of this chapter is organized as follows: Section 2.2 lays out the autarky

situation as well as the one-way FDI scenario (i.e., only a retailer from one of the countries conducts FDI in the other country) of our partial equilibrium model. In Section 2.3 we conduct the comparative statics with respect to the key parameters which determine under which circumstances a retail company will tend to find international expansion via FDI attractive. In Section 2.4 we construct the reciprocal FDI equilibrium (i.e., both retailers from both countries establish a foreign affiliate) and determine whether it will arise. In addition, we show that FDI may become a strategic economic instrument. Section 2.5 concludes the study.

2.2 A Partial Equilibrium Model of Retail FDI

The following analyses are based on a scenario of a world economy consisting of two countries i and j that may differ in terms production technology, and consumers' willingness to pay. In each country operate a single retailer as well as a manufacturing sector. Without loss of generality we assume that each retailer sources his goods from one of the manufacturers in his home country and will continue to do so when he sets up business abroad. Note that we maintain this assumption throughout the study. While it may appear restrictive it is supported by Zentes et al. (2007) who report that retailers source between one quarter and one third of their product range through direct imports. Note further that it would be easy to verify that relaxing this assumption would only diminish our results quantitatively but would not reverse them qualitatively. Throughout this chapter, we assume that neither direct marketing is an option, nor is mail-order shopping nor e-commerce.

Three scenarios may arise: first, an autarky equilibrium in which the retailers remain national players. Second, a one-way FDI equilibrium in which only one retailer sets up an outlet in the other country while his rival continues to operate only nationally. The third situation, in which both retailers set up business abroad and, thus, create a reciprocal FDI equilibrium, will be examined in Section 2.4.

2.2.1 Autarky

In autarky, trade costs, the sunk cost of doing FDI, or the competitive environment on the retail markets involved are assumed to be prohibitively high, or the retailers' productivity to be too low such that we do not observe any economic interaction between the countries i and j.[2]

Consumers

Consumers in country i buy a bundle of goods x_A from the monopolistic retailer. In fact, they have no other option than to travel to their local retail outlet for purchases since we have assumed away mail-order shopping etc. Consumers maximize their utility given by

$$U = b_i x_A - \frac{1}{2} x_A^2 \tag{2.1}$$

where x_A can be interpreted as the consumption of the representative consumer, and b_i is the consumers' maximum willingness to payin country i. Solving this simple optimization problem yields inverse consumer demand where p_A is the final goods price:

$$p_A = b_i - x_A. \tag{2.2}$$

Manufacturing

The manufacturing sector is assumed to consist of a mass of firms. Since we assume that e-commerce, etc. are not an option manufacturers have to rely on retailers to sell their products. Furthermore, throughout the analysis we assume that the manufacturer has no bargaining power vis-à-vis the retailer. This assumption is supported by findings of the Competition Commission (2000, p. 231), which say that "most suppliers sell most of the output to the main parties [author: i.e., retailers]", and that "the main parties were able to exert pressure during price negotiations on all the supplier's products by threatening to delist some of its [...] brands". This means that a manufacturer has to rely on the retailer

[2] A note on notation: in the autarky scenario we only use an index for the country of origin or for the destination country if necessary. Otherwise subscript A indicates autarky.

to reverse-auction his business. Therefore, only the manufacturer offering the lowest price for a product will be chosen. This implies that the supplier price s_A will be equal to the average costs of production. Furthermore, we assume the supplier price to depend inversely on the quantity produced, that is

$$s_A = s_A(x_A), \text{ and } s'_A < 0. \tag{2.3}$$

This assumption does not come without loss of generality. However, it captures the growing asymmetry of power in the retailer-manufacturer relationship as explained above. One possible interpretation is that the manufacturer incurs retailer-specific fixed costs of production because the retailer has created a so-called private label that is unique to him and, thus, requires a fixed and sunk investment into the relationship by the manufacturer. Hence, the manufacturer produces under increasing returns to scale. Note that this assumption is supported by stylized evidence. Scott Morton & Zettelmeyer (2004, p. 162) state in this context that "Retailers themselves list bargaining with manufacturers as one of the prime benefits of introducing private labels in a category [...]" and the OECD reports that in 2005 sales of private labels accounted for 17 percent of total sales in a study of supermarkets in 36 countries (Nordås et al., 2008).

Retailing

The retailer purchases a bundle of goods x_A from the manufacturer at the previously determined supplier price $s_A(x_A)$. Note that the size of x_A (i.e., the number of goods contained in the bundle) is limited by the retailer's optimal assortment size, which itself may be determined by technology, regulatory requirements such as zoning regulations, etc.[3] As explained above, the single retailer possesses full bargaining power vis-à-vis the potential suppliers. Accordingly, he is able to reverse-auction contracts to them. The contracting process takes place under the assumption that the two parties make simultaneous pricing decisions. That is, manufacturer and retailer take the price of the other as given. This implies that the retailer ignores the feedback effects of his pricing

[3]See Eckel (2009) for a detailed discussion of the determinants of the assortment size. Raff & Schmitt (2009b) report that some countries including Japan, Belgium and France have enacted legislation specifically limiting the size of retail establishments.

decision on the quantity he sells and, thus, on the supplier price he may demand. Finally, the retailer sells the goods to local consumers. The profits of the retailer are given by

$$\Pi_A^R = [p_A - s_A - \gamma_i]\, x_A. \tag{2.4}$$

They are derived by multiplying the price p_A net of his marginal cost $s_A + \gamma_i$ by the quantity sold to consumers x_A. The marginal cost component γ_i may be interpreted as costs of provision accruing to the retailer when selling to final consumers. Its inverse may, thus, represent retailer productivity.[4]

In autarky, the retail monopolist maximizes these profits with respect to the final goods price p_A given the supplier price $s_A(x_A)$. This yields the equilibrium quantity, price, and profits:

$$p_A = \frac{1}{2}[b_i + s_A + \gamma_i] \tag{2.5}$$

$$x_A = \frac{1}{2}[b_i - s_A - \gamma_i], \tag{2.6}$$

$$\Pi_A^R = \frac{1}{4}[b_i - s_A - \gamma_i]^2 = (x_A)^2. \tag{2.7}$$

2.2.2 The One-Way FDI Equilibrium

After having established the autarky equilibrium in which neither retailer undertakes FDI we now turn to the situation in which one of the retailers decides to enter the foreign market via FDI. We assume that the retail firm from country i enters the retail market in country j. While the retailer still acts as a monopolist on his home market he has to compete with the incumbent over market shares in the foreign country.

Consumers

Inverse demand in the home country is still given by $p_i = b_i - x_{ii}$ where x_{ii} is the demand facing retailer i on market i and b_i is still consumer willingness to pay. Consumers in

[4] See Eckel (2009) for the interpretation of such costs. Note, however, that we include these costs specifically as a variable cost component depending on the amount of sales.

the foreign market may now choose between two retail outlets to do their purchases: one operated by the incumbent retailer j, the other operated by the entrant retailer i. Hence, inverse demand facing a country i-based retailer on the foreign market j is represented by

$$p_{ij} = b_j - x_{ij} - \theta x_{jj}, \quad 0 < \theta < 1, \tag{2.8}$$

where x_{ij} is the demand facing retailer i on market j, and x_{jj} denoting demand facing retailer j on his home market j. Parameter θ represents the degree of competition on the retail market under consideration. The closer θ to unity the fiercer the competition between the retailers, and vice versa.

Similarly, inverse demand facing the incumbent retailer in country j is given by

$$p_{jj} = b_j - x_{jj} - \theta x_{ij}, \quad 0 < \theta < 1. \tag{2.9}$$

Manufacturing

Again, only the supplier selling the final goods priced at average cost is listed on the retailers' shelves. The manufacturing firms in country i now produce the products sold by the multinational retailer on both markets. Hence, the supplier price becomes

$$s_i = s_i \left(x_{ii} + x_{ij} \right), \text{ and } s_i' < 0. \tag{2.10}$$

Accordingly, in country j suppliers sell their goods to the local retailer j at price

$$s_j = s_j \left(x_{jj} \right), \text{ and } s_j' < 0. \tag{2.11}$$

The fact that the suppliers in country j still only sell to the incumbent retail company is intuitive: as the retailer is aware of the scale economies realized by the suppliers he has no incentive to sell goods from the host-country manufacturer. Reducing the quantity sourced from his home-country supplier would increase the supplier price; in addition it would lead to an increase in competition on the foreign market which is not desirable

from the point of view of the entrant retailer.[5] Note at this point that if $x_{ij} > 0$ then $s_i(x_{ii} + x_{ij}) < s_A(x_A)$ and $x_{ii} > x_A$.

Retailing

The profits of the i-based retail MNE are given by

$$\Pi_i^R = [p_{ii} - s_i - \gamma_i] x_{ii} + [p_{ij} - s_i - \gamma_i - t] x_{ij} - F, \tag{2.12}$$

where the first term describes the profits generated by sales in the home country. Price p_{ii} includes again a mark-up over the marginal procurement and provision cost $(s_i + \gamma_i)$, and the second term represents the profits generated on the foreign market where price p_{ij} includes a mark-up, this time over the marginal procurement and provision cost $(s_i + \gamma_i + t)$. Note that t are trade costs accruing to each unit of the goods the retailer orders from his home-country manufacturer. Parameter F represents the conventional fixed cost of setting up an affiliate in the foreign country.

The situation for the incumbent in market j changes as he, too, has to take the new competitor on his home market into account. His profits are given by

$$\Pi_j^R = [p_{jj} - s_j - \gamma_j] x_{jj} \tag{2.13}$$

Technically, the profits in (2.13) do not differ from the autarky profits (equation (2.4)), quantitatively, however, they are not the same as $s_j(x_{jj}) \neq s_A(x_A)$.

On the home market, retailer i still acts as a monopolist and maximizes his profits in (2.12) with respect to p_{ii} which yields the optimal sales quantity of

$$x_{ii} = \frac{1}{2} [b_i - s_i - \gamma_i]. \tag{2.14}$$

However, the two retailers now located in market j compete over market shares in

[5] A similar argument applies to the manufacturer in country i who still only sells to the home-market retailer after the latter has set up an affiliate in country j.

Cournot-Nash fashion.[6] Their profit-maximizing quantities are determined as best response functions given the quantity of the rival and given the respective supplier prices:

$$x_{ij} = \frac{1}{2}\left[b_j - s_i - \gamma_i - t - \theta x_{jj}\right], \tag{2.15}$$

$$x_{jj} = \frac{1}{2}\left[b_j - s_j - \gamma_j - \theta x_{ij}\right]. \tag{2.16}$$

In equilibrium retail profits then amount to

$$\Pi_i^R = (x_{ii})^2 + (x_{ij})^2 - F, \tag{2.17}$$

$$\Pi_j^R = (x_{jj})^2. \tag{2.18}$$

Given that the fixed cost of setting up business in the foreign country F is sufficiently small the multinational retailer's profits clearly exceed the autarky profits depicted in equation (2.4) once $x_{ij} > 0$: as explained in subsection 2.2.2, if $x_{ij} > 0$ then $s_A(x_A) > s_i(x_{ii} + x_{ij})$ and $x_{ii} > x_A$ so that the first term in (2.17) already exceeds the autarky profits. As the second term is the square of the equilibrium quantity retailer i sells on the foreign market (2.15) this increases the profits further. The incumbent's profits Π_j^R are lower than in autarky as he now holds a smaller market share, and has to pay a higher supplier price.

2.3 To FDI or not to FDI?

The decision of a retail firm to conduct FDI hinges on several factors: first, trade costs t, second, the competitive environment on the retail markets represented by θ, third, the marginal cost of distribution $\gamma_k, k \in \{i, j\}$, and fourth, the consumers' maximum willingness to pay b_k. Taking autarky as our starting point, a retailer considering to enter a foreign market via FDI will base his decision on whether the MNE profits in equation (2.12) will be lower, equal to or higher than the autarky profits in equation (2.4). Equations (2.7), (2.17), and (2.18) tell us that retail profits depend solely on the

[6]Note that if goods are differentiated changes in the number of firms or the degree of competition (here an increase in θ) yield similar results with respect to market performance whether we consider Cournot-Nash competition or Bertrand-Nash competition (Martin, 2002). Accordingly, for expositional purposes (more simple expressions), we chose to model competition in quantities.

quantities sold. Therefore, the retailer's incentive to conduct FDI is determined by how the quantities in (2.14), (2.15), and (2.16) react to changes in the parameters named above. Totally differentiating these quantities gives a system of three equations, which we use to conduct the comparative statics (see Appendix B.1).

2.3.1 Trade Costs

Think of trade costs as either the actual cost of shipping (logistics, etc.) or of tariff or non-tariff barriers to trade. Mathematically, we obtain the following solutions for an increase in these costs (see Appendix B.1):

$$\frac{dx_{ii}}{dt} = \frac{1}{\Delta} s_i' (x_{ii} + x_{ij}) \left[2 + s_j' (x_{jj})\right] < 0, \tag{2.19}$$

$$\frac{dx_{ij}}{dt} = -\frac{1}{\Delta} \left[2 + s_i' (x_{ii} + x_{ij})\right] \left[2 + s_j' (x_{jj})\right] < 0, \tag{2.20}$$

$$\frac{dx_{jj}}{dt} = \frac{1}{\Delta} \left[2 + s_i' (x_{ii} + x_{ij})\right] \theta > 0. \tag{2.21}$$

where $\Delta \equiv 4 \left[1 + s_i' (x_{ii} + x_{ij})\right] \left[2 + s_j' (x_{jj})\right] - \left[2 + s_i' (x_{ii} + x_{ij})\right] \theta^2$ and $\Delta > 0$ due to the stability of the equilibrium.[7] In addition, we assume that $\left[2 + s_i' (x_{ii} + x_{ij})\right] > 0$ so that $dx_{ii}/dx_{ij} = -s_i' (x_{ii} + x_{ij}) / \left[2 + s_i' (x_{ii} + x_{ij})\right] > 0$. This is intuitive since a higher quantity sold on the foreign market j lowers the supplier price $s_i (x_{ii} + x_{ij})$ also for x_{ii} sold on the retailer's home market because we have assumed that $s_i' (x_{ii} + x_{ij}) < 0$.

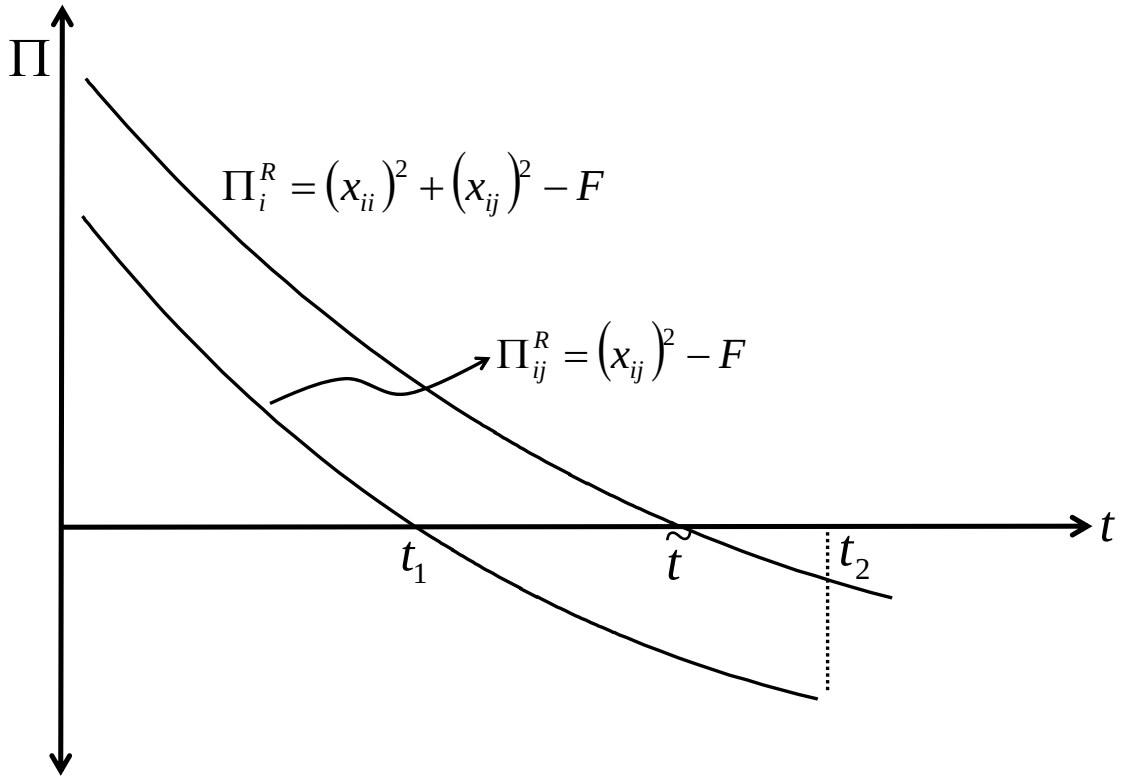
Proposition 1 *A retail company tends to find FDI more attractive the lower the per-unit trade costs t associated with procurement from the home-country manufacturer.*

This result is very intuitive: equations (2.19) and (2.20) show that in case of the internationalized retailer i lower trade costs directly feed into lower per-item costs, thus, into a lower final goods price, and, hence, retailer i sells more. By contrast, (2.21) shows that the incumbent retailer j loses market share as the entrant retailer i in country j gains competitiveness in terms of prices. Hence, given that the fixed cost F of doing FDI is not

[7] Stability requires the reaction functions $x_{ij} (x_{jj})$ and $x_{jj} (x_{ij})$ to be negatively sloped, and that they cross in the "right way". I.e., the derivatives of the reactions functions must be less than unity over the relevant range. See Tirole (1988) or Martin (2002) for a detailed analysis of the stability and uniqueness of a duopoly equilibrium in quantities.

prohibitively high there exists a critical value of trade costs below which FDI becomes attractive because potential profits (i.e., quantities) on the foreign markets are non-zero.

Figure 2.1: Three Threshold Values of t



A second important result with respect to changes in trade costs is that we can establish three threshold values of t when a retailer is faced with the decision whether to engage in FDI activities. Figure 2.1 shows a dissected version of the MNE's profits where the upper locus represents total profits Π_i^R while the lower locus depicts only the profits realized on the foreign market Π_{ij}^R, both net of fixed costs. It is straightforward to see that values of t above $\tilde{t}$ such as t_2 lead to negative total profits and, hence, to no retail FDI. Trade costs from threshold $\tilde{t}$ down to t_1, however, make FDI attractive despite the fact that profits on the foreign market are clearly negative. The latter is due to the fact that selling additional quantities on the foreign market exploits the returns to scale on the home-country supplier's part and therefore allows the retailer to increase his sales on the

home market.[8]

Proposition 2 *A retailer may be willing to incur negative profits on the foreign market when they are more than offset by increased profits on the home market.*

Proof. A retailer will find FDI attractive iff $\Pi_i^R - \Pi_A^R > 0$, that is $(x_{ii})^2 - x_A^2 > F - (x_{ij})^2$. Hence, the threshold value for doing FDI is determined by $\Pi_i^R = \Pi_A^R$ or else $(x_{ii})^2 - x_A^2 = F - (x_{ij})^2$ while noting that $\frac{d}{dt}\left(\Pi_i^R - \Pi_A^R\right) < 0$ as can be inferred from (2.19) and (2.20). Hence, FDI in terms of increases in profits Π_i^R becomes more attractive for lower values of t. More precisely, we can show that there are three different threshold values of t, namely $\tilde{t}$ at which $\Pi_i^R - \Pi^R = (x_{ii})^2 + (x_{ij})^2 - F - (x_A)^2 = 0$, t_1 at which $\Pi_{ij} = (x_{ij})^2 - F = 0$, and t_2 at which $x_{ij} = 0$. Then note that $t_2 > \tilde{t}$: if $t = t_2$, then $x_{ij} = 0$ and $x_{ii} = x_A$. Hence, $\Pi_i^R - \Pi_A^R = -F < 0$ and, thus, $t > \tilde{t}$. Furthermore, $\tilde{t} > t_1$: if $t = t_1$, then $(x_{ij})^2 = F$ and $\Pi_i^R - \Pi_A^R = (x_{ii})^2 - x_A^2 > 0 \; \forall \; t < t_2$ and, thus, $t < \tilde{t}$. Hence, if $t \in \left(t_1, \tilde{t}\right)$ a retailer may choose to conduct FDI even if foreign profits are negative. ■

2.3.2 Competition, Market Size and Productivity

An increase in parameter θ which, technically, makes the goods in (2.15) and (2.16) more substitutable, can also be interpreted as an increase in the overall competitiveness of the retail market in country j. Factors leading to an exogenous alteration of the competitive environment may be, for example, of the technological or legal type. In their study of the French retail sector, Bertrand & Kramarz (2002) show that entry regulations in terms of zoning restrictions limiting the creation or expansion of retail outlets lead to higher concentration. Conducting the comparative statics for θ is a rather intricate task (see Appendix B.2). However, we are rewarded with a set of very informative results depending on the initial relative strength of the two competing firms in retail market j expressed by the ratio x_{ij}/x_{jj}. Accordingly, we find that for retailer i's home-market quantity x_{ii}

$$\frac{dx_{ii}}{d\theta} < 0 \text{ if } \frac{\left[2 + s_j'\left(x_{jj}\right)\right]}{\theta} > \frac{x_{ij}}{x_{jj}}. \tag{2.22}$$

[8]This result resembles the *reciprocal dumping* solution in Brander & Krugman (1983), which is based on segmented markets and explains cross-hauling of goods despite positive trade costs with the fact that marginal revenue in the export market is higher than in the domestic market.

For the quantities sold by retailers i and j on market j using (2.42) and (2.43) in Appendix B.2 we can then distinguish three cases:

$$\frac{dx_{ij}}{d\theta} < 0 \text{ and } \frac{dx_{jj}}{d\theta} > 0 \text{ if } \frac{x_{ij}}{x_{jj}} < \frac{\left[2 + s_j'\left(x_{jj}\right)\right]}{\theta}\Lambda < \frac{\left[2 + s_j'\left(x_{jj}\right)\right]}{\theta}, \tag{2.23}$$

$$\frac{dx_{ij}}{d\theta} < 0 \text{ and } \frac{dx_{jj}}{d\theta} < 0 \text{ if } \frac{\left[2 + s_j'\left(x_{jj}\right)\right]}{\theta}\Lambda < \frac{x_{ij}}{x_{jj}} < \frac{\left[2 + s_j'\left(x_{jj}\right)\right]}{\theta}, \tag{2.24}$$

$$\frac{dx_{ij}}{d\theta} > 0 \text{ and } \frac{dx_{jj}}{d\theta} < 0 \text{ if } \frac{\left[2 + s_j'\left(x_{jj}\right)\right]}{\theta}\Lambda < \frac{\left[2 + s_j'\left(x_{jj}\right)\right]}{\theta} < \frac{x_{ij}}{x_{jj}}. \tag{2.25}$$

where $\Lambda \equiv \left[2 + s_i'\left(x_{ii} + x_{ij}\right)\right]\theta^2/4\left[1 + s_i'\left(x_{ii} + x_{ij}\right)\right]\left[2 + s_j'\left(x_{jj}\right)\right] < 1$ again due to stability requirements. Obviously, whether an increase in θ makes FDI more attractive for retailer i depends on his competitive strength (i.e., x_{ij}/x_{jj}) vis-à-vis the rival retailer j. Hence, the relatively larger retailer i in terms of quantities initially sold the more likely he is to benefit from an increase in the fierceness of competition by gaining an even larger market share. Note that this is due to the fact that a relatively larger quantity translates into a relatively lower supplier price compared to the rival.

Proposition 3 *The effect of an increase of the degree of competition on the profitability of FDI is ambiguous. It depends on the relative size of the retailers in terms of quantities sold.*

There remain two parameters that may have an impact on the ratio x_{ij}/x_{jj} and, thus, on the attractiveness of FDI for the retailer from country i in country j. First, there is the increase in the maximum willingness to pay b_i, which — as it increases demand — may be interpreted as an increase in the market size. Second, there are retailer i's marginal distribution costs γ_i, whose inverse may be interpreted as his productivity. The mathematical solutions for the comparative statics are straightforward (see Appendix B.3). For an increase in the size of market i we get

$$\frac{dx_{ii}}{db_i} = \frac{1}{\Delta}\left\{\left[2 + s_i'\left(x_{ii} + x_{ij}\right)\right]\left[2 + s_j'\left(x_{jj}\right)\right] - \theta^2\right\} > 0, \tag{2.26}$$

$$\frac{dx_{ij}}{db_i} = -\frac{1}{\Delta}s_i'\left(x_{ii} + x_{ij}\right)\left[2 + s_j'\left(x_{jj}\right)\right] > 0, \tag{2.27}$$

$$\frac{dx_{jj}}{db_i} = \frac{1}{\Delta}\theta s_i'\left(x_{ii} + x_{ij}\right) < 0, \tag{2.28}$$

where we have already discussed in Subsection 2.3.1 that $\Delta > 0$, from which follows that $[2 + s_i'(x_{ii} + x_{ij})]\left[2 + s_j'(x_{jj})\right] - \theta^2 > 0$. Clearly, by (2.26) an increase in the size of market i increases the retailer's sales on that market. Furthermore, because $s_i'(x_{ii} + x_{ij}) < 0$ by (2.27) the retailer's sales on market j, x_{ij}, also increase. By the same argument, the incumbent's sales x_{jj} in (2.28) fall since his goods become relatively more expensive. Overall, this effect resembles 'the home market effect' introduced by Krugman (1980, p.950), which says that "countries will tend to export those goods for which they have relatively large domestic markets".

Proposition 4 *Retail firms headquartered in larger markets tend to find FDI profitable.*

The analysis of an increase in the marginal cost of retail distribution γ_i (i.e., a loss of productivity) is just as straighforward. We find that

$$\frac{dx_{ii}}{d\gamma_i} = -\frac{1}{\Delta}\left\{2\left[2 + s_j'(x_{jj})\right] - \theta^2\right\} < 0, \tag{2.29}$$

$$\frac{dx_{ij}}{d\gamma_i} = -\frac{1}{\Delta}2\left[2 + s_j'(x_{jj})\right] < 0, \tag{2.30}$$

$$\frac{dx_{jj}}{d\gamma_i} = \frac{1}{\Delta}2\theta > 0, \tag{2.31}$$

where by the same argument as above $2\left[2 + s_j'(x_{jj})\right] - \theta^2 > 0$. Quite intuitively, (2.29) and (2.30) show that the entrant retailer's home-market and host-market quantity both fall in marginal distribution costs because they feed into higher final goods prices, which in turn reduce sales. Conversely, (2.31) demonstrates that the incumbent's sales increase in the rival's loss of productivity because the former becomes relatively more cost-competitive.

Proposition 5 *More productive retail companies tend to find FDI profitable.*

Finally, on the basis of equations (2.27), (2.28), (2.30), and (2.31) it is obvious that

$$\frac{d(x_{ij}/x_{jj})}{db_i} > 0 \text{ and } \frac{d(x_{ij}/x_{jj})}{d\gamma_i} < 0. \tag{2.32}$$

Together with (2.24) and (2.25) this leads to the following result:

Proposition 6 *An increase in market competitiveness tends to make FDI profitable for retail firms headquartered in larger markets as well as for more productive retail firms.*

2.4 Reciprocal FDI and Strategic FDI

Just as one of the national retailers in the autarky equilibrium can have the incentive to become an MNE, the remaining national retail firm (or country-j incumbent) in the one-way FDI scenario may at some point find it profitable to set up an affiliate in the other country, too. This way we observe a retail duopoly in both countries. Note that we specifically restrict our analysis to the case where the countries are symmetric in terms of consumers' maximum willingness to pay (size of the market), i.e., $b_i = b_j = b$, and where the retailers are identical in terms of productivity, i.e., $\gamma_i = \gamma_j = \gamma$. We thereby eliminate two sources of asymmetry that potentially make FDI more attractive for some retail firms, namely those from a bigger home and/or facing a large destination market, and more productive retailers. The elimination of these two channels leaves us with a purely symmetric two-country setting in which we would expect immediate reciprocal FDI once the remaining country- and retailer-unspecific parameters t and θ have fallen below a certain threshold. This means that we should not observe the one-way FDI scenario at all. We show, however, that this is not the case and that a retailer may have a strategic incentive to be the first to conduct FDI because he can shield his home market from rival entry. Note that in this section the superscript r denotes the reciprocal FDI equilibrium.

2.4.1 The Symmetric Setting

The inverse demand facing the retailer headquartered in country j is now given by $p^r_{jj} = b - x^r_{jj} - \theta x^r_{ij}$ on his home market, and $p^r_{ji} = b - x^r_{ji} - \theta x^r_{ii}$ on the host market, respectively. Note that consumers in country i can now also choose between two retail outlets, i.e., goods x^r_{ji} sold by the retailer from country j now enter their demand function. Parameter $b = b_i = b_j$ represents market size, and θ the intensity of retail market competitiveness. Manufacturing companies in both countries now supply one retailer that sells on two

markets. The pricing mechanism remains unchanged from the previous sections, and the ensuing supplier prices are $s_i^r = s_i^r\left(x_{ii}^r + x_{ij}^r\right)$ and $s_j^r = s_j^r\left(x_{jj}^r + x_{ji}^r\right)$ where $\left(s_i^r\right)' < 0$ and $\left(s_j^r\right)' < 0$ are again crucial assumptions (see Subsection 2.2.1 for the argumentation). Retailer j's profits are now also composed of a part earned on the domestic market (first term) and a part generated by sales on the foreign market (second term) minus the fixed cost F of undertaking FDI:

$$\Pi_j^{Rr} = \left[p_{jj}^r - s_j^r - \gamma\right] x_{jj}^r + \left[p_{ji}^r - s_j^r - \gamma - t\right] x_{ji}^r - F. \tag{2.33}$$

Operating profits on the home market are generated selling quantity x_{jj}^r at price p_{jj}^r net of the variable procurement and distribution costs $s_j^r + \gamma$ (where $\gamma_i = \gamma_j = \gamma$ as mentioned above). Operating profits on the foreign market are generated selling goods x_{ji}^r at price p_{ji}^r minus the variable costs of procurement, provision and trading $s_j^r + \gamma + t$. Just as before, the retailers compete in Cournot-Nash fashion, now on both markets. Accordingly, retailer j maximizes his profits over quantities given his supplier price and given the price of his competitor i. This yields the best response functions for the bundles of goods sold on the home and the foreign market where b may again be interpreted as the size of the retail markets:

$$x_{jj}^r = \frac{1}{2}\left[b - \gamma - s_j^r - \theta x_{ij}^r\right], \tag{2.34}$$

$$x_{ji}^r = \frac{1}{2}\left[b - \gamma - s_j^r - t - \theta x_{ii}^r\right]. \tag{2.35}$$

2.4.2 Market Entry

In Section 2.3 we analyzed the determinants of the market entry decision of retailer i starting in autarky. Now the incumbent retailer in country j faces the decision to enter market i whereby creating a situation of reciprocal retail FDI. He will make this decision by comparing his actual profits Π_j^R in equation (2.18) to the potential profits given by (2.33). As in both cases the profits are determined by the quantities sold we will restrict our analysis to the quantities in (2.16), (2.34), and (2.35). Conducting the comparative statics for our set of two parameters we can then determine under which circumstances

retailer j tends to find FDI profitable, too (see Appendix B.1).[9]

Examining the effect of an increase in the competitive environment (i.e., an increase in θ) on the destination market i we find that unambiguously

$$\frac{dx_{jj}^r}{d\theta} = -\frac{1}{\Omega}\left[x_{ji}^r\left(2+s_r'\right) - x_{jj}^r\left(\theta+s_r'\right)\right] < 0, \tag{2.36}$$

$$\frac{dx_{ji}^r}{d\theta} = -\frac{1}{\Omega}\left[x_{jj}^r\left(2+s_r'\right) - x_{ji}^r\left(\theta+s_r'\right)\right] < 0. \tag{2.37}$$

where $\Omega \equiv \left(2+s_r'\right)^2 - \left(\theta+s_r'\right)^2 > 0$ because we know that $0 < \theta < 1$. Furthermore, stability requires $\theta^2 < \left(2+s_r'\right)^2$ so we know that $\left(2+s_r'\right) > 0$, and we assume $\left(\theta+s_r'\right) < 0$ whereby $dx_{jj}^r/dx_{ji}^r > 0$ (see Subsection 2.3.1 for the economic reasoning). Consequently, in this symmetric setting according to equation (2.36) an increase of market competitiveness represented by θ diminishes quantities and therefore profits.

Proposition 7 *Fiercer competition between retailers tends to make reciprocal FDI less profitable.*

Equation (2.38) shows that an increase in trade costs lowers the profits of retailer j if he conducts FDI in country i because both quantities constituting his profits fall:

$$\frac{dx_{jj}^r}{dt} = \frac{1}{\Omega}\left(\theta+s_r'\right) < 0 \text{ and } \frac{dx_{ji}^r}{dt} = -\frac{1}{\Omega}\left(2+s_r'\right) < 0, \tag{2.38}$$

Proposition 8 *Lower trade costs tend to increase the profitability of reciprocal retail FDI.*

2.4.3 Strategic Market Entry

A final question arises now that we have examined the determinants of retail FDI for the two retail firms: can a retailer use market entry as a strategic instrument? I.e., could retailer i's entry into market j prevent retailer j from entering market i in return, and shielding it from (increased) competition? Producing such a result would be very informative as it could hold potential to explain why in certain economies we observe a

[9]Note that due to symmetry $x_{ii}^r = x_{jj}^r$ and $x_{ij}^r = x_{ji}^r$. Therefore, we may rewrite $s_i^r\left(x_{ii}^r + x_{ij}^r\right) = s_j^r\left(x_{jj}^r + x_{ji}^r\right) = s_r$, and $\left(s_i^r\right)' = \left(s_j^r\right)' = s_r'$

lot of outward retail FDI but do not see equivalent levels of inward retail FDI.[10] In order to see whether our model contains such a result consider

$$\Delta\Pi \equiv \Pi_j^{Rr} - \Pi_j^R = \left(x_{jj}^r\right)^2 + \left(x_{ji}^r\right)^2 - (x_{jj})^2 - F, \tag{2.39}$$

where $\Delta\Pi$ measures the relative benefit of FDI (profits in (2.33)) over staying a national firm for retailer j (profits in (2.18)). The crucial question now is, how does $\Delta\Pi$ change when competitor i sells (exogenously) more in market j, that is $d\bar{x}_{ij} > 0$? If the change is negative, the competitor i can make FDI less attractive by selling more in market j through FDI (see Appendix B.4). Indeed, we find that

$$\frac{d}{d\bar{x}_{ij}} \frac{\Delta\Pi}{2} \frac{\left(2 + s_j'\right)}{\theta} D < 0, \tag{2.40}$$

which means that $\Delta\Pi \equiv \Pi_j^{Rr} - \Pi_j^R$ falls in $\bar{x}_{ij}$, and, thus, proves that by entering market j retailer i may actually foreclose entry of retailer j in his market whereby shielding it from competition. Therefore, all factors conducive to FDI by retailer i (represented here by $\bar{x}_{ij}$) tend to make reciprocal FDI for retailer j unattractive.

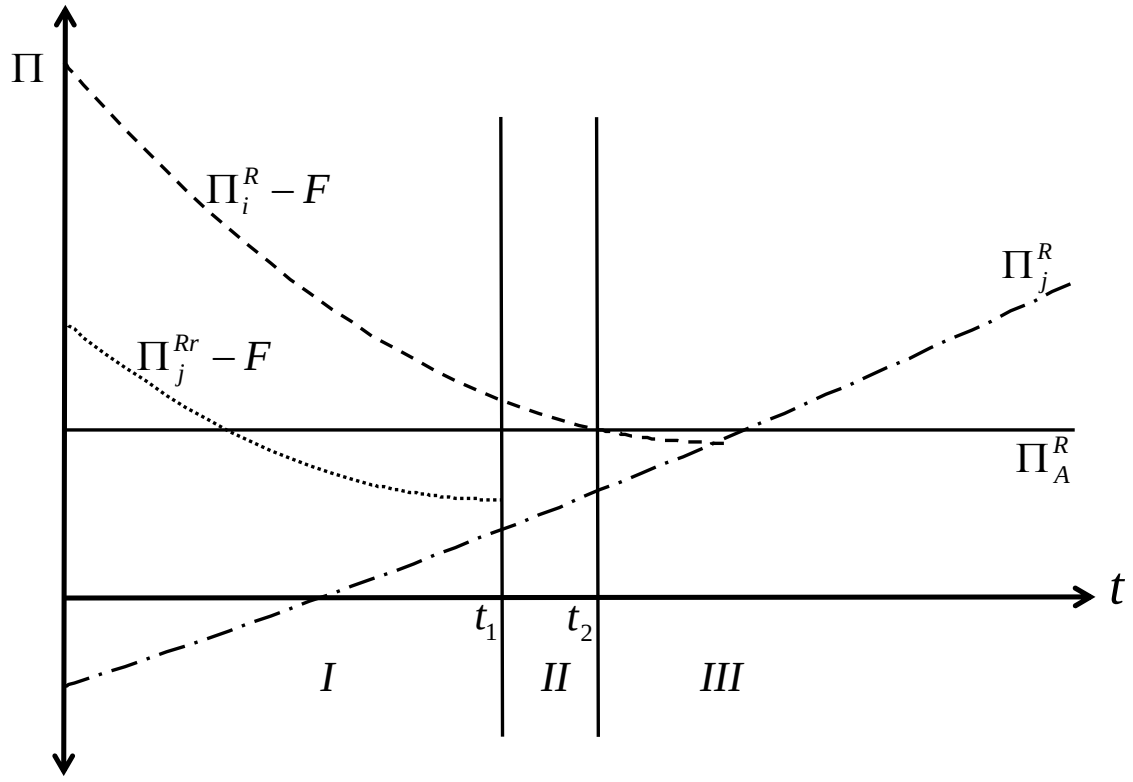
Proposition 9 *A retail firm tends to have the incentive to be the first retailer to set up an outlet in the other country as this move can shield the home market from rival FDI.*

In order to illustrate Proposition 9 we construct an exemplary case for changes in trade costs. In Subsection 2.3.1 we saw that starting in autarky there exists a threshold level of trade costs t below which retailer i will tend to find it profitable to conduct FDI (see specifically equations (2.19) and (2.20)) whereby generating the one-way FDI equilibrium. As we have shown in (2.38) the incentive of the remaining national retailer j to undertake FDI activities also falls in trade costs. The question at this point is if we are able to pin down parameter values under which the one-way FDI equilibrium actually exists or if we can only observe a switch from autarky directly to the reciprocal FDI equilibrium. Finding a parameter constellation that creates the one-way FDI equilibrium would suggest

[10] Note in this context that the retail industry is highly heterogeneous in itself. This means that relatively speaking we observe, e.g., little inward FDI in the German supermarket (grocery store) sector, while the same is not true for, e.g., the German market for garments.

the existence of a strategic motive underlying retail FDI, namely a first mover advantage. Hence, within a certain range of trade costs FDI by retailer i would prevent retailer j from also doing FDI.

Figure 2.2: Retail Market Structures and Trade Costs



In order to be able to plot the profits, in a first step we assume a specific functional form for the supplier prices that reflect our assumption of $s_k' < 0$, $k \in \{i, j\}$. Following, for example, Leahy & Neary (1996) assume that in order to lower his costs of supply and, hence, be able to offer a low price, each manufacturer may invest in means so as to improve his sales process to the retailer. Higher investment results in lower marginal costs. Hence, total optimal manufacturing costs of a representative manufacturer in country i are given by $C_i = \alpha(x_{ii} + x_{ij}) - \beta(x_{ii} + x_{ij})^2$ where α and β are positive constants., Accordingly, through the profit-maximization processes of the manufacturer in, say, country i in the one-way FDI equilibrium we get $s_i = \alpha - \beta(x_{ii} + x_{ij})$, and $s_j = \alpha + \beta x_{jj}$ for his counterpart in country j. In the reciprocal FDI equilibrium we have and $s^r = \alpha - \beta\left(x_{jj}^r + x_{ji}^r\right)$. In a

second step, we plot the ensuing profits for the exemplary parameter values of $b_i = b_j = 100, F = 40, \alpha_i = \alpha_j = 10, \beta = 0.01$, and $\theta = 0.5$ against trade costs. Indeed, Figure 2.2 shows that under this parameter constellation all three retail market structures arise. It depicts the retail profits generated by retailers i and j for varying values of trade costs in the three different scenarios we have laid out.[11] For values of t within segment *III* on the x-axis no retailer finds it profitable to do FDI and the autarky equilibrium obtains since $\Pi_A^R > \Pi_i^R$. A regime change only takes place when trade costs have fallen to levels depicted in segment *II* where $\Pi_i^R > \Pi_A^R > \Pi_j^R$. Once t declines below t_1 (segment *I*) the second retailer will find it profitable to establish a foreign affiliate as well and we observe a duopoly in both retail markets. The fact that there exists a parameter constellation under which for varying values of t we can obtain all three market structures suggests that FDI contains a first-mover advantage when trade costs are reduced to values below t_2: the retailer doing FDI first may actually foreclose FDI on his home market.

2.5 Conclusion

In this chapter we are the first to develop a partial equilibrium model of retail FDI. We thereby contribute to the large body of FDI literature that has thus far neglected service FDI in general and retail FDI in particular. Consumers typically do not make their purchases at the factory door but at a local retail outlet. In order to model the interaction between retailers and their suppliers, we incorporate in our study the observation that consolidation has characterized the retail industry while measures of concentration have fallen for manufacturing industries. Hence, retailers have been gaining bargaining power vis-à-vis their suppliers, and are able to extract extra-ordinary rents. All of these facts have recently come to the attention of policy makers. Our central assumption in this context is that the price paid by a retailer to his supplier falls in the quantity he sources. Subsequently, we analyze several parameters, which set this channel in motion.

First, we examine the influence of growing international market integration (i.e., falling trade costs), which per construction increases the profitability of FDI. Moreover, we find

[11] Note that only the economically relevant areas of the profit functions are displayed. I.e., only those areas where the trade costs are sufficiently low and, thus, the quantities sold positive.

that within a certain range of trade costs, a retailer may find it profitable to incur losses on the foreign market because these are more than offset by additional profits on the home market exactly because he is able to exert pressure on the supplier price with the larger total quantity. Finally, we are able to show that there exists a first-mover advantage of retail FDI: being the first retailer to set up an affiliate in the other country may actually shield the home market from foreign entry. Second, we study how the competitive environment on a given retail market impacts a retailer's incentive to conduct FDI. We find that the increase in the degree of competition has an ambiguous effect which depends on the relative competitiveness of the two rival retailers in the initial situation which is measured by the ratio of the quantities they sell on the same market. The larger the difference in quantities sold the stronger the incentive to conduct FDI for the company selling the relatively larger quantity when the competitiveness of the retail market increases. A third effect is driven by the sizes of the markets under consideration. We derive the result that retail firms headquartered in larger markets tend to find FDI profitable. Fourth, an increase in a retail firm's productivity (measured as a fall in its variable costs of distribution) also increases the incentive to establish a foreign affiliate. Finally, the second result can be sharpened by results three and four: retail companies headquartered in larger markets and/or with higher productivity tend to benefit from an increase in the degree of competition on a given retail market.

Our bear interesting implications. The result with respect to the first-mover advantage in retail FDI, for example, may explain why certain economies receive more inward retail FDI than others. Furthermore, our findings could enable policy makers to take more informed decisions when it comes to competition policy. The result concerning the competitive environment in a retail market could imply that increasing the competition by means of laws inhibiting anti-competitive behavior or imposing zoning regulations limiting the size of retail establishments may benefit the already large firms but not necessarily the relatively small ones. The present model is, to our best knowledge, the first to analyze the market entry decision of retail firms. Hence, there remains room for future research, which, given the economic importance of the largest retail companies, is in the best interest of consumers and especially policy makers seeking to make informed decisions.

B Mathematical Appendix

B.1 Trade Costs

Totally differentiating equations (2.14) - (2.16) and rearranging while for the sake of space letting $db_i = d\gamma_i = d\theta = 0$ gives a system of three equations which we solve by Cramer's law. Accordingly, we derive the total differentials of the quantities:

$$dx_{ii} = \frac{1}{\Delta} s_i'(x_{ii}+x_{ij}) \left\{ \left[\left(2+s_j'(x_{jj})\right) dt + \left(\left(2+s_j'(x_{jj})\right) x_{jj} - \theta x_{ij} \right) d\theta \right] \right\}, \quad (2.41)$$

$$dx_{ij} = -\frac{1}{\Delta} \left[2+s_i'(x_{ii}+x_{ij})\right] \left\{ \left[2+s_j'(x_{jj})\right] (dt + x_{jj}d\theta) - \theta x_{ij} d\theta \right\}, \quad (2.42)$$

$$dx_{jj} = \frac{1}{\Delta} \{ [(2+s_i'(x_{ii}+x_{ij}))\theta] dt + [(2+s_i'(x_{ii}+x_{ij}))\theta x_{jj} - 4(1+s_i'(x_{ii}+x_{ij}))x_{ij}] d\theta \} \quad (2.43)$$

where the determinant of coefficients is given by

$$\Delta \equiv 4\left[1+s_i'(x_{ii}+x_{ij})\right]\left[2+s_j'(x_{jj})\right] - \left[2+s_i'(x_{ii}+x_{ij})\right]\theta^2. \quad (2.44)$$

Note that stability requires $B - \theta^2 > 0$, where

$$B \equiv 4\left\{\left[1+s_i'(x_{ii}+x_{ij})\right]\left[2+s_j'(x_{jj})\right]\right\} / \left[2+s_i'(x_{ii}+x_{ij})\right]. \quad (2.45)$$

Note further that

$$B = \frac{4+4s_i'(x_{ii}+x_{ij})}{4+4s_i'(x_{ii}+x_{ij})+\left[s_i'(x_{ii}+x_{ij})\right]^2} \left[2+s_i'(x_{ii}+x_{ij})\right]\left[2+s_j'(x_{jj})\right] \quad (2.46)$$
$$< \left[2+s_i'(x_{ii}+x_{ij})\right]\left[2+s_j'(x_{jj})\right].$$

Hence, $\left[2+s_i'(x_{ii}+x_{ij})\right]\left[2+s_j'(x_{jj})\right] - \theta^2 > 0$ where we assume that $\left[2+s_i'(x_{ii}+x_{ij})\right] > 0$ so that $dx_{ii}/dx_{ij} > 0$ as explained in Subsection 2.3.1 in the main text.

We also totally differentiate equation (2.34) and (2.35) from the reciprocal FDI equilibrium. Note that due to the symmetry between countries and retailers in terms of market size and productivity we may assume $x_{ii}^r = x_{jj}^r$, $x_{ij}^r = x_{ji}^r$, hence, $dx_{ii}^r = dx_{jj}^r$, $dx_{ij}^r = dx_{ji}^r$,

and therefore, $(s_i^r)' = \left(s_j^r\right)' = s_r'$. Furthermore, for the sake of space let $db_k = d\gamma_k = 0$, $k = i, j$. This way we get a set of two equations, which we solve by Cramer's law again to derive the total differentials:

$$dx_{ii}^r = \frac{1}{\Omega}\left[(2+s_r')\left(-x_{ji}^r d\theta\right) - (s_r'+\theta)\left(-x_{jj}^r d\theta - dt\right)\right] \tag{2.47}$$

$$dx_{ij}^r = \frac{1}{\Omega}\left[(2+s_r')\left(-x_{jj}^r d\theta - dt\right) - (s_r'+\theta)\left(-x_{ji}^r d\theta\right)\right] \tag{2.48}$$

where $\Omega \equiv (2+s_r')^2 - (\theta + s_r')^2 > 0$ since $0 < \theta < 1$ and because stability requires that $(2+s_r') > 0$. Furthermore, we assume $(s_r'+\theta) < 0$ so that $dx_{ii}^r/dx_{ij}^r > 0$, which follows the same economic reasoning that we applied in Subsection 2.3.1 in the main text.

B.2 Competition Parameter

By equations (2.41) - (2.43) we can derive that

$$\frac{dx_{ii}}{d\theta} = \frac{1}{\Delta} s_i'\left(x_{ii}+x_{ij}\right)\left\{\left[2+s_j'\left(x_{jj}\right)\right]x_{jj} - \theta x_{ij}\right\} < 0, \tag{2.49}$$

$$\frac{dx_{ij}}{d\theta} = -\frac{1}{\Delta}\left[2+s_i'\left(x_{ii}+x_{ij}\right)\right]\left[\left(2+s_j'\left(x_{jj}\right)\right)x_{jj} - \theta x_{ij}\right] < 0, \tag{2.50}$$

$$\frac{dx_{jj}}{d\theta} = \frac{1}{\Delta}\left\{\left[2+s_i'\left(x_{ii}+x_{ij}\right)\right]\theta x_{jj} - 4\left[1+s_i'\left(x_{ii}+x_{ij}\right)\right]x_{ij}\right\} < 0. \tag{2.51}$$

Note that (2.49) - (2.51) are true, if $\frac{2+s_j'(x_{jj})}{\theta} > \frac{x_{ij}}{x_{jj}}$, if $\frac{2+s_j'(x_{jj})}{\theta} > \frac{x_{ij}}{x_{jj}}$, and if $\frac{2+s_j'(x_{jj})}{\theta}\Lambda < \frac{x_{ij}}{x_{jj}}$, respectively. Moreover, stability requires that $\Lambda \equiv \frac{\left[2+s_i'(x_{ii}+x_{ij})\right]\theta^2}{4\left[1+s_i'(x_{ii}+x_{ij})\right]\left[2+s_j'(x_{jj})\right]} < 1$, so that $\frac{2+s_j'(x_{jj})}{\theta}\Lambda < \frac{2+s_j'(x_{jj})}{\theta}$.

B.3 Market Size and Productivity

Totally differentiating equations (2.14) - (2.16) and rearranging while letting $dt = d\theta = 0$ gives a system of three equations which yields

$$\begin{aligned} dx_{ii} &= \frac{1}{\Delta}\left\{\left[\left(2+s_i'\left(x_{ii}+x_{ij}\right)\right)\left(2+s_j'\left(x_{jj}\right)\right)-\theta^2\right]db_i \right. \\ &\quad \left. -\left[2\left(2+s_j'\left(x_{jj}\right)\right)-\theta^2\right]d\gamma_i\right\}, \qquad (2.52) \\ dx_{ij} &= \frac{1}{\Delta}\left[2+s_j'\left(x_{jj}\right)\right]\left[-2d\gamma_i - s_i'\left(x_{ii}+x_{ij}\right)db_i\right], \qquad (2.53) \\ dx_{jj} &= \frac{1}{\Delta}\theta\left[2d\gamma_i + s_i'\left(x_{ii}+x_{ij}\right)db_i\right], \qquad (2.54) \end{aligned}$$

where we know that $\Delta > 0$. By the same stability argument as before

$$\begin{aligned} &\frac{4\left[1+s_i'\left(x_{ii}+x_{ij}\right)\right]\left[2+s_j'\left(x_{jj}\right)\right]}{2+s_i'\left(x_{ii}+x_{ij}\right)} \\ = \ &\frac{2+2s_i'\left(x_{ii}+x_{ij}\right)}{2+s_i'\left(x_{ii}+x_{ij}\right)}2\left[2+s_j'\left(x_{jj}\right)\right] < 2\left[2+s_j'\left(x_{jj}\right)\right]. \end{aligned} \qquad (2.55)$$

Hence, $2\left[2+s_j'\left(x_{jj}\right)\right]-\theta^2 > 0$.

B.4 Strategic FDI

We seek to calculate $\frac{d}{d\bar{x}_{ij}}\Delta\Pi = \frac{d}{d\bar{x}_{ij}}\left(\Pi_j^{Rr} - \Pi_j^R\right)$. By (2.33) and (2.18) we know that this is equal to

$$\frac{d}{d\bar{x}_{ij}}\Delta\Pi = 2x_{jj}^r\frac{dx_{jj}^r}{d\bar{x}_{ij}} + 2x_{ji}^r\frac{dx_{ji}^r}{d\bar{x}_{ij}} - 2x_{jj}\frac{dx_{jj}}{d\bar{x}_{ij}}. \qquad (2.56)$$

Using (2.34) and (2.35) and since we know that by symmetry $x_{ii}^r = \frac{1}{2}\left[b_i - s_i^r\left(x_{ii}^r+\bar{x}_{ij}\right)-\gamma_i-\theta x_{ji}^r\right]$ we get three total derivatives where we treat $\bar{x}_{ij}$ as exogenous:

$$\begin{aligned} dx_{jj}^r &= \frac{1}{2}\left[-s_j^{r\prime}\left(dx_{jj}^r+dx_{ji}^r\right)-\theta d\bar{x}_{ij}\right], \qquad (2.57) \\ dx_{ji}^r &= \frac{1}{2}\left[-s_j^{r\prime}\left(dx_{jj}^r+dx_{ji}^r\right)-\theta dx_{ii}^r\right], \qquad (2.58) \\ dx_{ii}^r &= \frac{1}{2}\left[-s_i^{r\prime}\left(dx_{ii}^r+d\bar{x}_{ij}\right)-\theta dx_{ji}^r\right]. \qquad (2.59) \end{aligned}$$

We solve this system of equations by Cramer's law. Accordingly, for the changes in the quantities due to the exogenous entry of retailer i into country j (represented by $\bar{x}_{ij}$) we get

$$\begin{aligned}
\frac{dx_{ii}^r}{d\bar{x}_{ij}} &= -\frac{1}{D}\left(\theta^2 s_j^{r\prime} + 4\left(1+s_j^{r\prime}\right)s_i^{r\prime}\right) > 0, && (2.60)\\
\frac{dx_{jj}^r}{d\bar{x}_{ij}} &= -\frac{1}{D}\theta\left(\left(2+s_j^{r\prime}\right)\left(2+s_i^{r\prime}\right) + s_j^{r\prime}s_i^{r\prime} - \theta^2\right) < 0, && (2.61)\\
\frac{dx_{ji}^r}{d\bar{x}_{ij}} &= \frac{1}{D}\theta\left(s_j^{r\prime}\left(2+s_i^{r\prime}\right) + s_i^{r\prime}\left(2+s_j^{r\prime}\right)\right) < 0 && (2.62)
\end{aligned}$$

where $D \equiv 4\left(1+s_j^{r\prime}\right)\left(2+s_i^{r\prime}\right) - \left(2+s_j^{r\prime}\right)\theta^2 > 0$ again due to stability requirements. Furthermore, because $4\frac{\left(1+s_j^{r\prime}\right)}{\left(2+s_j^{r\prime}\right)} < \left(2+s_j^{r\prime}\right)$ it follows from stability that $\left(2+s_j^{r\prime}\right)\left(2+s_i^{r\prime}\right) + s_j^{r\prime}s_i^{r\prime} - \theta^2 > 0$. Finally, by (2.16) the change in output of the country-j incumbent firm becomes

$$\frac{dx_{jj}}{d\bar{x}_{ij}} = -\frac{\theta}{\left(2+s_j^{\prime}\right)} < 0. \tag{2.63}$$

Substituting (2.60) - (2.63) into (2.56) and rearranging we get

$$\begin{aligned}
\frac{d}{d\bar{x}_{ij}}\frac{(\Delta\Pi)}{2}\frac{\left(2+s_j^{\prime}\right)}{\theta}D &= \underbrace{-x_{jj}^r\left(\left(2+s_j^{\prime}\right)^2\left(2+s_i^{r\prime}\right) + \left(2+s_j^{r\prime}\right)s_j^{r\prime}s_i^{r\prime} - \left(2+s_j^{r\prime}\right)\theta^2\right)}_{<0}\\
&\quad \underbrace{+x_{jj}\left(\left(2+s_j^{r\prime}\right)^2\left(2+s_i^{r\prime}\right) - s_j^{r\prime}s_j^{r\prime}\left(2+s_i^{r\prime}\right) - \left(2+s_j^{r\prime}\right)\theta^2\right)}_{>0}\\
&\quad \underbrace{+x_{ji}^r\left(2+s_j^{\prime}\right)\left(s_j^{r\prime}\left(2+s_i^{r\prime}\right) + s_i^{r\prime}\left(2+s_j^{r\prime}\right)\right)}_{<0}. \qquad (2.64)
\end{aligned}$$

Note that $x_{jj}^r > x_{jj}$ and

$$\begin{aligned}
&\left(2+s_j^{\prime}\right)^2\left(2+s_i^{r\prime}\right) + \left(2+s_j^{r\prime}\right)s_j^{r\prime}s_i^{r\prime} - \left(2+s_j^{r\prime}\right)\theta^2 \qquad (2.65)\\
>\ &\left(2+s_j^{r\prime}\right)^2\left(2+s_i^{r\prime}\right) - s_j^{r\prime}s_j^{r\prime}\left(2+s_i^{r\prime}\right) - \left(2+s_j^{r\prime}\right)\theta^2.
\end{aligned}$$

Hence, it is obvious to see that

$$\begin{aligned} & -x_{jj}^{r}\left(\left(2+s_{j}^{\prime}\right)^{2}\left(2+s_{i}^{r\prime}\right)+\left(2+s_{j}^{r\prime}\right)s_{j}^{r\prime}s_{i}^{r\prime}-\left(2+s_{j}^{r\prime}\right)\theta^{2}\right) \\ & +x_{jj}\left(\left(2+s_{j}^{r\prime}\right)^{2}\left(2+s_{i}^{r\prime}\right)-s_{j}^{r\prime}s_{j}^{r\prime}\left(2+s_{i}^{r\prime}\right)-\left(2+s_{j}^{r\prime}\right)\theta^{2}\right) \\ < \; & 0, \end{aligned} \tag{2.66}$$

and, thus,

$$\frac{d}{d\bar{x}_{ij}}\frac{(\Delta\Pi)}{2}\frac{\left(2+s_{j}^{\prime}\right)}{\theta}D<0. \tag{2.67}$$

Chapter 3

Retail MNEs: Trojan Horses or Gateways to Trade?

3.1 Introduction

Retail markets in industrialized countries mature and continue to consolidate while governments of many emerging countries have relaxed their legislation on foreign direct investment (FDI). Consequently, entry into the retail sector of these economies has become a natural path for expansion and growth for internationally operating retail chains. Retail FDI going to emerging economies has been observed over the past twenty years. The investment of multinational retail companies such as Carrefour (France), Wal-Mart (U.S.) or Metro (Germany) in countries such as China, India, and Vietnam has led to increases in the share of modern supermarket sales in total retail sales from initial two to ten percent in the early 1990s to as much as 60 percent in the mid-2000s (A.T.Kearney, 2008; Deloitte, 2008; Reardon & Gulati, 2008).[1] In 2008, roughly 23 percent of sales of the top 250 retail companies were realized through foreign operations. Of these international sales, 8.2 percent were generated in Africa and the Middle East, 11.9 percent in Asia and the Pacific, and 13.1 percent in Latin America (Deloitte, 2008). These figures are

[1]Note that a large part of retail FDI is done by companies in the food and fast-moving consumer goods sector. In 'modern' or 'organized' retail markets these goods are typically sold through supermarkets (Deloitte, 2010). Note further that modern retailing contrasts with traditional sales on wet markets or by street vendors, mom-and-pop stores, etc.

particularly informative as all three of these regions include a relatively high number of developing countries.

At the same time, FDI in retailing has raised concerns among policy makers in emerging economies so that "There is growing fear among producers and governments in developing regions that the supermarket chains are highly efficient 'Trojan horses' of imported goods." (Reardon et al., 2007, p. 416). This fear has provoked governmental institutions dedicated to the cause of economic development to add the issue to their agenda. In 2004, the Trade and Development Board of the United Nations Conference on Trade and Development (UNCTAD) noted that "While supermarkets contribute to greater efficiency in the distribution system, their growth has displaced smaller retailers, sometimes leading to unemployment." (UNCTAD, 2004, p. 4). Retail FDI, thus, seems to create an area of conflict between increased efficiency in distribution and the fear of crowding out of the traditional local retail and supply sectors.

In this chapter I will analyze the tradeoff between beneficial and detrimental effects of retail FDI: on the one hand, the Trojan horse effect, i.e., the competitive effect of a foreign retailer on indigenous traditional retail and supply channels, which works through imports by the retailer. On the other hand, there are the efficiency-increasing effect of technological upgrading and the effect of increased exports through a retailer's international distribution network. To the best of my knowledge I am the first to develop a model showing these ramifications of retail FDI on the local supply sector in an economically and technologically less advanced country, and to analyze which of the opposing effects is stronger. The analysis is conducted in a partial equilibrium setting. It takes into account the market power of the entrant retail company, its imports of foreign goods into the host country as well as the fact that retailers tend to technologically upgrade local manufacturers and sell locally produced goods to other regions through their existing distribution network. Overall, I find that the magnitudes of the three effects of retail FDI are detrimental for the local manufacturing sector when only the profits before and after retail entry are considered. Yet, when the quantities manufacturers produce for the entrant retailer are also taken into account the overall effect becomes ambiguous. In addition, I show that the results with respect to the quantities may be interpreted in terms of employment effects. Moreover, import tariffs may appear as a viable policy measure to

the government of the emerging economy. I find that while import tariffs help attenuate the Trojan horse effect of retail FDI, their imposition mitigates the positive influence of technological upgrading and the export gateway.

There exists vast anecdotal evidence on the effects of retail FDI on the local manufacturing sector in emerging economies. With regard to the *Trojan horse effect*, some studies claim that up to 70 percent of goods sold by retailers have been imported (Zentes et al., 2007). While for industrialized countries this may be explained by the fact that sourcing locally may be too costly for a retailer (e.g., due to high wage levels), in emerging economies the supply sector may not yet be capable of producing goods that comply with the retailer's quality and efficiency standards. Gereffi (1999, p. 52) notes in his study of the apparel commodity chain, "Retailers and marketers, however, need suppliers with the capability to make garments and the logistical know-how to find all the parts needed in the finished products." This statement illustrates how modern retail firms not only need sufficiently productive suppliers but also demand organizational and managerial skills from them and, thus, we observe the *upgrading effect*: retailers from industrialized countries located in emerging economies that lack such capabilities have been witnessed to make efforts in order to alleviate the deficiencies of their local suppliers. One example are French investors in the supermarket industry in Madagascar who have taught their contracted rice farmers how to make compost, which promotes healthy crop growth. A follow-up study comparing the productivity of plots of land with and without the retail contract found that rice productivity was 64 percent higher on plots cultivated by contracted farmers (Minten et al., 2009). The *gateway effect* occurs when a retailer links his operations in the host country to his expanding global network of sourcing. In Vietnam, for example, the French supermarket chain Carrefour works with farmers to build and upgrade their supply chains with the aim to reduce its reliance on imports and to facilitate exports to regional and global supply networks (Reardon et al., 2007). Retailers, thus, enter emerging retail markets via FDI, and upgrade local suppliers so as to make their products competitive enough to be exported to third markets through the retailer's own regional or global distribution network. Note in this context that while in 1990, developing-country exports (both, South-South as well as South-North flows) were responsible for 23 percent of global exports, this share had grown to to 37 percent in 2008 (OECD, 2010). Obviously,

not the entire increase in exports can be attributed to the gateway effect of retail FDI alone. However, the effect is conceivably non-negligible in terms of trade, especially after noting that the retail giant Wal-Mart who has invested in China accounts for over 15 percent of imports of consumer goods from China to the U.S. (Basker & Van, 2010). Note, finally, that the upgrading and gateway effect of retail entry are complementary: a retailer only adds the products of a new supplier (manufacturer) to his assortment when they comply with his efficiency and quality standards. Hence, these goods will also only be sold through his international distribution network once compliance with the standards is assured.

The literature already mentioned above provides rich anecdotal evidence on the effects of retail FDI in developing countries. To the best of my knowledge there is no formal model analyzing the issue using an economist's toolkit. The following studies relate to individual points made in the present study but none of them provide a comprehensive theoretical framework. Scholars that analyze contractual issues between retailers and their suppliers include Raff & Schmitt (2011b) who explain the interaction between retailers and manufacturers as well as the emergence of some key features of the retail sector such as slotting allowances, assortment size, and market concentration. In contrast to the present study, they do not consider contractual arrangements including technological upgrading of one party through the other. Villas-Boas (2007) compares different models of vertical relationships between manufacturers and retailers in the supermarket industry and computes price-cost margins for different models of vertical integration. Her results are informative as they show that retailers have pricing power in the vertical supply chain, which supports an assumption I make in this model. However, the efficiency of contracts in vertical relationships is not the focus of the present study and there are again no insights with regard to technological spillovers. Scott Morton & Zettelmeyer (2004) investigate the role of strategic positioning of store brands in retailer-manufacturer negotiations. Their results help to explain a retailer's bargaining power in the business relation — something that I stipulate in the model. Yet, I take this fact as given and do not seek to analyze how this bargaining power arises. In terms of technological spillovers, I am only aware of a single study posing and answering the question of how the entry of an international retail chain may affect productivity in the local supply sector. Using

Romanian data, Javorcik & Li (2008) find that the presence of a retail chain increases the total factor productivity (TFP) in the supply sector by 15.2 percent and that the doubling of the number of chains increases TFP by 10.8 percent. I build upon this result by incorporating technological upgrading of the local supplier through the entrant retailer. Other scholars have analyzed the relationship between retailing and international goods trade. For example, Basker & Van (2010) link the consolidation in the retail sector to the growth of imports from developing countries. In their empirical analysis they find that larger retailers have a higher propensity to import from developing countries than smaller retailers. Large retail chains also tend to be the ones that have affiliates in foreign countries I model this trade-increasing effect of retail FDI as the retailer will include the local supplier in his distribution network to export goods to store locations in the rest of the world. Since I also model the policy option of import tariffs, note that Richardson (2004) finds that the beneficial effects of trade liberalization (i.e., abolishing such tariffs) may be lost when the access of imported goods to the retail distribution network within the importing country is limited. His study, however, is very specific to trade relations between the U.S. and Japan. The distribution system in Japan is perceived as an invisible structural barrier to foreign exporters because the relationship between wholesalers and retailers is complex and incompletely specified. In my model I do not include wholesalers as additional intermediaries between manufacturers and retailers. Also, I only analyze the imposition of tariffs (as opposed to the abolishment) as a government's policy instrument to limit the amount of imports brought in by a retailer. Basker & Hoang (2011), finally, present a theory that links the size of a retail company to the imports of consumer goods in U.S.–China trade. In this context, they find that the effect of trade liberalization, i.e., lower import tariffs, increase imports through the usual effect on prices but also induces the retail firm to expand its chain. This brings imports to more locations, reduces the retailers marginal costs and, thus, causes a further expansion of the market for imports. Their analyses underline the negative effect of tariffs on retail-company imports, which I also find in my model.

The remainder of this chapter is organized as follows: Section 3.2 explains the basic partial equilibrium model of retail FDI in an emerging economy. In Section 3.3 the three effects of retail entry on the local supply sector are disentangled, their magnitudes are compared

and their implications for welfare are discussed. Section 3.5 analyzes the impact of the imposition of import tariffs, and Section 3.6 concludes.

3.2 A Partial Equilibrium Model of Trojan Horses, Upgrading, and Gateways

The following analysis is based on a world consisting of two countries and the rest of the world (ROW). One of the countries is assumed to be more advanced in terms of technology, and it is home to a modern retail company. The technologically less advanced country will be called country E as it can be thought of as an emerging economy. Before foreign retail investment there is no modern or organized retail sector in country E. However, there is a monopolistic manufacturer who does not interact economically either with the more advanced economy or with ROW. The subsequent entry of a retail company into country E is assumed to be exogenously determined by factors unrelated to the local manufacturer such as the saturation of the retailer's home market, technological advances in retail distribution systems, etc.[2] Hence, the factors determining the market entry decision are not part of this study. The retail firm imports a certain percentage of the products from his home country. This assumption is in line with Reardon et al. (2007) who have identified a 'reverse-J-curve' for imports by retailers that are gradually replaced by locally sourced goods. When entering the retail market in country E, the retailer seeks to cooperate with the local manufacturer and, thus, offers a retail distribution contract. This contract specifies technology upgrading measures supposed to help the manufacturer comply with the retailer's efficiency standards. Moreover, the contract specifies that if the manufacturer decides to sell through the retailer he will become part of his international distribution network and may, thus, export to ROW through the retailer. Retail FDI in economy E produces a tradeoff that consists of letting in a foreign retailer who brings with him foreign-produced goods which crowd out domestic products, and the technological upgrading of local suppliers through the retailer as well as the access to the retailer's distribution network, which spurs exports. We will see that imports as well as the effect

[2]Johnston et al. (2000) note, for example, that technological change (such as scanning and computerization) has influenced retail productivity by reducing labor input and changing management systems.

of retail entry on the manufacturer's production will also affect consumers as well as employment.[3]

3.2.1 Autarky in the Emerging Economy

Think of autarky in country E as a situation before legal provisions restricting inward retail FDI have been lifted. A good example is India where restrictions on FDI in the retail sector were only lowered in 2006 and which has experienced surging inward retail FDI ever since (A.T.Kearney, 2008). The construction of this scenario is informative as it is a useful benchmark case that will enable us to tell if the effects of retail FDI on the local supply sector in the emerging economy E are desirable or if policy makers in that country should try to avert the investment in the first place.

Consumers

In autarky, consumers in country E are assumed to consume only what the local manufacturer produces and sells directly to them. Since by assumption there is no modern retail sector in this country, there is no intermediary between the production and the sales of a final good. This is a realistic assumption as in countries attractive as destinations for retail FDI such as India or Vietnam, the modern retail sector accounts for less than five percent of the retail market (A.T.Kearney, 2008).[4] Hence, inverse demand can be illustrated by the linear function

$$p_E^a = b_E - x_E^a, \tag{3.1}$$

where p_E^a is the autarky price (superscript a), b_E the maximum willingness to pay of consumsers in country E, and x_E^a the quantity they demand.

[3]Note that throughout the analysis the terms manufacturer and supplier are used interchangeably. Note further, that whenever a manufacturer (or supplier) is mentioned, this always refers to the manufacturer in country E, unless indicated otherwise. Likewise, the retail firm's operations under consideration always take place in country E unless indicated otherwise.

[4]In grocery retailing alone this share is roughly 70 percent in industrialized regions such as North America or Wester Europe (Tandon et al., 2011).

Manufacturing

Before retail entry, the manufacturer in country E is assumed to embody both, the function of a producer and that of a retailer of consumer goods. The manufacturer is also assumed to be a local monopolist who generates the following profits by selling directly to the consumers:

$$\Pi_E^a = (p_E^a - c_E)\, x_E^a, \tag{3.2}$$

where $c_E > 0$ is the exogenously determined marginal cost of producing and distributing consumer goods accruing to the manufacturer in country E. The supplier maximizes his profits with respect to x_E^a, which then yields the equilibrium price, quantity, and profits:

$$p_E^a = \frac{1}{2}(b_E + c_E), \tag{3.3}$$

$$x_E^a = \frac{1}{2}(b_E - c_E), \tag{3.4}$$

$$\Pi_E^a = \frac{1}{4}(b_E - c_E)^2. \tag{3.5}$$

Obviously, the price, quantity, and profits increase in the consumers' maximum willingness to pay b_E. Moreover, the optimal quantity x_E^a and, hence, also the profits Π_E^a fall in the marginal costs of production and distribution c_E. The consumer price p_E^a increases in c_E since higher costs of production feed into a higher final goods price, which in turn reduces demand.

3.2.2 Retail Entry

Think of the retail FDI scenario as a situation in which the barriers to investment that existed in the autarkic situation have been lowered such that a modern retail company finds it profitable to enter economy E. As mentioned before, the profitability of this entry decision is taken to be exogenously determined and is, thus, not part of this analysis. Note also that all of the following economic interactions take place in country E, unless indicated otherwise.

Consumers

Consumers can now purchase two varieties as the retailer will always import products from his home country (subscript M) while the local varieties produced by the manufacturer are still available (subscript E). We will see below that these consumer goods are either sold only through the retailer or the imported variety M is sold through the retailer and the local variety E through the manufacturer. However, independent of who sells the final goods inverse demand for the goods is given by (3.6):

$$p_M^i = b_E - x_M^i - \theta x_E^i, \text{ and } p_E^i = b_E - x_E^i - \theta x_M^i, \quad 0 < \theta < 1, \quad i \in \{c, nc, TH, up\} \tag{3.6}$$

where the superscripts $i = c, nc$ indicate whether the manufacturer accepts the retail distribution contract *(compliance)* or refuses it *(non-compliance),* while $i = TH, up$ denote consumer demand in the hypothetical *Trojan horse (TH)* and *Upgrading (up)* case. These will be constructed in Section 3.3 in order to disentangle the effects of retail FDI. Note that the *non-compliance* case (nc) determines the manufacturer's outside option, which will be discussed below. p_M^i and p_E^i are the prices of imported goods x_M^i and locally produced goods x_E^i, respectively, both sold in country E. $0 < \theta < 1$ is a differentiation parameter indicating that consumers view the local variety and the foreign variety as imperfect substitutes. $\theta \to 1$ means that the goods are almost perfect substitutes, $\theta \to 0$ that they are nearly perfectly differentiated. This differentiation ensures that the retailer will sell both varieties when he enters the market. If the goods were homogeneous he would only sell the cheapest one.

Only when the retailer has technologically upgraded the manufacturer and has admitted him to his distribution network the latter may not only sell domestically but also to the rest of the world (ROW), both through the retailer. Inverse residual demand in ROW is given by (3.7):

$$p_{ROW}^i = b_{ROW} - x_{ROW}^i, \tag{3.7}$$

where p_{ROW}^i is the price paid for goods produced in country E and sold to ROW, b_{ROW} is the maximum willingness to pay in ROW and x_{ROW}^i is the quantity demanded. Note that $x_{ROW}^{nc} = x_{ROW}^{TH} = x_{ROW}^{up} = 0$ per definition as will be discussed in Section 3.2.2 and

in Section 3.3.[5]

Retailing and Manufacturing

Upon entry into the retail sector of the emerging economy E, the retailer will be both, a monopolist vis-à-vis consumers as well as a monopsonist vis-à-vis the local supplier.[6] In fact, it has been reported that large supermarket chains tend to apply onerous requirements such as slotting fees, buyback of unsold goods, etc., which hint at the market power enjoyed by these chains (UNCTAD, 2004). Note that the retailer will have an incentive to include local varieties in his stores (in addition to the imported ones) because of the consumer tastes reflected in (3.6), as long as the additional cost of the expansion of the product range remains sufficiently low (Eckel, 2009), and as long as the imported and the local goods are sufficiently substitutable. This implies that there must exist a lower bound on the differentiation parameter θ, i.e., $\underline{\theta} > 0$, which ensures that consumers will actually want to consume both goods. Otherwise, upon entry the retailer would incur the fixed cost of adding another variety to his range but would not generate additional profits through the sales of that variety. Given these prerequisites, the retailer draws up a contract, which he offers to the manufacturer. The contract specifies assistance with technological upgrading, and, once the locally produced goods comply with his standards, access to the retailer's international distribution network.[7] Moreover, the contract will state the quantity of locally produced goods the retailer wishes to purchase from the manufacturer as well as the supplier price he is willing to pay for this quantity. In order

[5]The abstraction from any other costs of trading simplifies the analysis and comes without loss of generality.

[6]This assumption is supported by findings of the UK Competition Commission (2000, p. 231), which say that "most suppliers sell most of the output to the main parties [author: i.e., retailers]", and that "the main parties were able to exert pressure during price negotiations on all the supplier's products by threatening to delist some of its [...] brands". Also, in her study of the vertical relationship between retailers and manufacturers, Villas-Boas (2007) finds that wholesale prices (i.e., supplier prices) are close to marginal cost and that retailers have pricing power.

[7]It was illustrated in the introduction that retailers have been observed to technologically upgrade their suppliers. Nordås et al. (2008, p. 8) note in this context that "leaner supply chains [author: e.g., reduced permanent inventory] often mean shorter supply chains, which could contribute to sourcing becoming more sensitive to distance". In the present framework this means that a retailer who wants to distribute goods in an emerging economy while keeping his inventory costs down needs to cooperate with local suppliers so as to reduce distance costs. Hence, I take the profitability of upgrading the technologically less advanced manufacturers as given and do not analyze the optimality of such a strategy.

to determine the optimal quantities, the retailer faces the profit-maximization problem

$$\begin{aligned} \max_{x_M^c, x_E^c, x_{ROW}^c} \Pi_R^c &= (p_M^c - s_M - t)\, x_M^c + (p_E^c - s_E^c)\, x_E^c \\ &\quad + (p_{ROW}^c - s_E^c)\, x_{ROW}^c - 2\Gamma, \\ \text{s.t. } s_E^c &\geqq \widehat{s}_E^c, \end{aligned} \tag{3.8}$$

where subscript c denotes the case of the manufacturer's *compliance* with the contract offer. The first term on the right-hand-side (RHS) of equation (3.8) are the profits generated by selling imported varieties to consumers in country E: the quantity x_M^c multiplied by the consumer price p_M^c which includes a mark-up over the supplier price paid for imports in the source country s_M and the per-item import tariffs t imposed by the government in the importing country E. Both parameters are assumed to be exogenous throughout the analysis. The second term represents profits generated by sales of locally produced goods to local consumers in country E x_E^c multiplied by the price p_E^c including a mark-up over the endogenous supplier price s_E^c the retailer pays to the local manufacturer. The third term are profits generated when the retailer sells goods x_{ROW}^c produced by the country-E manufacturer and sold through the retailer to ROW at consumer price p_{ROW}^c minus the supplier price s_E^c.[8] Finally, 2Γ denote the fixed costs associated with the provision of goods. They are fixed in the sense that while they increase in the assortment (or inventory) size, once the retailer has decided upon the latter they do not depend on the actual sales (Eckel, 2009). As was already stated above, these cost are assumed to be sufficiently low so that the retailer will actually sell both, the imported as well as the local variety.[9] The maximization problem is restricted by the constraint $s_E^c \geqq \widehat{s}_E^c$, where s_E^c is any given supplier price, and $\widehat{s}_E^c$ represents the minimum price the retailer has to pay the manufacturer so the latter will be indifferent between accepting the retail distribution contract and selling directly to consumers. $\widehat{s}_E^c$ is endogenously determined by the manufacturer's outside option, which will be discussed below.

The retailer sells two varieties that are imperfect substitutes in the eyes of consumers.

[8] Note again that without loss of generality I abstract from costs of transportation or export taxes or subsidies.

[9] Nordås et al. (2008) calculate that costs of inventory (so the cost of holding different goods in stock) could amount to 9 to 17 percent of total sales.

This implies that his internal structure resembles that of a duopoly with differentiated goods. Hence, calculating the first order conditions of problem (3.8) and rearranging yields the best-response functions for the goods sold in country E, i.e., (3.9) and (3.10), as well as the solution for the goods sold to ROW (3.11):

$$x_M^c = \frac{1}{2}\left(b_E - \theta x_E^c - s_M - t\right), \tag{3.9}$$

$$x_E^c = \frac{1}{2}\left(b_E - 2\theta x_M^c - \widehat{s}_E^c\right), \tag{3.10}$$

$$x_{ROW}^c = \frac{1}{2}\left(b_{ROW} - \widehat{s}_E^c\right). \tag{3.11}$$

x_M^c, x_E^c, and x_{ROW}^c are the quantities that maximize the retailer's profits. In addition, $x_E^c + x_{ROW}^c$ is the quantity the retailer will then specify in the distribution contract with the supplier. Already, the term $(-2\theta x_M^c)$ in equation (3.14) very clearly shows the intrusion of the imported varieties into the market of the country-E manufacturer compared to his monopolistic market position in autarky.

Now consider the situation of the manufacturer when he has signed the retail distribution contract. Without loss of generality, I assume that the technological upgrading specified therein will be such that the costs of production and distribution are reduced to zero, i.e., $c_E = 0$. Note that such a cost reduction constitutes a non-negligible improvement as in some sectors, such as the production of coffee, the costs of distribution may amount to more than 30 percent of the retail price (UNCTAD, 2004). In addition, the manufacturer gains access to the retailer's distribution network and will export through the retailer to ROW. Hence, the supplier's profits are given by (3.12)

$$\Pi_E^c = \widehat{s}_E^c\left(x_E^c + x_{ROW}^c\right), \tag{3.12}$$

Since I have assumed that the retailer's bargaining power allows him to dictate the terms of the distribution contract in terms of quantities, technological upgrading, and distribution

we can solve (3.9) and (3.10) to get the quantities

$$x_M^c = \frac{1}{2\left(1-\theta^2\right)}\left[b_E - s_M - t - \theta\left(b_E - \widehat{s}_E^c\right)\right], \tag{3.13}$$

$$x_E^c = \frac{1}{2\left(1-\theta^2\right)}\left[b_E - \widehat{s}_E^c - \theta\left(b_E - s_M - t\right)\right], \tag{3.14}$$

and, thus, the manufacturer's total profits when he sells through the retailer:

$$\Pi_E^c = \widehat{s}_E^c\left\{\frac{1}{2\left(1-\theta^2\right)}\left[b_E - \widehat{s}_E^c - \theta\left(b_E - s_M - t\right)\right] + \frac{1}{2}\left(b_{ROW} - \widehat{s}_E^c\right)\right\}. \tag{3.15}$$

Returning to the issue of the minimum supplier price $\widehat{s}_E^c$ note that the manufacturer faces an outside option in case he does not have the incentive to sell through the retailer. This outside option is represented by the profits he would generate if he sold directly to the consumers in country E:

$$\Pi_E^{nc} = \left(p_E^{nc} - c_E\right) x_E^{nc}, \tag{3.16}$$

where index *nc* denotes the situation of *non-compliance* with the retail contract. In this case the manufacturer would neither enjoy technological upgrading, which implies $c_E > 0$, nor does he have access to the rest of the world through the retailer's distribution network, which implies $x_{ROW}^{nc} = 0$.[10] Hence, his profits are composed of the mark-up over marginal costs $\left(p_E^{nc} - c_E\right)$ multiplied by the quantity of goods the manufacturer produces and sells, x_E^{nc}.

At the same time, the retailer is still active in the retail market of country E but only sells imported varieties. Hence, he maximizes the profits

$$\Pi_R^{nc} = \left(p_M^{nc} - s_M - t\right) x_M^{nc} - \Gamma, \tag{3.17}$$

where the retailer receives the price of p_M^{nc} per unit of goods x_M^{nc} he sells, and where he pays $s_M + t$ per item, i.e., the import price plus import tariffs. Note that since the retailer

[10] This assumption is quite realistic since "Private infrastructure, such as packing houses, cold chains, and shipping equipment among suppliers and distributors [author: in developing countries], is usually inadequate." (UNCTAD, 2004, p. 5). Hence, they are not able to export without the help of an experienced intermediary such as a retail firm. Also, from the literature on financial constraints and international firm activity we know that FDI and exports are inversely affected by the severity of these constraints (Buch et al., 2010). In the present context it is easily conceivable than an emerging-economy manufacturer neither has sufficient internal funds nor access to external financing.

now has a smaller inventory (or assortment) his fixed costs of keeping the inventory are reduced to Γ.

In this situation, both agents maximize their profits simultaneously with respect to quantities while taking the quantity of the other agent as given. This duopoly behavior yields the following solutions for the manufacturer's quantity and profits (see Appendix C.1):

$$x_E^{nc} = \frac{1}{4-\theta^2}\left[2\left(b_E - c_E\right) - \theta\left(b_E - t - s_M\right)\right], \tag{3.18}$$

$$\Pi_E^{nc} = \frac{1}{\left(4-\theta^2\right)^2}\left[2\left(b_E - c_E\right) - \theta\left(b_E - s_M - t\right)\right]^2. \tag{3.19}$$

Having obtained this outside option (3.19) which the manufacturer faces when not selling through the retailer we can easily determine at which point he does in fact have the incentive to engage in the retail distribution contract. Obviously, the supplier will sign the contract if and only if his profits from selling through the retailer (3.12) are greater than or equal to those generated by selling independently (equation 3.16), i.e.,

$$\Pi_E^c \geqq \Pi_E^{nc} \Leftrightarrow \widehat{s}_E^c\left(x_E^c + x_{ROW}^c\right) \geqq \left(p_E^{nc} - c_E\right) x_E^{nc}. \tag{3.20}$$

This *participation constraint* determines the minimum supplier price $\widehat{s}_E^c$ which the retailer has to state so that the manufacturer is indifferent between selling through and selling independently of the retailer. Hence, since I have assumed that the retailer always seeks the manufacturer's compliance, i.e., he finds it profitable to sell both, imported as well as local goods, he will always state a price $s_E^c \geqq \widehat{s}_E^c$. Moreover, note that the retailer does not have the incentive to state a price $s_E^c > \widehat{s}_E^c$ since the manufacturer is already indifferent between compliance and non-compliance when $s_E^c = \widehat{s}_E^c$. Hence, the retailer will never state a supplier price above $\widehat{s}_E^c$.

3.3 Consequences of Retail FDI

In the previous section I established the autarky equilibrium as well as the equilibrium after the retailer has entered country E. In this section I will now analyze the magnitude of the effects of retail entry on the local supply sector. We will see that the overall effect

in terms of profits (i.e., the sum of the three partial effects) will be unambiguously detrimental for the local manufacturer. Considering the quantities produced by the supplier, however, I find that the effect is ambiguous and leaves room for different interpretations. In order to see this, I will disentangle the three different channels through which the supply sector is affected: first, the Trojan horse effect, second, the cost-reduction effect, and third, the gateway effect. This will be done by deliberately closing the other channels and, thus, creating a set of hypothetical comparison cases.

3.3.1 Trojan Horse Effect

The first effect is the pure effect of retail entry, i.e., the impact of market entry by the foreign retailer who not only sells local products but also sells imported goods. As I stipulate that the two varieties are imperfect substitutes the supplier, thus, gains a competitor in terms of the imported varieties and loses market share compared to the autarky situation. This effect can be isolated by comparing the manufacturer's autarky profits (3.5), Π_E^a, to the hypothetical profits the manufacturer would realize if he accepted a retail distribution contract that did not specify any technological upgrading and granted no access to the retailer's distribution network. The absence of upgrading implies that costs of production and distribution still accrue to the supplier ($c_E > 0$). Moreover, sales to ROW are zero $\left(x_{ROW}^{TH} = 0\right)$ because in the absence of upgrading the goods do not comply with the retailer's standards and will, thus, not be exported. The resulting reference profits and quantity are then given by

$$\Pi_E^{TH} = \left(\widehat{s}_E^{TH} - c_E\right) x_E^{TH} \text{ and } x_E^{TH} = \frac{1}{2\left(1-\theta^2\right)}\left[b - \widehat{s}_E^{TH} - \theta\left(b - t - s_M\right)\right], \tag{3.21}$$

where a *TH* indicates the variables derived from this reference scenario.[11] We also get a new participation constraint, which determines the supplier price $\widehat{s}_E^{TH}$ ensuring the compliance of the manufacturer:

$$\Pi_E^{TH} = \Pi_E^{nc} \Leftrightarrow \left(\widehat{s}_E^{TH} - c_E\right) x_E^{TH} = \left(p_E^{nc} - c_E\right) x_E^{nc}. \tag{3.22}$$

[11] See Appendix C.2 for the derivations.

Obviously, the manufacturer's outside option is again the profits he would generate by selling independently, i.e., Π_E^{nc}. Hence, I compare these profits to the autarky profits given by (3.5) to see if $\Pi_E^a - \Pi_E^{nc} \gtreqless 0$. The mathematical proof is straightforward (see Appendix C.2) when we note that the outside option (3.19) can be expressed as

$$\Pi_E^{nc} = \frac{1}{4}\left[(b - c_E) - \frac{\theta}{4 - \theta^2}\left(2\left(b - t - s_M\right) - \theta\left(b - c_E\right)\right)\right]^2, \tag{3.23}$$

which can be rewritten as

$$\Pi_E^{nc} = \frac{1}{4}\left(b - c_E - \theta x_M^{nc}\right)^2 < \Pi_E^a = \frac{1}{4}\left(b - c_E\right)^2. \tag{3.24}$$

Obviously, $\Pi_E^{nc} - \Pi_E^a < 0$ as soon as $\theta x_M^{nc} > 0$. I.e., because the retailer imports a second variety, the manufacturer does not sell as much as under autarky and his profits will fall. Further, we know from participation (3.22) that the retailer will always pay a supplier price ensuring the manufacturer signs the contract offer, i.e., ensuring that $\Pi_E^{TH} = \Pi_E^{nc}$ is given. Consequently, equation (3.23) also implies

$$\Pi_E^{TH} < \Pi_E^a, \tag{3.25}$$

which clearly shows that the goods imported by the retailer and sold in country E's retail market act like a Trojan horse: they crowd out sales of local varieties and, thus, diminish the local supplier's profits compared to his profits in the autarky situation.

3.3.2 Upgrading Effect

Given retail entry has occurred, the second effect we observe is the technology upgrading effect. It can be isolated by assuming that the retail contract contains a technological upgrading clause implying $c_E = 0$ but still does not grant access to the distribution network ($x_{ROW}^{up} = 0$). Hence, the new reference profits and quantity are given by (3.26):

$$\Pi_E^{up} = \widehat{s}_E^{up} x_E^{up} \text{ and } x_E^{up} = \frac{1}{2\left(1 - \theta^2\right)}\left[b - \widehat{s}_E^{up} - \theta\left(b - t - s_M\right)\right], \tag{3.26}$$

with index *up* as in upgrading. Note that $s_E^{up} \geqq \widehat{s}_E^{up}$ is the supplier price which ensures the supplier's compliance with the new retail contract. The participation constraint determining this price is

$$\Pi_E^{up} = \Pi_E^{nc} \Leftrightarrow \widehat{s}_E^{up} x_E^{up} = (p_E^{nc} - c_E)\, x_E^{nc}, \tag{3.27}$$

which implies that the profits the manufacturer would generate by selling independently as given by equation (3.19) serve again as the outside option. This also implies $\Pi_E^{up} = \Pi_E^{TH}$, which means that the retailer reaps all additional rents of the cost savings through the technology upgrading, i.e., $\Pi_E^{up} - \Pi_E^{TH} = 0$. He will do so by quoting a lower price $\widehat{s}_E^{up}$ while the manufacturer still generates the same profits by selling more in terms of the new quantity, x_E^{up}. Note that this emphasizes the retailer's incentive to actually upgrade the supplier as he will ultimately benefit from the ensuing reduction in the supplier price.

Therefore, in order to isolate the upgrading effect instead of comparing profits, I compare the quantity produced by the supplier in the present upgrading scenario x_E^{up} to the quantity in the previously analyzed Trojan horse case x_E^{TH} to determine whether $x_E^{up} - x_E^{TH} \gtreqless 0$. As it is the retailer who sets the terms of the retail contract we solve this problem from his point of view. In order to determine the optimal wholesale price we look at the profit-maximization problems the retailer faces in both cases on the market for final goods:

$$\begin{aligned} \max_{x_M^{TH}, x_E^{TH}} \Pi_R^{TH} &= (p_M^{TH} - s_M - t)x_M^{TH} + \left[p_E^{TH} - s_E^{TH}(x_E^{TH})\right] x_E^{TH} - 2\Gamma, \\ s.t.\ s_E^{TH} &\geqq \widehat{s}_E^{TH}, \end{aligned} \tag{3.28}$$

and

$$\begin{aligned} \max_{x_M^{up}, x_E^{up}} \Pi_R^{up} &= (p_M^{up} - s_M - t)x_M^{up} + [p_E^{up} - s_E^{up}(x_E^{up})]\, x_E^{up} - 2\Gamma, \\ s.t.\ s_E^{up} &\geqq \widehat{s}_E^{up}, \end{aligned} \tag{3.29}$$

where I have already taken into account that $x_{ROW}^{TH} = x_{ROW}^{up} = 0$. Note that due to the participation constraints (3.22) and (3.27) we can always express the supplier price that the retailer has to pay as a function of the quantity he sells, i.e., $s_E^{TH} = \widehat{s}_E^{TH} = \widehat{s}_E^{TH}\left(x_E^{TH}\right)$

and $s_E^{up} = \widehat{s}_E^{up} = \widehat{s}_E^{up}(x_E^{up})$, respectively. Accordingly, the optimal values of x_M^i and x_E^i are uniquely characterized by the corresponding first order conditions (note that inverse demand (3.6) has been substituted):

$$\left.\frac{d\Pi_R^i}{dx_E^i}\right|_{x_{ROW}^{TH}=x_{ROW}^{up}=0} = \left[\left(b - x_E^i - \theta x_M^j\right) - \widehat{s}_E^i(x_E^i)\right] - x_E^i - \frac{d\widehat{s}_E^i}{dx_E^i}x_E^i = 0, \quad (3.30)$$

$$\left.\frac{d\Pi_R^i}{dx_M^i}\right|_{x_{ROW}^{TH}=x_{ROW}^{up}=0} = \left[\left(b - x_M^i - \theta x_E^i\right) - s_M - t\right] - x_M^i = 0, \quad (3.31)$$

where by (3.22) and (3.27) for the constant outside option $k \equiv \Pi_E^{nc}$ we have

$$\widehat{s}_E^{TH}\left(x_E^{TH}\right) = \frac{k}{x_E^{TH}} + c_E \text{ and } \widehat{s}_E^{up}\left(x_E^{up}\right) = \frac{k}{x_E^{up}}, \quad (3.32)$$

which implies

$$\frac{d\widehat{s}_E^{TH}}{dx_E^{TH}} = -\frac{k}{\left(x_E^{TH}\right)^2} < 0 \text{ and } \frac{d\widehat{s}_E^{up}}{dx_E^{up}} = -\frac{k}{\left(x_E^{up}\right)^2} < 0. \quad (3.33)$$

Now consider the pair of quantities (x_M^{TH}, x_E^{TH}) that are optimal when the retailer does not cut the manufacturer's cost. Since for a given x_E^{TH} by (3.32) and (3.33) we have $\widehat{s}_E^{TH} = k/x_E^{TH} + c_E > \widehat{s}_E^{up} = k/x_E^{TH}$ and $d\widehat{s}_E^{TH}/dx_E^{TH} = d\widehat{s}_E^{up}/dx_E^{TH}$, respectively, we know that this choice of quantities can no longer be optimal after technological upgrading. Instead, by (3.21) and (3.26) we know that the supplier will sell a strictly larger quantity:

$$x_E^{up} > x_E^{TH}, \quad (3.34)$$

which in turn implies that $\widehat{s}_E^{up}\left(x_E^{up}\right) < \widehat{s}_E^{TH}\left(x_E^{TH}\right)$. Hence, the upgrading effect is strictly positive for the manufacturer in terms of the quantity he produces and sells through the retailer.

3.3.3 Gateway Effect

I isolate the gateway effect of retail FDI by allowing the retailer to now specify in the sourcing contract that he will open his international distribution network to the supplier. This means that he will now also sell goods from country E to ROW. In order to determine whether access to the retailer's distribution network is beneficial for the local manufacturer

compared to the situation without sales to ROW, I compare this case to the hypothetical *upgrading* case as established in the previous section. Note that since the *gateway* case includes technological upgrading ($c_E = 0$) as well as sales to ROW ($x^c_{ROW} > 0$) it is equal to the initial case of *compliance* as established in Section 3.2.2. Clearly, the participation constraints (3.20) and (3.27) imply that both cases have the same outside option, i.e., $\Pi^{up}_E = \Pi^c_E = \Pi^{nc}_E$. For the comparison of the manufacturer's profits this means that $\Pi^{up}_E - \Pi^c_E = 0$, i.e., the retailer reaps again all additional rents of the sales to ROW. Accordingly, I compare the quantities instead of the profits and seek to determine whether $x^c_E + x^c_{ROW} - x^{up}_E \gtreqless 0$. Mathematically, the solutions are straightforward: participation constraints (3.20) and (3.27) can be rearranged to give

$$\widehat{s}^c_E = \frac{k}{(x^c_E + x^c_{ROW})} \text{ and } \widehat{s}^{up}_E = \frac{k}{(x^{up}_E + x^{up}_{ROW})}, \tag{3.35}$$

where I have already defined $k \equiv \Pi^{nc}_E$ and where per definition $x^c_{ROW} > x^{up}_{ROW} = 0$. Clearly, this implies

$$\widehat{s}^{up}_E > \widehat{s}^c_E, \tag{3.36}$$

and, thus, by equations (3.11), (3.14), and (3.26)

$$x^c_E + x^c_{ROW} > x^{up}_E. \tag{3.37}$$

Therefore, the gateway effect is again positive for the local manufacturer in terms of the quantity he produces and sells to the retailer.

3.3.4 Overall Effect

The overall effect of exogenous retail entry on the local manufacturer is composed of the three partial effects, which were presented in the previous section. It can either be expressed in terms of profits, $\Delta\Pi_E \equiv \Pi^c_E - \Pi^a_E$, or in terms of quantities, $\Delta x_E \equiv x^c_E + x^c_{ROW} - x^a_E$. First, let us depict it in terms of the differences between profits generated in the different scenarios:

$$\Delta\Pi_E \equiv \Pi_E^c - \Pi_E^a = \underbrace{\left(\Pi_E^{TH} - \Pi_E^a\right)}_{\substack{\text{Trojan horse} \\ < 0}} + \underbrace{\left(\Pi_E^{up} - \Pi_E^{TH}\right)}_{\substack{\text{upgrading} \\ = 0}} + \underbrace{\Pi_E^c - \Pi_E^{up}}_{\substack{\text{gateway} \\ = 0}} < 0. \tag{3.38}$$

Equation (3.38) implies that retail entry is detrimental for the local manufacturer when comparing the profit differentials that costitute the overall effect $\Delta\Pi_E$. The Trojan horse effect is clearly in favor of autarky: retail entry without an upgrading clause in the distribution contract merely reduces the manufacturer's market share without improving his capacity to compete in terms of production costs. The second and third term represent the upgrading and gateway effect, respectively. The effects are zero since the manufacturer always realizes the same profits. This is due to the constant outside option in both cases, which allows the retailer to extract all additional rents. However, taking the fact that $\Delta\Pi_E$ is negative as evidence that policy makers in country E should try to avert foreign retail market entry would be missing the mark since we already saw that the quantities produced by the supplier differ between the scenarios. Hence, consider equation (3.39):

$$\Delta x_E \equiv x_E^c + x_{ROW}^c - x_E^a = \underbrace{\left(x_E^{TH} - x_E^a\right)}_{\substack{\text{Trojan horse} \\ < 0}} + \underbrace{\left(x_E^{up} - x_E^{TH}\right)}_{\substack{\text{upgrading} \\ > 0}} + \underbrace{(x_E^c + x_{ROW}^c - x_E^{up})}_{\substack{\text{gateway} \\ > 0}}. \tag{3.39}$$

Obviously, the Trojan horse effect acts again in favor of autarky while the other effects underpin the beneficial influence of retail entry on the local manufacturer. Therefore, the overall effect in terms of quantities is ambiguous.

3.4 Welfare

The findings of the previous sections need to be discussed in terms of the welfare implications of retail FDI for economy E. In fact, we can distinguish three ways in which the country is affected. First, the supplier profits change due to retail entry. As equation (3.38) shows, the supplier generates lower profits because of the negative Trojan horse

effect. Hence, from the supplier's point of view retail FDI in his home country is undesirable and policy makers in country E should try to avert it if the supplier's profits before and after entry were the only decision parameters. Second, equation (3.39) shows that while the Trojan horse effect is also negative, the upgrading and gateway effect increase the total quantity produced by the supplier. This result by itself is not very informative in terms of welfare. However, Bjorvatn & Eckel (2006) show that the quantity changes may be translated into employment effects also in a partial equilibrium framework if one allows for involuntary unemployment: suppose labor is the only variable factor of production and that one unit of labor produces one unit of output. Suppose further that the shadow price of labor (i.e., its opportunity cost) is smaller than the marginal costs of production (i.e., the wage) which may be due to labor market frictions. In combination with the assumption of involuntary unemployment this implies that workers receive a surplus from being employed. Furthermore, as labor is the only factor of production, total output equals total employment. Once production increases, so will employment and, thus, also the sum of wages paid to workers. Applied to the present analysis this means that the Trojan horse effect is negative in terms of employment and wages, the upgrading and gateway effect, however, are beneficial because the quantities produced increase in both cases vis-à-vis the comparison case. Finally, consumers most likely benefit from the entry of the foreign retail company (only the intuitive reasoning is given here). In autarky, the supplier is a monopolist who sells too-low quantities at too-high prices. The foreign retailer creates competition which lowers consumer prices and, thus, increases welfare. In addition, the imports which are detrimental for the local supplier are beneficial for the local consumers if we assume their preferences to be of the Dixit-Stiglitz type (Dixit & Stiglitz, 1977). In that case welfare is also determined by the number of varieties available to consumers (the love-of-variety effect) and would, thus, increase after the entry of the retailer. Obviously, when considering the effects on employment and consumer welfare making a distinct policy recommendation whether to deter or encourage retail FDI in country E is not straightforward anymore. The following Section will shed some light on one possible policy measure and its impact on the effects of retail FDI.

3.5 Import Tariffs

Suppose now that the government of country E decides to levy tariffs on imports because it is alarmed by the potentially negative effects of foreign retail FDI on its economy. Hence, in this section I examine how the imposition of tariffs represented by parameter t changes the magnitude of the Trojan horse, the upgrading, and the gateway effect of retail FDI. First, consider how the three effects change in terms of supplier profits. Mathematically, this amounts to the following solutions (see Appendix C.3):

$$\frac{d}{dt}\left(\Delta\Pi_E\right) \equiv \frac{d}{dt}\left(\Pi_E^c - \Pi_E^a\right) = \underbrace{\frac{d}{dt}\left(\Pi_E^{TH} - \Pi_E^a\right)}_{\substack{\text{Trojan horse} \\ > 0}} + \underbrace{\frac{d}{dt}\left(\Pi_E^{up} - \Pi_E^{TH}\right)}_{\substack{\text{upgrading} \\ = 0}} + \underbrace{\frac{d}{dt}\left(\Pi_E^c - \Pi_E^{up}\right)}_{\substack{\text{gateway} \\ = 0}} < 0, \tag{3.40}$$

where

$$\frac{d\Pi_E^a}{dt} = 0, \text{ and } \frac{d\Pi_E^c}{dt} = \frac{d\Pi_E^{up}}{dt} = \frac{2\theta}{(4-\theta^2)} x_E^{nc} > 0. \tag{3.41}$$

The interpretation of these results is straightforward: The Trojan horse effect is attenuated as an increase in the cost of importing goods into country E leads the retailer to import less goods, and the competitive pressure on the supplier is reduced. The profits in the upgrading and gateway case also increase with the increase in tariffs, but the increases are proportional and neutralize each other since they have the same outside option. Therefore, if a policy maker based his decision whether or not to levy import tariffs on the profits of the local supply sector before and after retail FDI in his country he should choose to do so. However, from the discussion of equation (3.39) as well as the welfare discussion in Section 3.4 we know that the quantities produced also carry their separate meaning for the impacts of retail entry. Therefore, the effect of import tariffs on the three effects in terms of quantities, $d\left(\Delta x_E\right)/dt$, will be subject to the subsequent analysis. Note that the analytical results are ambiguous (see Appendix C.4). Hence, I assume parameter values and derive numerical solutions for the changes in each one of the three effects of retail FDI. For each effect I identify one of the parameters as the main driver, and then vary that parameter *ceteris paribus*. More specifically, I make the distinction between two cases: a *low* value of the focus parameter (index L) and a *high* value (index H) while

the other parameters are kept at intermediate levels. Note that two parameters are kept constant throughout the numerical exercises: first, the maximum willingness to pay of consumers in country E, which may be interpreted as the size of the market, is set to $b_E = 100 \leqq b_{ROW}$ in all scenarios. This accounts for the fact that a single country will always be smaller compared to the rest of the world. Second, the supplier price paid by the retailer for goods imported from his home country is set to $s_M = 0$. In doing so I account for the assumption that suppliers in the retailer's home country are technologically more advanced and, thus, tend to have lower prices than suppliers in country E. Table 3.1 summarizes the parameter values used for the six numerical results.

Table 3.1: Parameter Values

Effect	Trojan horse		Upgrading		Gateway	
Parameter	Low	High	Low	High	Low	High
b_E	100	100	100	100	100	100
b_{ROW}	1000	1000	1000	1000	100	10,000
c_E	50	50	10	90	50	50
θ	0.05	0.7	0.5	0.5	0.5	0.5
s_M	0	0	0	0	0	0

First, I consider the change in the magnitude of the Trojan horse effect in quantities. I identify the differentiation parameter θ as the main driver of this effect as it measures the substitutability between variety M and E and, hence, the degree of competition.

Conjecture 1 *The Trojan horse effect should be alleviated by the imposition of import tariffs. For high values of θ it should have a strong protective effect on the local variety. Conversely, the lower θ the more differentiated the goods, the less of a competitive threat is exerted by imports, and the less of a protective effect the tariff should have.*

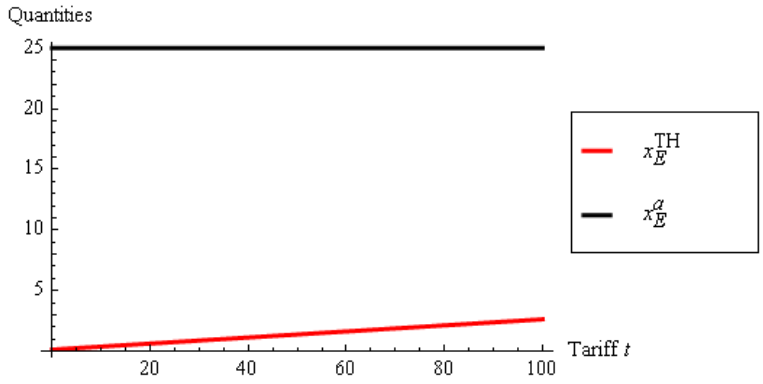
Formally, the expectation with regard to the numerical outcome can be expressed as

$$\frac{d}{dt}\left(dx_E^{TH} - dx_E^a\right)\Big|_{\theta^H} > \frac{d}{dt}\left(dx_E^{TH} - dx_E^a\right)\Big|_{\theta^L} > 0, \tag{3.42}$$

where $dx_E^a/dt = 0$.

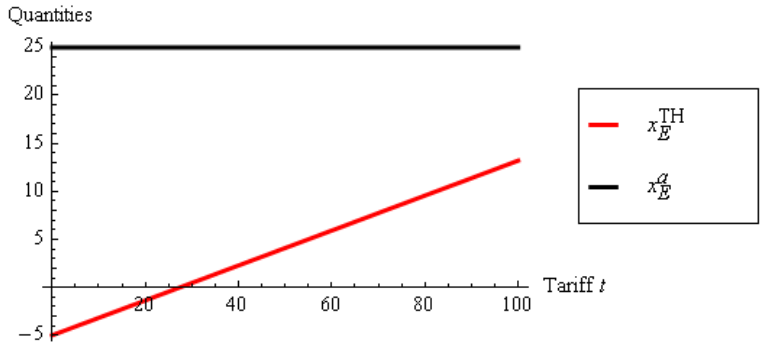
I choose $\theta^L = 0.05$ and $\theta^H = 0.7$ for the numerical calculations and find Conjecture 1 to be confirmed: Figure 3.1 plots the quantities against import tariffs t and shows that for θ^L, i.e., a high degree of differentiation, the increase in tariffs has a much weaker effect on x_E^{TH} than for the case of little differentiation, θ^H, displayed in Figure 3.2. In fact, when x_M^{TH} and x_E^{TH} are highly substitutable in the eyes of the consumers we see in Figure 3.2 that tariff t needs to rise to fairly high levels in order for x_E^{TH} to become positive in the first place. Therefore, from a policy-maker's point of view imposing a tariff generally alleviates the Trojan horse effect of retail FDI. It also increases employment if we make the labor market assumptions discussed in Section 3.4.

Figure 3.1: Tariffs and the Trojan Horse I



Plot of x_E^a and x_E^{TH} for $\theta^L = 0.05$.

Figure 3.2: Tariffs and the Trojan Horse II



Plot of x_E^a and x_E^{TH} for $\theta^H = 0.7$.

Second, I examine the change in the magnitude of the upgrading effect, i.e.,

$d/dt\left(x_E^{up} - x_E^{TH}\right)$. Quite conceivably, the marginal costs of production and distribution, c_E, are chosen as the focus parameter. Note that the choice of the value of c_E was made with respect to the value of b_E, i.e., the maximum willingness to pay of consumers in country E. Since in the autarky situation we derived (3.4), $x_E^a = \frac{1}{2}(b_E - c_E)$, we know that $c_E \leqq b_E$ must be given.

Conjecture 2 *With respect to the upgrading effect I expect the imposition of tariffs to work in two ways: first, both quantities increase in tariffs, but* $d/dt\left(x_E^{TH}\right) > d/dt\left(x_E^{up}\right) > 0$, *which implies* $d/dt\left(x_E^{up} - x_E^{TH}\right) < 0$. *This means that the upgrading effect will be mitigated by the imposition of tariffs because it increases the import price of the imported variety,* $(\widehat{s}_M^i + t)$, *and, thus, reduces the cost difference between the imported and the local variety from the point of view of the retailer. Hence, the cost-competitiveness enhancing effect of the upgrading for the local goods is also diminished. Second, the mitigation of the upgrading effect will be more pronounced for high initial values of* c_E *than for low values. This is due to the fact that if* c_E *is already low before upgrading (remember,* $c_E = 0$ *after technological upgrading has been effectuated) the upgrading effect itself is not very pronounced. Thus, the protective power of tariffs should be less pronounced for a low* c_E *than when a supplier is relatively cost-inefficient to begin with (high* c_E*).*

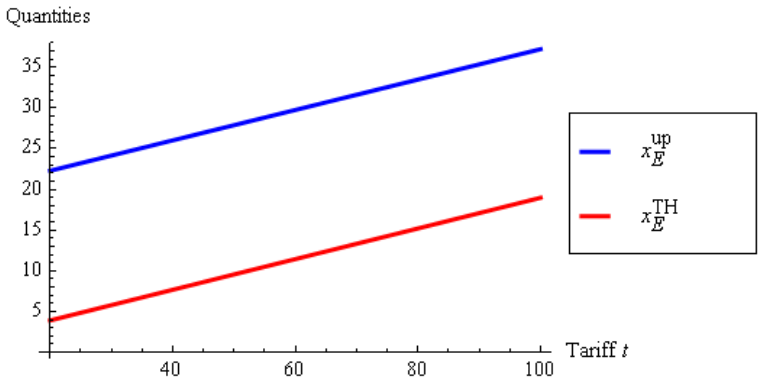
Formally, the expectation with regard to the numerical outcome can be expressed as

$$\left.\frac{d}{dt}\left(x_E^{up} - x_E^{TH}\right)\right|_{c_E^L} < \left.\frac{d}{dt}\left(x_E^{up} - x_E^{TH}\right)\right|_{c_E^H} < 0. \tag{3.43}$$

Indeed, Figures 3.3 and 3.4 illustrating the case of low and high marginal distribution costs, respectively, confirm the analytical results from Section 3.3.2 as well as Conjecture 2 for the chosen parameter values: $x_E^{up} > x_E^{TH}$, and, while both quantities increase in tariffs (the protective effect) the difference becomes smaller since $d/dt\left(x_E^{TH}\right) > d/dt\left(x_E^{up}\right) > 0$. Moreover, this effect is more pronounced for $c_E^H = 90$ than for $c_E^L = 10$. Consequently, from a policy point of view, the levying of import tariffs is not advisable as the upgrading effect may eventually be forestalled altogether. This could be detrimental for the local supply sector if not for the economy as a whole. The latter is particularly true with respect to emerging economies that have limited capacity to progress in terms of the best

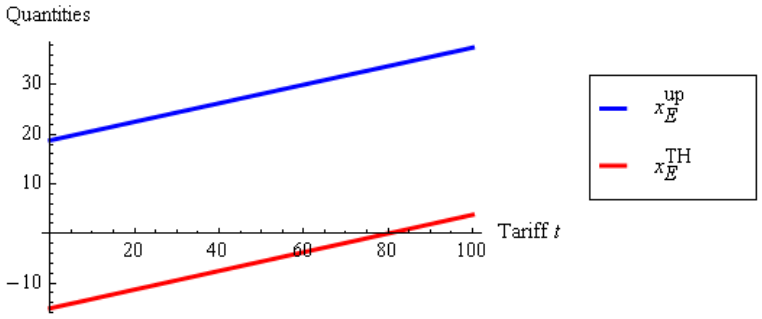
available technology but which is needed to propel economic development forward.

Figure 3.3: Tariffs and Upgrading I



Plot of x_E^{TH} and x_E^{up} for $c_E^L = 10$.

Figure 3.4: Tariffs and Upgrading II



Plot of x_E^{TH} and x_E^{up} for $c_E^H = 90$.

Third, consider the change in the gateway effect when the government of country E decides to levy import tariffs. Clearly, this effect is driven by the supplier's access to the retailer's distribution network and, hence, to ROW. Therefore, b_{ROW}, the consumers' maximum willingness to pay in ROW (which may be interpreted as the size of ROW) is identified as the main channel through which this effect runs. Note that b_{ROW} may also represent the size of the retailer's distribution network in a particular region which may be subject to expansion (or contraction) (Reardon et al., 2007).

Conjecture 3 *The gateway effect is expected to be diminished by tariffs to a greater extent for a relatively small rest of the world than when the rest of the world is relatively*

large compared to country E. This is explained by the fact that the quantity sold to the rest of the world falls in import tariffs because the supplier price increases in tariffs, i.e., $d/dt\,(x^c_{ROW}) < 0$ *since* $d\widehat{s}^c_E/dt > 0$.[12] *Moreover,* $d/dt\,(x^{up}_E) > d/dt\,(x^c_E) > 0$, *which implies* $d/dt\,(x^c_E + x^c_{ROW} - x^{up}_E) < 0$.

Formally, this conjecture with regard to the numerical solutions can be expressed as

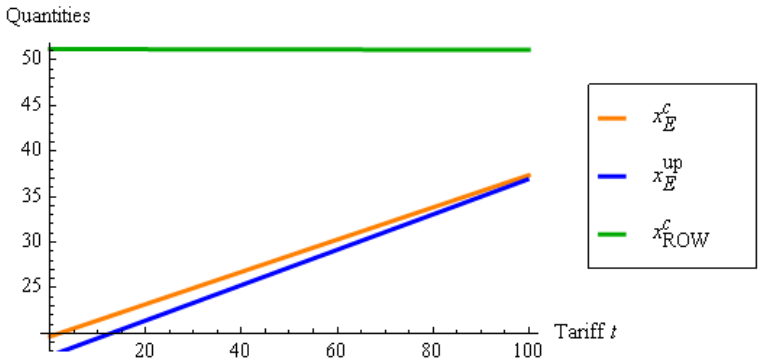
$$\frac{d}{dt}\,(x^c_E + x^c_{ROW} - x^{up}_E)\Big|_{b^L_{ROW}} < \frac{d}{dt}\,(x^c_E + x^c_{ROW} - x^{up}_E)\Big|_{b^H_{ROW}} < 0. \tag{3.44}$$

Figures 3.5 and 3.6 are plotted for $b^L_{ROW} = 100$ and $b^H_{ROW} = 10,000$, respectively confirm the expectations: obviously, in both numerical solutions the quantity sold to ROW is larger than x^c_E and x^{up}_E. Quite conceivably, the difference is larger for b^H_{ROW}. Moreover, $dx^c_{ROW}/dt < 0$. However, in both cases the decline is extremely gradual as the effect runs indirectly through the supplier price as explained above. In addition, in both graphs we see that $d/dt\,(x^{up}_E) > d/dt\,(x^c_E) > 0$. Together with $dx^c_{ROW}/dt < 0$ this confirms Conjecture 3 which says that the gateway effect is mitigated by the imposition of import tariffs, and that the mitigation is stronger for a relatively small ROW. Hence, from a policy point of view levying tariffs on imports reduces the positive effect of the local supplier gaining access to the global market through the retailer: imposing tariffs reduces the total quantity produced relative to the quantity without access to ROW and the positive employment effect becomes relatively smaller. Furthermore, integration into the global market by becoming exporters of consumer goods is particularly interesting for emerging economies that often export mainly primary products. Prices of these kinds of goods often fluctuate substantially on international markets and, thus, do not represent a stable source of revenue. In addition, the creation of an export sector of consumer goods tends to increase employment, which would increase welfare further.[13]

[12]Note that $\frac{d\Pi^{nc}_E}{dt} > \frac{d\Pi^c_E}{dt}\Big|_{d\widehat{s}^c_E/dt=0} > 0$ iff $1 > \overline{\theta} \geqq \widetilde{\theta} \geqq \underline{\theta} > 0$. Hence, $d\widehat{s}^c_E/dt > 0$ needs to be true to ensure participation by the supplier (equation (3.20)) and, thus, $dx^c_{ROW}/dt < 0$. Note further that the differentiation parameter must have a lower bound $\underline{\theta} > 0$ so that the local and the imported goods are not too differentiated, and the effect of an increase in tariffs on the imported varieties still carries through to the local varieties. This implies $dx^i_E/dx^i_M \neq 0$ iff $\widetilde{\theta} \geqq \underline{\theta}$. In addition, θ must be bounded from above, i.e., $1 > \overline{\theta} \geqq \widetilde{\theta}$ (goods need to be sufficiently differentiated) so that the retailer has an incentive to sell both goods in the first place (see section 3.2.2, equation (3.6)).

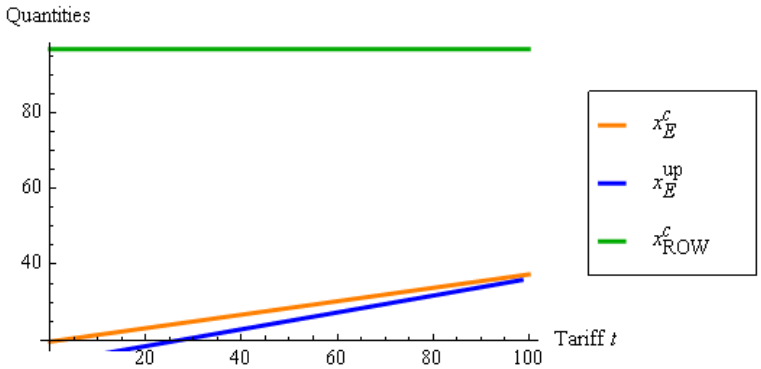
[13]The result of the 'destruction' of exports due to the imposition of a tariff on imports is, albeit derived

Figure 3.5: Tariffs and the Gateway I



Plot of x_E^{up}, x_E^c, and x_{ROW}^c for $b_{ROW}^L = 100$.

Figure 3.6: Tariffs and the Gateway II



Plot of x_E^{up}, x_E^c, and x_{ROW}^c for $b_{ROW}^H = 10,000$.

Combined, the numerical exercises for the overall impact of import tariffs on the Trojan horse, the upgrading, and the gateway effect in terms of the quantities give an ambiguous result as (3.45) shows:

from a different theoretical framework, in line with the theoretical and empirical findings of Kasahara & Lapham (2008). In their model as well as in the present study, imports and exports are complementary to a certain degree. In Kasahara & Lapham (2008) imports serve as intermediate inputs for export goods. In the present study only because of the entry of the retailer who imports final goods and upgrades the local manufacturer can the latter engage in exporting activities.

$$\frac{d}{dt}\left(\Delta x_E\right) = \underbrace{\frac{d}{dt}\left(x_E^{TH} - x_E^{a}\right)}_{\substack{\text{Trojan horse} \\ > 0}} + \underbrace{\frac{d}{dt}\left(x_E^{up} - x_E^{TH}\right)}_{\substack{\text{upgrading} \\ < 0}} + \underbrace{\frac{d}{dt}\left(x_E^{c} + x_{ROW}^{c} - x_E^{up}\right)}_{\substack{\text{gateway} \\ < 0}}. \tag{3.45}$$

While tariffs attenuate the Trojan horse effect, they also mitigate upgrading and the gateway effect. At the same time, it was already shown that the change in supplier profits is clear-cut: tariffs are profit-neutral with respect to the upgrading and the gateway effect (equation (3.40)). They do, however, reduce the competitive pressure exerted by imports, i.e., the Trojan horse effect. In summary, looking at the economic situation from a policy maker's point of view import tariffs seem like a viable strategy in order to reduce the competitive threat posed by imports through the retail firm. At the same time, tariffs mitigate the technology upgrading and gateway effect that are desirable with regard to the development of productive capacity as well as the integration into the global economy. Also, retail FDI tends to increase employment as well as consumer welfare in terms of lower prices and available product varieties. In addition, if the government seeks further integration by means of accession to governmental organizations such as the World Trade Organization (WTO), tariffs are not an option as they are not allowed under the WTO's rules. Finally, note that the imposition of tariffs increases the costs of trading, which may prevent retail FDI in the first place (see, e.g., Eckel & Lindemann, 2011). Conversely, the revenue generated by the levying of tariffs could be used by the government to subsidize the local supply sector. This way firms in this sector do not have to rely solely on knowledge transfers by the retailers and the market power of retailers could be hampered, thus, allowing the suppliers to extract higher rents.

3.6 Conclusion

This study analyzes how the supply sector in an emerging economy is affected by the entry of a foreign retail company in a partial equilibrium. Governments in these countries have recognized the positive but also the negative potential of these firms for their economies: on the one hand, retail chains cooperate with local suppliers by upgrading them techno-

logically as well as integrating them into their international distribution networks. On the other hand, retailers also sell imported goods which are suspected to crowd-out goods from local suppliers.

The partial equilibrium setting presented in this study models the Trojan horse, the upgrading as well as the export gateway effect. It was shown that the former is indeed detrimental for the local supply sector in terms of profits. The latter two effects are found to be neutral in terms of profits, yet, they tend to be beneficial for the local suppliers because production increases. Overall, however, the effect remains ambiguous. Finally, policy makers in the countries subject to retail FDI may wish to use import tariffs so as to reduce the amount of products imported by the retailers. The impact of this policy is found to be unambiguously beneficial in terms of supplier profits but it is again ambiguous in terms of the quantities produced. While the Trojan horse effect in quantities is attenuated, the upgrading and gateway effect are mitigated.

This model acknowledges that retailers are global players and that their entry into a country via FDI will leave its traces in the economy. As FDI in services in general and FDI in retailing in particular remain under-researched areas in economics there is still much room for further research: possible extensions to this model could include the policy measure of import quotas instead of import tariffs as they would affect the bargaining power of the entrant retail company and could, thus, enhance the local manufacturer's bargaining position. Furthermore, the effects on consumer welfare in terms of prices and variety could be explored more formally. Already, however, the results of this study will help us to gain a better understanding of the effects of globalization on emerging economies. More particularly, they can assist governments in these countries in making informed policy decisions when faced with FDI of retail companies.

C Mathematical Appendix

C.1 Outside Option

In case the manufacturer does not have the incentive to sell his products through the retailer he does not receive any technological upgrading, which implies $c_E > 0$. Substituting inverse demand (3.6) the maximization problem of the manufacturer becomes

$$\max_{x_E^{nc}} \Pi_E^{nc} = \left(p_E^{nc} - c_E\right) x_E^{nc} = \left(b_E - x_E^{nc} - \theta x_M^{nc} - c_E\right) x_E^{nc}, \tag{3.46}$$

which yields the first order condition

$$x_E^{nc} = \frac{1}{2}\left(b - c_E - \theta x_M^{nc}\right), \tag{3.47}$$

and the profits

$$\Pi_E^{nc} = \frac{1}{4}\left(b - c_E - \theta x_M^{nc}\right)^2. \tag{3.48}$$

Simultaneously, the retailer maximizes his profits given by

$$\max_{x_M^{nc}} \Pi_R^{nc} = \left(p_M^{nc} - s_M - t\right) x_M^{nc} = \left(b_E - x_M^{nc} - \theta x_E^{nc} - s_M - t\right) x_M^{nc} - \Gamma, \tag{3.49}$$

which yields the first order condition

$$x_M^{nc} = \frac{1}{2}\left(b_E - s_M - t - \theta x_E^{nc}\right), \tag{3.50}$$

and the profits

$$\Pi_R^{nc} = \frac{1}{4}\left(b_E - s_M - t - \theta x_E^{nc}\right)^2 - \Gamma. \tag{3.51}$$

Substituting (3.50) in (3.47) gives the solution for the manufacturer's *non-compliance* quantity and profits:

$$x_E^{nc} = \frac{1}{4 - \theta^2}\left[2\left(b - c_E\right) - \theta\left(b - s_M - t\right)\right], \tag{3.52}$$

and

$$\Pi_E^{nc} = \frac{1}{\left(4-\theta^2\right)^2}\left[2\left(b-c_E\right)-\theta\left(b-s_M-t\right)\right]^2. \tag{3.53}$$

C.2 Comparison Cases

In all of the comparison cases the retail firm sets the terms of the retail distribution contract due to its assumed monopsonist power. Hence, the reference quantities $\left(x_E^{TH}, x_E^{up}\right)$, and profits $\left(\Pi_E^{TH}, \Pi_E^{up}\right)$ of the manufacturer are determined indirectly through the retailer's maximization problem

$$\begin{aligned} \max_{x_M^{TH}, x_E^{TH}} \Pi_R^{TH} &= (p_M^{TH} - s_M - t)x_M^{TH} + \left[p_E^{TH} - s_E^{TH}(x_E^{TH})\right] x_E^{TH} - 2\Gamma, \\ s.t.\ s_E^{TH} &\geqq \widehat{s}_E^{TH}, \end{aligned} \tag{3.54}$$

and

$$\begin{aligned} \max_{x_M^{up}, x_E^{up}} \Pi_R^{up} &= (p_M^{up} - s_M - t)x_M^{up} + \left[p_E^{up} - s_E^{up}(x_E^{up})\right] x_E^{up} - 2\Gamma, \\ s.t.\ s_E^{up} &\geqq \widehat{s}_E^{up}, \end{aligned} \tag{3.55}$$

where $x_{ROW}^{TH} = x_{ROW}^{up} = 0$ has already been taken into account. Accordingly, the first order conditions for the quantities in the Trojan horse and the upgrading comparison case are given by

$$x_M^{TH} = \frac{1}{2}\left(b_E - 2\theta x_E^{TH} - s_M - t\right) \text{ and } x_M^{up} = \frac{1}{2}\left(b_E - 2\theta x_E^{up} - s_M - t\right), \tag{3.56}$$

as well as

$$x_E^{TH} = \frac{1}{2}\left(b_E - 2\theta x_M^{TH} - \widehat{s}_E^{TH}\right) \text{ and } x_E^{up} = \frac{1}{2}\left(b_E - 2\theta x_M^{up} - \widehat{s}_E^{up}\right), \tag{3.57}$$

which can then easily be solved to yield the solutions discussed in Section 3.3.

C.3 Import Tariffs and Profits

We seek to determine the effect of tariffs on the Trojan horse effect in profits, i.e., $d/dt\left(\Pi_E^{TH}-\Pi_E^a\right)$. Obviously, $d\Pi_E^a/dt=0$. The total differential of (3.21) is easily derived:

$$d\Pi_E'=\frac{1}{2\left(1-\theta^2\right)}\left[b-2\widehat{s}_E^{TH}+c_E-\theta\left(b-t-s_M\right)\right]d\widehat{s}_E^{TH}+\frac{\theta\left(\widehat{s}_E^{TH}-c_E\right)}{2\left(1-\theta^2\right)}dt. \tag{3.58}$$

Note that $\widehat{s}_E^{TH}$ is determined by the participation constraint (3.22), $\Pi_E^{TH}=\Pi_E^{nc}$. Hence, we can determine $d\widehat{s}_E^{TH}$ via the same constraint. Deriving the total differential is again straightforward:

$$\frac{1}{2\left(1-\theta^2\right)}\left[b-2\widehat{s}_E^{TH}+c_E-\theta\left(b-t-s_M\right)\right]d\widehat{s}_E^{TH}=\left(\frac{2\theta}{4-\theta^2}x_E^{nc}-\frac{\theta\left(\widehat{s}_E^{TH}-c_E\right)}{2\left(1-\theta^2\right)}\right)dt. \tag{3.59}$$

Rearranging we get

$$d\widehat{s}_E^{TH}=\left[\frac{2\left(1-\theta^2\right)}{2\left(1-\theta^2\right)x_E^{TH}-\widehat{s}_E^{TH}+c_E}\right]\left[\frac{4\theta\left(1-\theta^2\right)x_E^{nc}+\theta\left(\widehat{s}_E^{TH}-c_E\right)\left(\theta^2-4\right)}{2\left(1-\theta^2\right)\left(4-\theta^2\right)}\right]dt, \tag{3.60}$$

and by substitution

$$\frac{d\Pi_E^{TH}}{dt}=\frac{2\theta}{\left(4-\theta^2\right)}x_E^{nc}>0. \tag{3.61}$$

By the same logic we can determine the effect of tariffs on the upgrading effect, i.e., $d/dt\left(\Pi_E^{up}-\Pi_E^{TH}\right)$ where we already know that $d\Pi_E^{TH}/dt=2\theta x_E^{nc}/\left(4-\theta^2\right)>0$. The total differential of (3.26) is given by

$$d\Pi_E^{up}=\frac{1}{2\left(1-\theta^2\right)}\left[b-2\widehat{s}_E^{up}-\theta\left(b-t-s_M\right)\right]d\widehat{s}_E^{up}+\frac{\theta\widehat{s}_E^{up}}{2\left(1-\theta^2\right)}dt \tag{3.62}$$

and $d\widehat{s}_E^{up}$ can be determined via the participation constraint (3.27), $\Pi_E^{up}=\Pi_E^{nc}$:

$$d\widehat{s}_E^{up}=\left[\frac{2\left(1-\theta^2\right)}{2\left(1-\theta^2\right)x_E^{up}-\widehat{s}_E^{up}}\right]\left[\frac{4\theta\left(1-\theta^2\right)x_E^{nc}+\theta\widehat{s}_E^{up}\left(\theta^2-4\right)}{2\left(1-\theta^2\right)\left(4-\theta^2\right)}\right]dt. \tag{3.63}$$

By substitution this yields

$$\frac{d\Pi_E^{up}}{dt}=\frac{2\theta}{\left(4-\theta^2\right)}x_E^{nc}>0. \tag{3.64}$$

Finally, we can determine the effect of tariffs on the gateway effect, i.e., $d/dt\left(\Pi_E^c - \Pi_E^{up}\right)$ where we already know that $d\Pi_E^{up}/dt = 2\theta x_E^{nc}/\left(4-\theta^2\right) > 0$. The total differential of (3.12) is given by

$$\begin{aligned} d\Pi_E^c &= d\widehat{s}_E^c \left\{ \frac{1}{2\left(1-\theta^2\right)} \left[b - 2\widehat{s}_E^c - \theta\left(b - t - s_M\right)\right] + \frac{1}{2}\left(b_{ROW} - 2\widehat{s}_E^c\right) \right\} \\ &\quad + \widehat{s}_E^c \frac{\theta}{2\left(1-\theta^2\right)} dt, \end{aligned} \tag{3.65}$$

and ds_E^c can be determined by totally differentiation participation constraint (3.20), $\Pi_E^c = \Pi_E^{nc}$, which gives

$$d\widehat{s}_E^c = \frac{\frac{2\theta}{4-\theta^2} x_E^{nc} - \frac{\theta}{2(1-\theta^2)} \widehat{s}_E^c}{\frac{1}{2(1-\theta^2)}\left[2\left(1-\theta^2\right) x_E^c - \widehat{s}_E^c\right] + \frac{1}{2}\left(b_{ROW} - 2\widehat{s}_E^c\right)} dt. \tag{3.66}$$

By substitution this yields

$$\frac{d\Pi_E^c}{dt} = \frac{2\theta}{4-\theta^2} x_E^{nc} > 0. \tag{3.67}$$

C.4 Import Tariffs and Quantities

We seek to determine the effect of tariffs on the Trojan horse effect in quantities, i.e., $d/dt\left(x_E^{TH} - x_E^a\right)$. Obviously, $dx_E^a/dt = 0$. The total differential of x_E^{TH} in (3.21) is easily derived:

$$dx_E^{TH} = \frac{1}{2\left(1-\theta^2\right)}\left(-d\widehat{s}_E^{TH} + \theta dt\right). \tag{3.68}$$

By substitution of (3.60) and dividing by dt we get

$$\frac{dx_E^{TH}}{dt} = \frac{\theta\left[\left(4-\theta^2\right) x_E^{TH} - 2x_E^{nc}\right]}{\left(4-\theta^2\right)\left[2\left(1-\theta^2\right) x_E^{TH} - \widehat{s}_E^{TH} + c_E\right]}, \tag{3.69}$$

which is ambiguous.

We also seek to determine the effect of tariffs on the upgrading effect, i.e., $d/dt\left(x_E^{up} - x_E^{TH}\right)$ where we already know that dx_E^{TH}/dt is ambiguous. The total differential of x_E^{up} in (3.26) is given by

$$dx_E^{up} = \frac{1}{2\left(1-\theta^2\right)}\left(-d\widehat{s}_E^{up} + \theta dt\right). \tag{3.70}$$

By substitution of (3.63) and dividing by dt we get

$$\frac{d\left(x_E^{up}\right)}{dt} = \frac{\theta\left[\left(4-\theta^2\right)x_E^{up} - 2x_E^{nc}\right]}{\left(4-\theta^2\right)\left[2\left(1-\theta^2\right)x_E^{up} - \widehat{s}_E^{up}\right]}, \tag{3.71}$$

which is also ambiguous. Hence,

$$\begin{aligned}\frac{d}{dt}\left(x_E^{up} - x_E^{TH}\right) &= \frac{\theta\left[\left(4-\theta^2\right)x_E^{up} - 2x_E^{nc}\right]}{\left(4-\theta^2\right)\left[2\left(1-\theta^2\right)x_E^{up} - \widehat{s}_E^{up}\right]} \\ &\quad - \frac{\theta\left[\left(4-\theta^2\right)x_E^{TH} - 2x_E^{nc}\right]}{\left(4-\theta^2\right)\left[2\left(1-\theta^2\right)x_E^{TH} - \left(\widehat{s}_E^{TH} - c_E\right)\right]}\end{aligned} \tag{3.72}$$

is also ambiguous since we know from Section 3.3.2 that $x_E^{up} > x_E^{TH}$ which implies

$$\left|\theta\left[\left(4-\theta^2\right)x_E^{up} - 2x_E^{nc}\right]\right| > \left|\theta\left[\left(4-\theta^2\right)x_E^{TH} - 2x_E^{nc}\right]\right|, \tag{3.73}$$

and since via participation constraint (3.27) we know that $\Pi_E^{up} = \Pi_E^{TH} \Leftrightarrow \widehat{s}_E^{up}x_E^{up} = \left(\widehat{s}_E^{TH} - c_E\right)x_E^{TH}$ which implies $x_E^{up}/x_E^{TH} = \left(\widehat{s}_E^{TH} - c_E\right)/\widehat{s}_E^{up} > 1$, wherefore

$$\left(4-\theta^2\right)\left[2\left(1-\theta^2\right)x_E^{up} - \widehat{s}_E^{up}\right] > \left(4-\theta^2\right)\left[2\left(1-\theta^2\right)x_E^{TH} - \left(\widehat{s}_E^{TH} - c_E\right)\right]. \tag{3.74}$$

Finally, totally differentiate (3.11) and (3.14), and substitute (3.66) to get

$$\frac{dx_E^c}{dt} = \frac{\theta\left(x_E^c - \widehat{s}_E^c - \frac{2}{4-\theta^2}x_E^{nc} + \frac{1}{2}b_{ROW}\right)}{2\left(1-\theta^2\right)x_E^c - \widehat{s}_E^c + \left(1-\theta^2\right)\left(b_{ROW} - 2\widehat{s}_E^c\right)}, \tag{3.75}$$

and

$$\frac{dx_{ROW}^c}{dt} = \frac{\theta\left(\widehat{s}_E^c\frac{1}{2(1-\theta^2)} - \frac{2}{4-\theta^2}x_E^{nc}\right)}{2x_E^c - \frac{1}{(1-\theta^2)}\widehat{s}_E^c + \left(b_{ROW} - 2\widehat{s}_E^c\right)}, \tag{3.76}$$

both of which are ambiguous. Together with (3.71) this yields the equally ambiguous result

$$\begin{aligned}\frac{d}{dt}\left(x_E^c + x_{ROW}^c - x_E^{up}\right) &= \frac{\theta\left(x_E^c - \widehat{s}_E^c - \frac{2}{4-\theta^2}x_E^{nc} + \frac{1}{2}b_{ROW}\right)}{2\left(1-\theta^2\right)x_E^c - \widehat{s}_E^c + \left(1-\theta^2\right)\left(b_{ROW} - 2\widehat{s}_E^c\right)} \\ &\quad + \frac{\theta\left(\widehat{s}_E^c\frac{1}{2(1-\theta^2)} - \frac{2}{4-\theta^2}x_E^{nc}\right)}{2x_E^c - \frac{1}{(1-\theta^2)}\widehat{s}_E^c + b_{ROW} - 2\widehat{s}_E^c} \\ &\quad - \frac{\theta\left[\left(4-\theta^2\right)x_E^{up} - 2x_E^{nc}\right]}{\left(4-\theta^2\right)\left[2\left(1-\theta^2\right)x_E^{up} - \widehat{s}_E^{up}\right]}.\end{aligned} \tag{3.77}$$

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