Income Distribution, Market Size, and Foreign Direct Investment*

Andreas Kohler †

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Abstract

This paper studies the role of the host country's market size in the determination of foreign direct investment (FDI) and trade flows in a general equilibrium model. We propose a simple model with non-homothetic consumer behavior where the distribution of income in the host country implies market segmentation. Facing a proximity-concentration trade-off, in equilibrium ex-ante identical firms choose different foreign market entry modes depending on the market segment they serve. Firms supplying the mass market in the foreign country engage in FDI whereas those catering to a few rich consumers abroad export. For firms serving the mass market the cost reduction due to the saving of transportation costs on a large number of units sold, outweighs the cost increase due to the higher fixed cost associated with setting up a foreign production facility. The model predicts a positive relationship between average income of the middle class in the host country and FDI activity in the host country. As an illustration, we use data on outward FDI positions of OECD countries between 1997-2007. We estimate a positive relationship between average income of the host country's middle class and FDI positions in the host country held by OECD countries.

JEL classification: F12, F21, F23, F6, D31

Keywords: Trade, Foreign Direct Investment, Multinational Firms, Globalization, Income Distribution, Market Size

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†University of Zurich, Department of Economics, Muehlebachstrasse 86, CH-8008 Zürich, e-mail: andreas.kohler@econ.uzh.ch

1 Introduction

> Picture Mom, Dad, and the kids in an upper-middle-class Asian family in 10 years' time: After loading up with cash at the corner Citibank, they drive off to Walmart and fill the trunk of their Ford with the likes of Fritos and Snickers. On the way home, they stop at the American-owned Cineplex to catch the latest Disney movie, paying with their Visa card. In the evening, after putting the kids to bed, Mom and Dad argue furiously about whether to invest in a Fidelity mutual fund or in a life insurance policy issued by American International Group (The New York Times, February 1, 1998).

Why do firms engage in foreign direct investment to serve a foreign market rather than export? The economic literature on foreign direct investment (FDI) and international trade regards the size of the market in the destination or host country to be a fundamental determinant of investment and trade flows. The size-of-market hypothesis as proposed by Balassa (1966), and later by Scaperlanda and Mauer (1969), argues that foreign direct investment will take place if the market is large enough to capture economies of scale. Typically in the literature, market size is reflected by the host country's aggregate income (see e.g. Markusen 2002; Davidson 1980). However, as the quote from the New York Times illustrates it might be the middle class in the host country that plays a major role in attracting FDI. In turn, this suggests that the distribution of income within the host country may be important in determining international investment and trade patterns. The business literature has long recognized that aggregate income might not be an adequate measure for the size of the market:

> The problem in using gross national product (or gross domestic product) is its failure to show for some countries that a large number of people have very low incomes. Hence, a seemingly sizable GNP might nevertheless represent a small market for many U.S. goods (Stobaugh 1969, p. 131).

A very early example of FDI also highlights the role of the market size. In 1867 the Singer Manufacturing Co., with headquarters in New York, opened a production facility for sewing machines, the first mass marketed (complex) consumer good, in the UK (see Godley 2001). According to Godley (2001) Singer's enterprise was driven by booming demand and lower production costs in the UK. Browsing today's business press confirms that the purchasing power and size of the middle class seem elemental aspects for investors in evaluating the attractiveness of markets. For instance, in a survey on India the consultancy Ernst & Young writes: "The fundamentals that make India attractive to investors remain intact. The high potential of the domestic market driven by an emerging middle class ..." (Ernst & Young 2012*b*, p. 2).[1]

[1] There are numerous other examples. Ernst & Young (2012*a*) also emphasizes the importance of the middle class in its survey on the attractiveness of Russia. The McKinsey Global Institute (2010) makes a similar point in a report on African economies. In the World Investment Report 2012 prepared by the UNCTAD it is noted that a growing middle class in emerging markets has attracted FDI in the manufacturing and service sectors

Motivated by these observations, this paper argues that the distribution of aggregate income within the host country is important for its attractiveness of horizontal FDI because it segments the market.[2] Consider a situation where firms face a proximity-concentration trade-off, i.e. they want to concentrate production to capture economies of scale, but at the same time locate their production in the proximity of their consumers due to trade costs. In the presence of a proximity-concentration trade-off the firm's foreign market entry mode depends on which market segment it serves. Firms serving a mass market in the foreign country engage in FDI, whereas firms catering exclusively to the needs of a few rich consumers abroad tend to export. In other words, foreign direct investment will take place if the market is large enough to capture economies of scale. This is the essence of the size-of-market hypothesis. Poor households are likely to be irrelevant to a firm's decision because they can often barely afford the level of subsistence consumption, let alone consumer goods like cars etc. This implies that a country's middle class, in terms of per capita income and size, should be important in determining FDI and trade patterns.

First, we formalize the market size theory in a simple general-equilibrium model with two regions Home and Foreign, and low, middle and high income classes of consumers in both regions. We think of Home as a wealthy region relative to Foreign, e.g. the U.S. compared to the rest of the world. Consumers must satisfy a certain level of subsistence consumption in terms of food before they can spend income on horizontally differentiated consumer goods. We look at the case where consumers in the low income class in both regions cannot afford to purchase differentiated goods. Food is produced under conditions of perfect competition and sold only domestically. Monopolistic firms producing differentiated goods face a proximity-concentration trade-off. Due to the presence of iceberg trade costs they want to produce near their consumers while concentrate their production to take advantage of economies of scale. In this setting, ex-ante identical firms choose different pricing strategies supplying different market segments (i.e. income classes) in equilibrium. Depending on their pricing strategy they opt for a different mode to supply the foreign market. In equilibrium, firms serving the mass market (i.e. middle and rich classes in both regions) engage in FDI whereas firms serving exclusively the rich classes in both regions export. For firms supplying the mass market the cost of exporting is higher than the cost of setting up a foreign production facility. Since they serve a large

(UNCTAD 2012). Forbes Magazine (2012) writes that the consumer goods company Unilever built a factory in the Chinese city of Anhui mainly to produce products for China's growing middle class. In an article on Indonesia the Wall Street Journal (2013) reports that Toyota Motor Corp., Honda Motor Co. and Nissan Motor Co. invest several hundred million dollars to step up production at their plants in Indonesia as a response to increasing car purchases from the growing middle class.

[2]Traditionally, the literature distinguishes between horizontal and vertical FDI. The former refers to the duplication of a production facility abroad designed to serve customers in the foreign market, whereas the latter refers to the segmentation of the production process (i.e. outsourcing or offshoring). Our theory complements the literature on horizontal FDI. The motives for vertical FDI are usually explained by lower production costs abroad (see e.g. Blonigen 2005; Caves 2007) or in the context of incomplete contracts (see e.g. Antras and Helpman 2004). Several studies indicate that the bulk of FDI is horizontal rather than vertical (see e.g. Markusen and Maskus 2002; Ramondo, Rappoport and Ruhl 2011). Recently, a literature concerned with platform FDI, where the foreign affiliate's output is sold in a third market rather than the host market, emerged (see e.g. Ekholm, Forslid and Markusen 2007). Although important, in our analysis we will abstract from that phenomenon, as well as licensing (see e.g. Horstmann and Markusen 1996).

market, economies of scale are high enough to compensate higher fixed costs associated with FDI such that average costs are lower compared to exporting. Due to our assumptions about the distribution of income within regions, products sold in the mass market are priced according to the willingness to pay of the middle class in Foreign. This is the highest price a firm can set, if it wants to sell on the mass market. Thus, taking the perspective of firms in Home, we show that, ceteris paribus, redistributing income towards the middle class in Foreign increases the number of multinational corporations (MNCs) with a production facility in Foreign and headquarters (HQ) in Home. Expanding the size of the middle class in Foreign has, ceteris paribus, ambiguous effects on the number of MNCs with HQ in Home, depending on whether the poor or rich class contracts.

Second, we extend our model to differences in technologies across regions, and show that the results of redistributing income between classes are the same as in the baseline model. We further analyze the baseline model in the case of standard CES preferences, and argue that it is meaningless to distinguish between different market segments in that case because only aggregate income matters for the determination of FDI. Last, we show that the effects of changing the income distribution is not isomorphic to changing the skill distribution in the economy. Based on Markusen and Venables (2000), and Egger and Pfaffermayr (2005), we study a simple model where differentiated goods producers combine different skills in their production. In simulations we show that in contrast to the baseline model the relationship between per capita income of Foreign's middle class and the number of MNCs active in Home is ambiguous.

Third, as an illustration we empirically investigate the model's predictions regarding FDI activity, and leave the analysis of trade flows for future work.[3] We focus on the effect of the middle class' per capita income in the host country on FDI positions, using pooled data on outward FDI positions from 1997-2007 of OECD countries from the OECD International Direct Investment Statistics (OECD, 2012). Building on empirical work by Bernasconi (2013), who uses inequality and income data from UNU-WIDER (2008) and Heston, Summers and Aten (2012) to construct empirical income distributions, we define global low, middle, and high income classes by imposing common income thresholds across all countries in the sample. Applying different definitions of a global middle class used in the literature, we find a positive relationship between average income of the middle class in the host country and the amount of FDI it attracts from OECD countries, controlling in particular for host GDP and GDP per capita.

The rest of the paper is organized as follows. The related literature is briefly reviewed

[3] In the trade literature, both theoretical and empirical, on the determinants of bilateral trade flows there has been some renewed interest in countries' similarity in per capita incomes or income distributions motivated by the famous Linder hypothesis (Burenstam-Linder 1961), see e.g. Markusen (1986), Hunter (1991), Dalgin, Trindade and Mitra (2008), Fajgelbaum, Grossman and Helpman (2009), Hallak (2010), Markusen (2010), Foellmi, Hepenstrick and Zweimüller (2011), Martinez-Zarzoso and Vollmer (2011), Bernasconi (2013). However, this development has mainly been restricted to the international trade literature, and with the exception of Fajgelbaum, Grossman and Helpman (2011) has not spilled over to the literature on foreign direct investment. For a brief discussion on the problem of estimating FDI flows/stocks and trade flows simultaneously see Section 6.4.

in Section 2. Section 3 presents the baseline model, and looks at the effects of income redistribution on FDI activity and international trade. In Section 5.1, we extend the model to a North-South perspective allowing for differences in technology across regions. Sections 5.2 and 5.3 compare the baseline model to the standard model with constant-elasticity-of-substitution (CES) preferences, and a simple factor-proportions model incorporating different skill levels. In Section 6, we illustrate the predictions of the baseline model with regard to FDI activity using data on outward FDI stocks of OECD countries. Section 7 concludes.

2 Related Literature

This paper is related to the theoretical and empirical literature on the determinants of FDI and international trade. Excellent surveys of the literature can be found in Agarwal (1980), and more recently, in Helpman (2006), Caves (2007) or Antras and Yeaple (2013). A detailed treatment of multinational firms in general-equilibrium theory is given in Markusen (2002).[4]

Even though market size is deemed an important determinant of FDI and trade the literature has, by and large, focused on supply side explanations. Often, consumption patterns for consumers at different income levels are identical due to the assumptions on preferences. Thus, implying that the relevant market size for all firms is reflected by aggregate income regardless of the distribution of income.

For example, Brainard (1997) uses a simple model where consumers have homothetic preference and firms face a proximity-concentration trade-off to motivate an empirical assessment of the proximity-concentration hypothesis. Due to the assumption of homothetic preferences only aggregate GDP in the destination country matters, but not its distribution. Thus, in her regressions explaining the share of export sales in total sales (i.e. export plus foreign affiliate sales) Brainard (1997) includes aggregate GDP in the destination country to control for market size effects. She finds that foreign affiliate relative to export sales increase the higher trade costs are, and the lower are economies of scale at the plant relative to the firm level. Brainard (1997) concludes that the proximity-concentration hypothesis is quite robust in explaining the share of export sales in total sales.[5]

Another example that focuses on the supply side is Helpman, Melitz and Yeaple (2004), which explores the emergence of multinational corporations in the context of heterogeneous firms based on Melitz (2003). They argue that only the most productive firms are internationally active, and of those only the most productive engage in FDI. Using data on U.S. exports and foreign affiliate sales Helpman, Melitz and Yeaple (2004) confirm the prediction of their model that foreign affiliate sales relative to export sales are low in

[4]Most theories on the organization of the firm in an international context are based on the OLI (Ownership, Location, Internalization) framework (see Dunning 1988, Dunning 2000). In this framework the existence of multinational firms is explained with competitive advantages due to ownership structure, location abroad, and internalization (net benefits from producing itself rather than licensing technology).

[5]In the context of the proximity-concentration trade-off, Neary (2009) explores the apparent paradox that in the theory falling trade costs discourage horizontal FDI (relative to exports) while in reality falling trade costs in the 1990s led to higher FDI activity (i.e. FDI grew at a higher rate than trade).

sectors where firm heterogeneity is high. Additionally, they find evidence consistent with the proximity-concentration hypothesis.[6]

A notable exception is Fajgelbaum, Grossman and Helpman (2011). They propose a Linder-type explanation for bilateral FDI activity, and stress that vertical FDI is more likely to take place between countries with similar per capita incomes. In particular, they present a multi-country general-equilibrium model with vertically (quality) differentiated products. Preferences are such that consumers with higher incomes choose higher quality varieties, and firms face a proximity-concentration trade-off. They show that firms supply foreign markets that have a similar demand structure to their domestic market via FDI rather than via exports.

Blonigen (2005) surveys the empirical literature on FDI determinants. A large part of the literature investigates predictions on FDI decisions based on partial-equilibrium models. Only recently has the literature started to test general-equilibrium models. Most empirical models that employ modified versions of the gravity equation approximate market size by GDP. However, Blonigen (2005) points out that contrary to the trade literature the gravity equation lacks a theoretical foundation in the FDI literature. He concludes that the (empirical) literature is still in its infancy and most hypotheses are still up for grabs.[7]

3 Model

We propose a simple general-equilibrium model with two regions, Home and Foreign, where different market sizes interact with a proximity-concentration trade-off. Producers manufacturing horizontally differentiated products decide whether to serve a foreign market by exporting their product or whether to duplicate production in the foreign country, depending on the market segment they serve.

3.1 Environment

There are two regions, Home (H) and Foreign (F). The population size of region $i = \{H, F\}$ is denoted by L^i. In each region i there are three groups of consumers $k = \{1, 2, 3\}$, where group k in region i is of size $s_k^i L^i$, with $\sum_k s_k^i = 1$ for all i. Each consumer in region i and group k is endowed with θ_k^i (efficiency) units of labor, supplied inelastically. We make the following assumption.

Assumption 1. $\sum_k s_k^H \theta_k^H > \sum_k s_k^F \theta_k^F$.

In equilibrium average income in Home is larger than in Foreign if Assumption 1 holds.

[6] Head and Ries (2003) provide a simple alternative model that yields the same predictions as Helpman, Melitz and Yeaple (2004). They confirm the model's predictions using data on Japanese manufacturing firms, and highlight the interaction of firm productivity with heterogeneity in market size and factor prices of host countries.

[7] Blonigen (2005) also mentions that most determinants of cross-country FDI are statistically rather fragile. Blonigen and Piger (2011), using Bayesian statistics to gauge model selection, argue that traditional gravity variables like parent and host GDP and GDP per capita should be included in a regression explaining bilateral FDI positions. However, their analysis does not support the inclusion of many explanatory variables used in previous studies like legal institutions and business costs (e.g. time to start business etc.).

3.2 Consumers

Preferences follow Murphy, Shleifer and Vishny (1989). All consumers have the same non-homothetic preferences defined over a homogeneous good x (e.g. food), and a continuum of indivisible and horizontally differentiated products indexed by $j \in \mathcal{J}$

$$U = \begin{cases} x, & x \leq \overline{x} \\ \overline{x} + \int_{\mathcal{J}} c(j)dj, & x > \overline{x} \end{cases} \tag{1}$$

where $\overline{x}$ denotes a level of subsistence consumption of the homogeneous good that must be satisfied before consumers can start purchasing differentiated products, and $c(j)$ is equal to one if product j is purchased and zero otherwise. The homogeneous good x is a necessity in the sense that consumers' propensity to spend is one at low levels of income, and zero after the subsistence amount $\overline{x}$ is purchased. Differentiated products enter the utility of consumers symmetrically, i.e. no product is intrinsically better or worse than any other product. Indivisibility of differentiated products combined with local satiation after one unit has been purchased, implies that consumers choose their consumption only along the extensive margin but have no choice about the intensive margin. This contrasts with standard constant-elasticity-of-substitution (CES) preferences where consumers choose only along the intensive margin but have no choice about the extensive margin (see Appendix A.3). Consumers maximize utility (1) subject to their budget constraints

$$y = p_x x + \int_{\mathcal{J}} p(j)c(j)dj \tag{2}$$

where $y \equiv w\theta + v$ denotes income, which consists of wage income $w\theta$ and shares in producer profits v, which will be zero in an equilibrium with free entry; p_x is the price of food, and $p(j)$ is the price of differentiated product j. The first-order conditions to the consumer's maximization problem for $x \leq \overline{x}$ are given by

$$\begin{aligned} 1 - \lambda p_x &= 0 \\ y - p_x x &= 0 \end{aligned}$$

and for $x > \overline{x}$ by

$$\begin{aligned} 1 - \lambda p(j) &\geq 0, \; c(j) = 1 \\ 1 - \lambda p(j) &< 0, \; c(j) = 0 \\ y - p_x x - \int_{\mathcal{J}} p(j)c(j)dj &= 0 \end{aligned}$$

where λ denotes the Lagrange multiplier, which can be interpreted as the marginal utility of income. Affluent consumers have a low marginal utility of income (low λ), whereas low-income consumers have a high marginal utility of income (high λ). The first-order conditions implicitly

define an endogenous income threshold $\overline{y} \equiv p_x \overline{x}$. Consumers with income above $\overline{y}$ can afford to buy differentiated products whereas below they cannot. From the first-order conditions we can deduce individual demand for the homogeneous good and differentiated products. It follows that individual demand for food is given by

$$x_k^i = \begin{cases} y_k^i / p_x^i, & y_k^i \leq \overline{y}^i \\ \overline{x}, & y_k^i > \overline{y}^i. \end{cases} \tag{3}$$

Individual demand for differentiated product j is determined by

$$c(j) = \begin{cases} 0, & p(j) > z_k^i \\ 1, & p(j) \leq z_k^i \end{cases} \tag{4}$$

where $z_k^i \equiv 1/\lambda_k^i$ denotes the willingness to pay of a consumer in region i and group k for product j. Note that $c(j) = 0$ for all j if $y \leq \overline{y}$, and $c(j) = 1$ for some j if $y > \overline{y}$. In other words, poor consumers with income below $\overline{y}$ buy only food. Wealthy consumers with income above $\overline{y}$, spend their residual income $(y - \overline{y})$ on differentiated products. They purchase one unit of a differentiated product if the price of that product does not exceed their willingness to pay. With growing income they consume an expanding variety of products instead of increasing consumption of the same products. Figure 1 below shows (a) individual demand (3) for food and (b) individual demand (4) for differentiated product j.

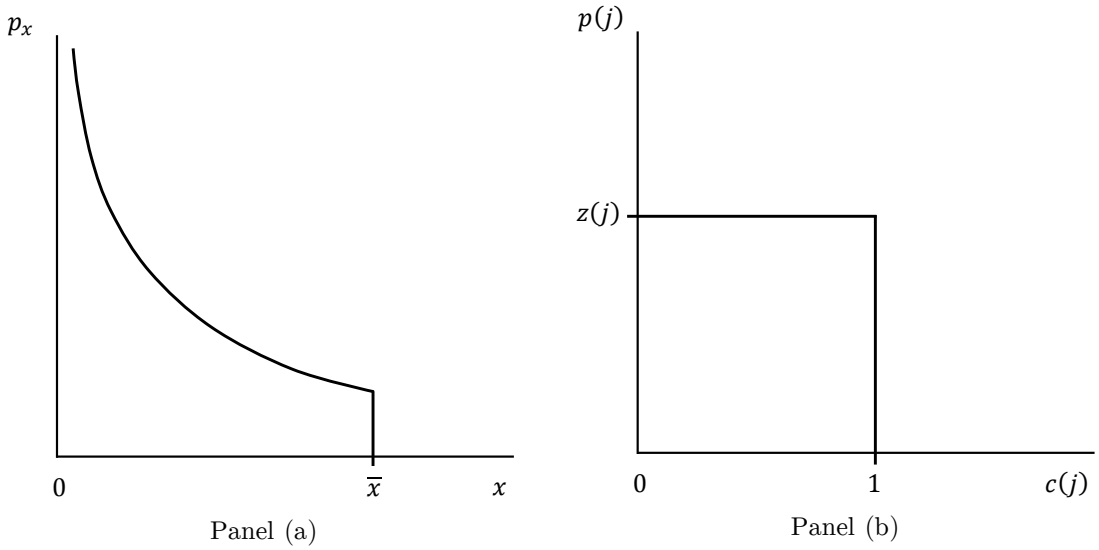

Figure 1: Individual demand for (a) food and (b) differentiated product j

3.3 Producers

Suppose there is a large number of producers in both regions, which employs (homogenous) labor, the only production factor in the economy.

Homogeneous Good

Food is produced under conditions of perfect competition with the following constant-return-to-scale (CRS) technology. In region i, the production of 1 unit of output requires a^i units of labor. We assume that trade costs in the food sector are prohibitively high, and there is no foreign direct investment.[8]

Differentiated Products

Technology in the differentiated product sector is based on Brainard (1997). Differentiated products are produced under conditions of monopolistic competition with free market entry. Producers have access to the following increasing-returns-to-scale (IRS) technology, which might differ across regions. A producer in region i needs to invest f_E^i units of labor to invent (differentiate) a new product or blueprint. After investing in the creation of a new product a producer in region i must incur f_D^i units of labor to set up a new production plant. The production of 1 unit of output requires b^i units of labor. We assume that producers have a choice between supplying a foreign market by exports or by setting up a foreign production facility, i.e. become a multinational corporation (MNC). By assumption we rule out the possibility of selling or licensing the right to use a blueprint to foreign producers. Suppose that exporters incur all costs in the country of production, whereas multinational producers incur all variable and fixed costs in the foreign production plant in the host country. E.g. a producer with headquarters (HQ) in Home has fixed costs $w^F f_D^H$ to set up a foreign production plant, and variable costs $w^F b^H$ to produce output in the foreign plant. Note that technology is firm-specific and not region-specific. Differentiated products can be traded across regions at iceberg trade costs $\tau \in (1, \infty)$ on each unit shipped. Hence, the model features the familiar proximity-concentration trade-off, where producers would like to maximize the proximity to consumers due to iceberg trade costs, while at the same time, they would like to concentrate their production in one location due to increasing-returns-to-scale technology.

3.4 Integrated Equilibrium with FDI and Exports

We are interested in an equilibrium where some producers choose to export and others become multinational corporations. In order to isolate the demand side channel we abstract from heterogeneous technology across regions, i.e. $f_E^i = f_E$, $f_D^i = f_D$, $b^i = b$, and $a^i = a$ for all $i = \{H, F\}$. For an extension discussing differences in technology see Section 5.1.

Market Demand

We make the following assumption about the distribution of income across regions and groups.

[8] According to Gibson, Whitley and Bohman (2001) the global average tariff (ad valorem) on agricultural products is estimated at 62 percent. See Davis (1998) for a comparison of tariff rates between homogeneous and differentiated goods. FAO (1995) estimates that global agricultural exports account for less than 10 percent of total merchandise exports in 1995. Mahlstein (2010) argues that during the 20th century foreign direct investment in the food sector was negligible.

Assumption 2.

$$\left(\theta_1^H - \overline{y}\right) > \tau\left(\theta_1^F - \overline{y}\right) > \tau^2\left(\theta_2^H - \overline{y}\right) > \tau^3\left(\theta_2^F - \overline{y}\right) > 0 > \left(\theta_3^H - \overline{y}\right) > \left(\theta_3^F - \overline{y}\right).$$

This assumption has the following implications. First, the income distribution is such that group 1 corresponds to the rich class, group 2 to the middle class, and group 3 to the poor class in region i. Second, the poor class in both regions cannot afford to purchase differentiated products. Third, income differences across regions and groups are sufficiently high such that producers of differentiated products cannot perfectly price discriminate. For a detailed discussion on the price setting behavior of monopolistic producers see below. Obviously, the equilibrium structure depends crucially on Assumption 2. We think that this assumption reflects reality well, and thus constitutes an interesting case worth investigating.

Given Assumption 2 aggregate demand is determined as follows. Market demand for food in region i is equal to

$$X^i = \sum_k x_k^i = \overline{x}\left(s_1^i + s_2^i\right) L^i + \frac{y_3^i s_3^i L^i}{p_x^i} \tag{5}$$

where the first term denotes aggregate consumption of the middle and rich classes in region i, and the second term total consumption of the poor class. Due to symmetry, market demand is the same for all differentiated products j, and is given by

$$C^i = \begin{cases} 0, & p^i > z_1^H \\ s_1^H L^H, & z_1^F < p^i \leq z_1^H \\ s_1^H L^H + s_1^F L^F, & z_2^H < p^i \leq z_1^F \\ \left(s_1^H + s_2^H\right) L^H + s_1^F L^F, & z_2^F < p^i \leq z_2^H \\ \left(s_1^H + s_2^H\right) L^H + \left(s_1^F + s_2^F\right) L^F, & p^i \leq z_2^F. \end{cases} \tag{6}$$

If the price exceeds the willingness to pay of the rich class in Home demand for a differentiated product is zero. If the price is between the willingness to pay of the rich class in Foreign and the rich class in Home demand is equal to the size of the rich class in Home, and so forth. Demand is equal to the size of the middle and rich classes in both regions if the price is equal to or less than the willingness to pay of the middle class in Foreign. Market demand for any product j is depicted in Figure 2 below.

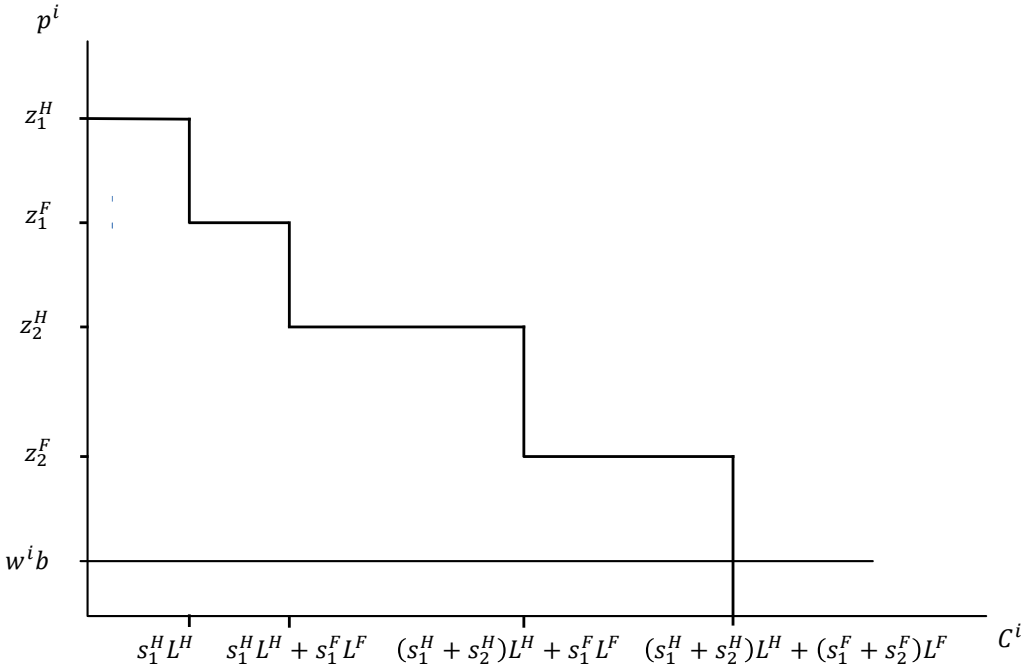

Figure 2: Market demand for product j

Aggregate Supply

Perfect competition in the non-traded food sector implies that prices are equal to marginal costs. Hence, the price of the homogeneous good in region i is determined by

$$p_x^i = w^i a. \tag{7}$$

Price setting in the differentiated product market is non-trivial. Monopolistic competition implies that producers have price setting power, and charge a markup on marginal costs. In general, producers maximize profits subject to their market demand (6) by setting a price where marginal revenue equals marginal cost. Hence, producers would like to sell to all consumers, and perfectly price discriminate by charging prices equal to the willingness to pay of each group of consumers. However, the imminent threat of arbitrage opportunities, i.e. the threat of parallel imports, imposes a price setting restriction on producers. If income differences across groups and regions are sufficiently pronounced the price setting restriction becomes binding.[9] Assumption 2 implies that income differences are sufficiently large such that producers' price setting is restricted. In particular, Assumption 2 implies that $z_1^H \geq \tau z_1^F$ holds in equilibrium. Hence, producers supplying the rich class in Home and Foreign cannot perfectly price discriminate. For illustration, suppose that producer j would set a price equal to z_1^H in Home and equal to z_1^F in Foreign. However, since by Assumption 2, $z_1^H \geq \tau z_1^F$ holds, it is a profitable enterprise for arbitrageurs to purchase product j at a low price z_1^F in Foreign and

[9] We assume that producers can never perfectly price discriminate within region i since they cannot distinguish between consumers belonging to different groups or storage of such information is prohibitively expensive.

ship it to Home at costs $\tau > 1$. There it could be sold with a profit at a price marginally below z_1^H. This threat of parallel imports induces the original producer to set a limit price equal to τz_1^F in Home. Similarly, $z_1^F \geq \tau z_2^H$ implies that producers selling to both middle and rich classes in Home and the rich class in Foreign cannot perfectly price discriminate, and set prices equal to z_2^H in Home and τz_2^H in Foreign. Likewise, $z_2^H \geq \tau z_2^F$ means that producers that sell to both middle and rich classes in Home and Foreign cannot perfectly price discriminate, and charge prices equal to τz_2^F in Home and z_2^F in Foreign. Only producers that serve exclusively the rich class in Home can perfectly price discriminate and set prices corresponding to z_1^H.

Pricing strategy

Assumption 2 further implies that *some* producers *must* exclude the middle class in Foreign, some the middle class in Home, and some the rich class in Foreign. For example, consider the case where all producers serve both the middle and rich classes in both regions. In that case, consumers in the middle and rich classes in Home pay prices τz_2^F and consumers in the middle and rich classes in Foreign pay prices z_2^F for all differentiated products. This implies that consumers in the middle and rich classes in Home and consumers in the rich class in Foreign would not exhaust their budget constraints. Since they spend all additional income above $\overline{y}^i$ on differentiated products their (marginal) willingness to pay would become infinitely large. This would induce some producers to deviate and exclude the middle class in Foreign. A similar argument applies for the exclusion of the middle class in Home, and the rich class in Foreign. Hence, ex-ante *identical* producers will choose *different* pricing strategies in equilibrium, serving different segments of the market. Note that if Assumption 2 does not apply, some producers can perfectly price discriminate across regions, and might not exclude some groups. In the extreme case, where income differences across regions and groups are sufficiently small all differentiated products might be available on the world market to all consumers with income above the income threshold $\overline{y}^i$. In the following, we stick with Assumption 2 since we believe that it reflects a more interesting and realistic situation.

Location

Let us take the organizational decision, i.e. whether a firm sets up a foreign production facility or exports, as given for the moment, and look at the location decision.

First, consider a producer who decides to serve the middle and rich classes in both regions. Due to Assumption 2 she sets prices equal to τz_2^F in Home and z_2^F in Foreign. Suppose this producer decides to engage in FDI and locate her HQ in Home. In that case, she earns profits equal to

$$\pi_M^H = \left(\tau z_2^F - b w^H\right)\left(s_1^H + s_2^H\right) L^H + \left(z_2^F - b w^F\right)\left(s_1^F + s_2^F\right) L^F - \left[w^H\left(f_E + f_D\right) + w^F f_D\right]$$

where the first term denotes profits (i.e. revenue minus variable costs) from sales in the domestic market, the second term profits from foreign affiliate sales, and the last term are

fixed costs. Similarly, profits of a producer who chooses to serve the market in Home through foreign affiliate sales and set up her HQ in Foreign are given by

$$\pi_M^F = \left(z_2^F - bw^F\right)\left(s_1^F + s_2^F\right)L^F + \left(\tau z_2^F - bw^H\right)\left(s_1^H + s_2^H\right)L^H - \left[w^F\left(f_E + f_D\right) + w^H f_D\right].$$

It is straightforward to show that $\pi_M^H > \pi_M^F$ if and only if $w^H < w^F$, and vice versa. In an equilibrium where multinational firms locate in both regions, profits must equalize, i.e. $\pi_M^H = \pi_M^F$. Hence, wages must be equalized across regions, i.e. $w^H = w^F$. Let us choose labor in Home as the numeraire and set w^H equal to one.

Second, consider a producer who chooses to sell her product to the middle and rich classes in Home but only to the rich class in Foreign. Assumption 2 implies that she offers her product at prices z_2^H in Home and at τz_2^H in Foreign. Suppose this producer decides to locate in Home and export to Foreign. That way she makes profits given by

$$\pi_{X,2}^H = \left(z_2^H - bw^H\right)\left(s_1^H + s_2^H\right)L^H + \left(\tau z_2^H - \tau bw^H\right)s_1^F L^F - w^H\left(f_E + f_D\right).$$

Suppose that such a producer located in Foreign opts to serve the market in Home by engaging in FDI. This producer collects profits equal to

$$\pi_{M,2}^F = \left(\tau z_2^H - bw^F\right)s_1^F L^F + \left(z_2^H - bw^H\right)\left(s_1^H + s_2^H\right)L^H - \left[w^F\left(f_E + f_D\right) + w^H f_D\right].$$

At equalized wage rates normalized to 1 it can be shown that $\pi_{X,2}^H > \pi_{M,2}^F$ if and only if $f_D/s_1^F L^F > (\tau - 1)b$. In that case, all producers who choose this pricing strategy locate in Home.

Third, consider a producer who supplies only the rich class in both regions. If Assumption 2 holds this producer puts her product up for sale at prices τz_1^F in Home and z_1^F in Foreign. Suppose that this producer locates in Home and exports to Foreign. In doing so, she makes profits given by

$$\pi_{X,1}^H = \left(\tau z_1^F - bw^H\right)s_1^H L^H + \left(z_1^F - \tau bw^H\right)s_1^F L^F - w^H\left(f_E + f_D\right).$$

Similarly, such a producer who decides to locate in Foreign and export to Home obtains profits equal to

$$\pi_{X,1}^F = \left(z_1^F - bw^F\right)s_1^F L^F + \left(\tau z_1^F - \tau bw^F\right)s_1^H L^H - w^F\left(f_E + f_D\right).$$

Having e.g. the U.S. in mind as Home and less affluent regions as Foreign, we make the assumption that the size of the middle and rich class, respectively, is larger in Home than in Foreign.

Assumption 3. *$s_1^H L^H > s_1^F L^F$, and $s_2^H L^H > s_2^F L^F$.*

If Assumption 3 holds, it is straightforward to show that $\pi_{X,1}^H > \pi_{X,1}^F$, with wage rates equalized across regions. Hence, Assumptions 2 and 3 jointly imply that all producers opting

for this pricing strategy locate in Home.

Eventually, consider a producer who sells exclusively to the rich class in Home. This producer can perfectly price discriminate, and market her product at a price equal to z_1^H. If she locates in Home she receives profits given by

$$\pi_1^H = \left(z_1^H - bw^H\right) s_1^H L^H - w^H \left(f_E + f_D\right).$$

At equal wage rates across regions one can show that in the presence of iceberg trade costs $\tau > 1$ this producer locates in Home.

Organization

Now, we show that no producer has an incentive to deviate from the organizational form we conjectured above. Given there is a large number of producers the behavior of a single producer has no impact on aggregate variables. Comparing profits from different strategies, it is straightforward to show that no producer has an incentive to deviate from its chosen foreign market entry mode if and only if the following proposition holds:

Proposition 1. *Given the following condition holds for all $i = \{H, F\}$, all producers serving both the rich and middle classes (i.e. groups 1 and 2) in region i become MNCs whereas all producers supplying only the rich class (i.e. group 1) in region i export:*

$$\frac{f_D}{s_1^i L^i} > (\tau - 1)b > \frac{f_D}{\left(s_1^i + s_2^i\right) L^i}. \tag{8}$$

Proof. The proof follows from comparing producers' profits under alternative forms of organization. □

Condition (8) has a simple economic intuition. It balances the benefit of engaging in FDI against the cost of that choice. The term $(\tau - 1)b$ denotes the cost reduction per unit sold if a producer engages in FDI instead of exporting her product, due to lower variable costs since no transportation costs incur (opportunity cost of FDI). The terms $f_D / \left(s_1^i + s_2^i\right) L^i$, and $f_D / s_1^i L^i$, respectively, denote the cost increase per unit sold of engaging in FDI due to the fixed cost associated with setting up a foreign production facility. We note that, ceteris paribus, producers choose FDI over exports if variable costs are high, or fixed costs to set up a foreign production factory are low relative to the number of units sold (market size in terms of consumers). For a detailed discussion about how condition (8) compares to the condition in the case of standard CES preferences see Section 5.2 and Appendix A.3.

In particular, Proposition 1 implies that in equilibrium no producer has an incentive to set up only "headquarters-services" in Home, i.e. create a new product in Home, and produce all output in Foreign. For example, a situation where producers serving the middle and rich classes in both regions incur f_E in Home, i.e. locate their "headquarters-services" in Home, produce all output only in Foreign (i.e. incur f_D only once in Foreign), and ship it back to Home at trade costs $\tau > 1$ cannot occur in equilibrium. Furthermore, together with Assumption 3 no

producer serving the middle and rich classes in Home and the rich class in Foreign, or the rich classes in both regions, respectively, has an incentive to locate only her "headquarters-services" in Home, and produce all output in Foreign.

At this point, a brief remark about the assumption of indivisible differentiated products is appropriate. While this assumption makes the model tractable it comes at the cost of shutting down the intensive margin of consumption. To better understand its implications suppose for the moment that consumers had a choice about the extensive and intensive margin. This would be the case with e.g. quadratic preferences over differentiated products of the following form $\int_{\mathcal{J}} \left(sc(j) - \frac{1}{2}c(j)^2\right) dj$, where $0 < s < \infty$ denotes a local satiation level.[10] In that case, wealthy consumers would not only purchase a larger variety of products but also a larger amount of each product relative to less affluent consumers. That would increase the incentives to engage in FDI relative to exporting for all producers, in particular, also those serving the rich market segment. Hence, the parameter space for which condition (8) is fulfilled contracts but does not collapse entirely, such that an equilibrium where some producers engage in FDI and others export is still feasible.

Equilibrium Structure

Given Assumptions 1-3 and Proposition 1 the equilibrium structure looks as follows. Non-homothetic consumer demand segments the market for differentiated products in the sense that it makes ex-ante identical producers choose different pricing strategies to supply different market segments. Differentiated products that are sold to the middle and rich classes in both regions are manufactured in both regions. All products which are sold to all consumers above income threshold $\overline{y}^i$ in region i except the middle class in Foreign are produced in Home.[11] Figure 3 below summarizes the equilibrium structure, where the number of MNCs with headquarters in region i are denoted by M^i, the number of exporters located in Home that sells to the middle and rich classes in the domestic market and to the rich class in Foreign by $N^H_{X,2}$, the number of exporters located in Home that serves only the rich class in both regions by $N^H_{X,1}$, and the number of producers located in Home which is not internationally active and sells only to the rich in Home by N^H_1. To close the model, we use the resource and consumer budget constraints. See Appendix A.1 for details and the formal solution to the model.

[10] With $s < \infty$ consumption of an infinitesimal amount of some product j does not yield infinite utility, and therefore generates a non-trivial extensive margin of consumption.

[11] In Appendix A.1 we show that Foreign's trade deficit is accommodated by a surplus in net factor payments.

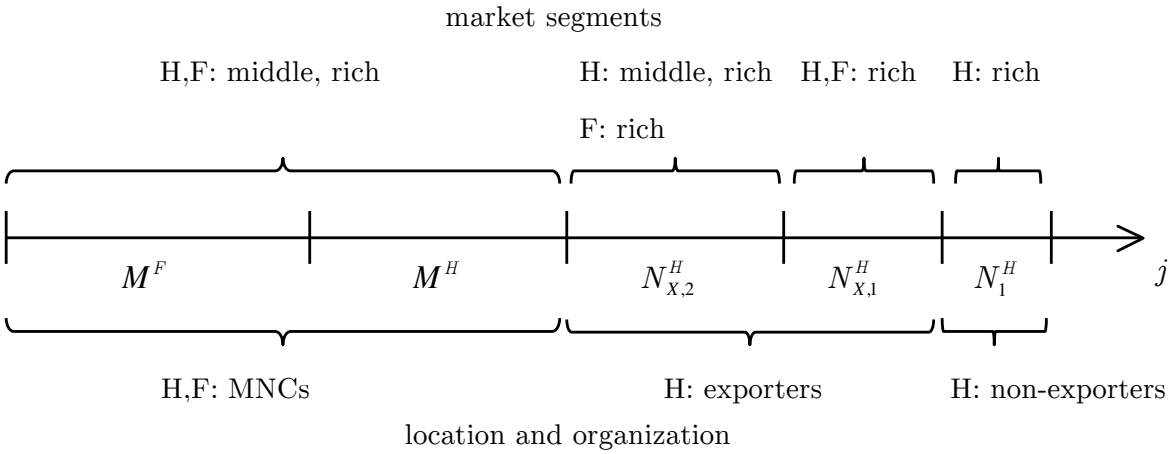

Figure 3: Equilibrium structure

4 Income Distribution, Market Size, and FDI vs. Exports

We now analyze in detail how market segmentation determined by the income distribution affects foreign direct investment and exports. We will take the viewpoint of Home, and ask how varying market sizes in Foreign, affect the incentive to engage in FDI for producers in Home. In particular, we will focus our analysis on the following two experiments. First, we change the size of the market by changing per capita incomes θ_2^F of consumers in the middle class in Foreign, and second we change the size s_2^F of the middle class in Foreign. In both experiments we hold aggregate income $Y^i \equiv \sum_k s_k^i L^i \theta_k^i$, and average income Y^i/L^i for all i, k constant. We assume that Assumptions 2 and 3, and Proposition 1 holds in all experiments. The intuition for the first case is discussed in some detail, whereas the discussion for the remaining cases is kept short as the intuition is similar.

4.1 Changing Per Capita Income of the Middle Class in Foreign

Let us start by considering an increase in per capita income of the middle class θ_2^F, where we (i) decrease per capita income of the rich class θ_1^F, and (ii) decrease per capita income of the poor class θ_3^F, holding everything else constant.

Case (i): Redistribution from Rich to Middle Class

We transfer incomes from the rich class to the middle class. One can show that this increases the number of MNCs with HQ in Home, M^H, whereas the number of MNCs with HQ in Foreign, M^F, decreases. However, the total number of MNCs in the world, $\sum_i M^i$, unambiguously increases. The number of exporters $N^H_{X,2}$ serving the middle and rich classes in Home and only the rich class in Foreign decreases, whereas the number of exporters $N^H_{X,1}$ serving only the rich classes in both regions, and the number of non-exporters N_1^H might increase or decrease.

The intuition is the following. A higher θ_2^F implies that the willingness to pay of consumers belonging to the middle class in Foreign, and therefore prices for products sold in the mass

market (i.e. to middle and rich classes in both regions) rises. This creates a disequilibrium in the product market. At higher prices producers who sell in the mass market make positive profits, ceteris paribus. Hence, some producers decide to enter that market segment. Ceteris paribus, this implies that expenditures on mass products increase, depressing expenditures on exported and non-exported products made in Home. This further implies that labor demand in Foreign increases more than labor demand in Home so that relative wages w^H/w^F fall below one. At relative wage rates $w^H/w^F < 1$ profits of MNCs with HQ in Home exceed profits of those with HQ in Foreign, i.e. $\pi_M^H > \pi_M^F$. Hence, producers that enter the mass market set up their HQ in Home. This ameliorates the disequilibrium in the labor market by increasing labor demand in Home. However, at the same labor demand in Foreign also increases since MNCs absorb resources in the host region. Because labor supply in Foreign has not changed, MNCs with HQ in Foreign start exiting the market. In other words, MNCs with HQ in Home crowd out MNCs with HQ in Foreign. Nevertheless, in equilibrium more MNCs enter in Home than exit in Foreign. Note that exit and entry is such that prices for products sold in the mass market are the same in the old and new equilibrium. In other words, competition intensifies to such a degree that prices fall to the old equilibrium level.

Next, consider the changes induced by the income transfer in the number of exporters and non-exporters. Notice that expenditures on mass products have increased for all consumers above the income threshold $\overline{y}$. First, consider the budget constraint of the middle class in Home, which are the decisive consumers for products sold by producers $N_{X,2}^H$ to middle and rich classes in Home and the rich class in Foreign. Since their income has not changed but their expenditures on mass products has increased they must decrease their expenditures on products sold by producers $N_{X,2}^H$. Hence, some of those producers exit the market, i.e. $N_{X,2}^H$ decreases. Next, consider the budget constraint of a consumer belonging to the rich class in Foreign. She is the decisive consumer for products sold exclusively to the rich classes in both regions. On the one hand, her expenditures for mass products increase by 1, and on the other hand, decrease by τ^2, for products sold to the middle and rich classes in Home and the rich class in Foreign. The net change in her expenditures on those products is negative and equal to $\left(\tau^2 - 1\right)$. This tends to increase her expenditure on products sold exclusively to the rich classes in both regions. At the same time, her income θ_1^F falls by s_2^F/s_1^F, which tends to decrease her expenditures on exclusive products sold only to the rich classes. Hence, if $\left(\tau^2 - 1\right) < s_2^F/s_1^F$ total expenditure on products which are sold only to the rich classes falls, and the number of producers, $N_{X,1}^H$, catering to that market segment decreases in equilibrium. Last, looking at the budget constraint of rich consumers in Home reveals that if their expenditures on products sold exclusively to the rich classes falls, their expenditures on products sold exclusively to them must increase, and vice versa. In that case, the number of producers, N_1^H, serving that market segment rises. We conclude that the effect on the trade volume, i.e. the value of exports from Home to Foreign, given by $\left(N_{X,2}^H \tau z_2^H + N_{X,1}^H z_1^F\right) s_1^F L^F$, is ambiguous. Of course, producers exit and enter the different market segments across the two regions until the equilibrium is restored at relative wage rates $w^H/w^F = 1$.

Case (ii): Redistribution from Poor to Middle Class

We redistribute income from the poor to the middle class. It can be shown that the number of MNCs with HQ in Home, M^H, increases and with HQ in Foreign, M^F, decreases. However, the total number of MNCs $\sum_i M^i$ again increases. At the same time, the number of exporters, $N^H_{X,2}$, that sell to the middle and rich classes in Home and solely to the rich class in Foreign decreases, the number of exporters, $N^H_{X,1}$, catering exclusively to the rich classes in both regions increases, and the number of non-exporters N^H_1 selling only to the rich class in Home falls.

The intuition is similar to case (i) above. Thus, we keep the discussion short and emphasize the difference. First, the intuition for the change in the number of MNCs is the same as before.[12] However, the number of exporters, $N^H_{X,1}$, that sell exclusively to the rich classes in both regions unambiguously increases in equilibrium since the income of the rich class in Foreign does not decrease in case (ii). Thus, because their expenditures on mass products and products sold to the middle and rich classes in Home and the rich class in Foreign falls, they increase their expenditures on products sold by producers $N^H_{X,1}$. This implies that $N^H_{X,1}$ increases. However, the rich class now spends more on all products sold at least to two classes above income threshold $\overline{y}$, and therefore has less income to spend on products sold exclusively to them. Hence, the number of non-exporters, N^H_1, serving that market segment decreases. Again, the effect on the trade volume is ambiguous.

We summarize our main results in the following proposition:

Proposition 2. *An increase in per capita incomes θ^F_2 of the middle class in Foreign leads to an increase in the number of MNCs with HQ in Home, and has an ambiguous effect on the volume of exports from Home to Foreign.*

Proof. The proof follows from writing $\theta^F_k = \left(\overline{Y} - \theta^F_2 s^F_2 L^F - \theta^F_{l\neq k} s^F_{l\neq k} L^F\right) / s^F_k L^F$ for $k, l = \{1, 3\}$, where we hold aggregate income $\overline{Y}$ constant, and differentiating the solutions for the number of producers in Appendix A.1 with respect to θ^F_2. □

4.2 Changing the Size of the Middle Class in Foreign

Next, consider a decrease in the (relative) size s^F_2 of the middle class in Foreign where we (iii) adjust per capita income θ^F_1 and the size s^F_1 of the rich class in Foreign, and (iv) change per capita income θ^F_3 and the size s^F_3 of the poor class such that aggregate income Y^i and class sizes $\left(s^F_1 + s^F_2\right)$, $\left(s^F_2 + s^F_3\right)$, respectively, are constant. In other words, in this experiment we hold per capita income of the middle class in Foreign constant and change the number of people in the middle class by changing the number of (iii) rich consumers and (iv) poor consumers and their corresponding per capita incomes, holding everything else constant.

[12] Note that the increase in demand for food from the poor class has no effect on the wage rate within Foreign. The reason is that wage rates across food and differentiated product sector are equalized because labor within Foreign is perfectly mobile, and aggregate labor supply is constant.

Case (iii): Increasing Size of Middle Class, and Decreasing Size of Rich Class

Let us start with the case where we decrease the size of the rich class in Foreign and increase the size of the middle class, holding their per capita income constant. We want to hold aggregate and average incomes constant, so we have to adjust per capita income of the rich class accordingly. It can be shown that the number of MNCs in both regions, M^H and M^F, do not change, whereas the number of exporters $N_{X,2}^H$ decreases, $N_{X,1}^H$ might increase or decrease, and the number of non-exporters N_1^H decreases. The intuition is similar to case (i). However, now total market size for multinational producers does not change. The reason is that on the one hand, prices for their products do not change since per capita income of the middle class is constant, and on the other hand, the size of the market in terms of the number of people that consume their product does not change because the number of people in the middle and rich class is constant. Next, consider the market for products sold to the middle and rich class in Home and the rich class in Foreign. Since the size of the rich class in Foreign decreases less exporters enter that market segment in Home, so that $N_{X,2}^H$ decreases.[13] Whether the number of exporters serving only the rich classes in both regions increases or decreases depends on whether the decrease in the size of the market in terms of customers (since s_1^F decreases) served outweighs the increase in terms of prices (since θ_1^F increases). However, in equilibrium expenditures of the rich class in Home on products sold exclusively to them unambiguously decrease. This implies that N_1^H falls.

Case (iv): Increasing Size of Middle Class, and Decreasing Size of Poor Class

Now, we increase the size of the middle class in Foreign while at the same time we decrease the size of the poor. Again, since we hold aggregate and average incomes constant, we must adjust per capita income of the poor. In that case, one can show that assuming a price elasticity of z_2^F with respect to the population size s_2^F greater than one is sufficient for the number of MNCs with HQ in Home to increase, with HQ in Foreign to decrease, and the total number of MNCs that are active in the world to increase. The number of exporters and non-exporters in Home is unaffected.

The intuition behind the result is best understood with the following argument. The number of exporters and non-exporters are not affected because aggregate expenditures on their products do not change. However, aggregate spending on mass products changes because the size $s_2^F L^F$ of the mass market in terms of customers has increased. This induces producers to enter the mass market. If the price elasticity of products marketed on the mass market with respect to population size s_2^F exceeds one, labor demand in Foreign increases more than in Home. This implies that relative wages w^H/w^F fall below one, so that MNCs set up their HQ in Home. The rest of the argument is the same as in case (i). However, entry and exit of MNCs is such that in equilibrium prices z_2^F are lower in the new equilibrium due to more intense competition.

[13] Notice that a decrease in the market size in terms of the number of customers induces some producers to exit. Due to less intense competition prices rise such that aggregate expenditures are constant.

We summarize our main results in the following proposition:

Proposition 3. *Enlarging the size of the middle class $s_2^F L^F$ by increasing its population share has an ambiguous effect on the number of MNCs with HQ in Home, and the volume of exports from Home to Foreign.*

Proof. The proof follows from writing $\theta_k^F = \left(\overline{Y} - \theta_2^F s_2^F L^F - \theta_{l\neq k}^F s_{l\neq k}^F L^F\right) / s_k^F L^F$ for $k, l = \{1, 3\}$, where we hold aggregate income $\overline{Y}$ and $\left(s_k^F + s_2^F\right)$ constant, and differentiating the solutions for the number of producers in Appendix A.1 with respect to s_2^F. □

5 Extensions

The baseline model is very stylized, and thus helps us understand the role of the demand side by isolating it from other factors like e.g. technology. In this section, we discuss extensions of the baseline model with regard to technology and preferences. First, we extend the baseline model towards heterogeneity in technology by arguing that producers in Foreign might not have access to foreign direct investment (e.g. they do not have the managerial know-how to provide headquarter services). The second extension compares the baseline model to the standard model with CES preferences, and highlights the differences. Last, we confront the objection that a factor endowment model, where the skill distribution is reflected in the income distribution, might be observationally equivalent to the baseline model.

5.1 Technological Differences: A North-South Perspective

In this section, we look at a simple extension by assuming that firms in Foreign have no access to foreign direct investment. If they want to serve the foreign market they have to do so by exports. That puts the model into a North-South context where we think of Home as North, and Foreign as South.

For comparison's sake, we assume that parameters are such that the equilibrium structure is similar to the one discussed in the baseline model. To preserve space, we refer the reader to Appendix A.2 for the formal model including its solution. The equilibrium which emerges looks as follows. Producers which supply both the middle and rich classes still locate in both regions. However, those located in the South can only serve the foreign market through exports whereas producers in the North set up headquarters there and engage in FDI in the South. Relative wage rates $\omega \equiv w^H/w^F$ are such that producers with that pricing strategy break even, regardless of whether they choose to locate in North or South. In the equilibrium we consider, relative wages ω exceed one. This is the case if labor in the North is more productive than in the South, which we think is a reasonable assumption in this context. In other words, if a North producer's amount of labor used to supply the foreign market, $f_E + f_D + b\left(s_1^H + s_2^H\right) L^H$, falls short of a South producer's labor input, $f_E + \tau b\left(s_1^H + s_2^H\right) L^H$, to supply the market in the North. In sum, $\omega > 1$ if and only if $(\tau - 1)b > f_D / \left(s_1^H + s_2^H\right) L^H$, which is identical to condition (8) for i equal to H. In the baseline model, labor productivity is the same for all

producers. Therefore, in an equilibrium where MNCs are present in both regions (relative) wages are equalized. Note that relative labor productivity, and therefore the relative wage rate, is determined by the inverse of relative labor requirements given above. Furthermore, we assume that relative wages are such that all producers excluding the middle class in the South choose to locate in the North. This is identical to the equilibrium structure in the baseline model. However, this implies that there is an upper bound ϕ_2 on relative wage rates, where ϕ_2 is defined as the labor productivity of a producer located in the North selling to the rich class in both regions relative to such a producer located in the South. For a formal definition see Appendix A.2. Hence, if $\phi_2 > \omega > 1$ holds, no producer has in equilibrium an incentive to locate in a different region. Similar to the baseline model, no producer in the North has an incentive to deviate from its chosen mode to serve the foreign market if and only if

$$\frac{f_D}{s_1^F L^F} > (\tau\omega - 1)\, b > \frac{f_D}{\left(s_1^F + s_2^F\right) L^F},$$

where ω is endogenously determined by $\left[f_E + \tau b \left(s_1^H + s_2^H\right) L^H\right] / \left[f_E + f_D + b \left(s_1^H + s_2^H\right) L^H\right]$. The condition above is the equivalent to condition (8) in the baseline model. By assumption, producers in the South have no choice but to export. In sum, we get a similar equilibrium structure in the North-South context as in the baseline model, except that now there are no Southern MNCs by assumption. Notice that the same equilibrium structure would emerge if we assumed identical technologies across countries but modified condition (8) such that all producers located in the South that sell to the middle and rich classes in both regions choose exports over FDI. A Southern producer pursuing that pricing strategy would do so if and only if $f_D / \left(s_1^H + s_2^H\right) L^H > \left(\tau\omega^{-1} - 1\right) b$, which means that the cost of serving the foreign market through exports, i.e. $w^F \tau \left(s_1^H + s_2^H\right) L^H$, is lower than the cost of serving it through a foreign production facility, i.e. $w^H f_D + w^F b \left(s_1^H + s_2^H\right) L^H$. This implies together with the deviation incentive of Northern producers that relative wages ω must be larger than one in equilibrium. We conclude that if labor in the South is sufficiently unproductive relative to labor in the North, engaging in foreign direct investment is less profitable for Southern producers serving the middle and rich classes in both regions compared to exporting.

Again, let us take the viewpoint of producers in the North. The effects of market size on the decision of Northern producers to engage in FDI versus exporting are identical to the baseline model. Thus, we keep the discussion brief and just summarize the results. For the formal treatment refer to Appendix A.2. We start with case (i) and (ii), where we decrease per capita income of the middle class in the South and increase the per capita income of the rich, respectively the poor in the South, holding South's aggregate income constant. In both cases, the results and their intuition are exactly the same as in the baseline model. In particular, the number of MNCs with HQ in the North decreases in both cases. Remember, in cases (iii) and (iv) we reduce the size of the middle class in the South and raise the size of the rich, respectively, the poor class in the South, while holding aggregate and average income in the South constant. Both, case (iii) and case (iv) are also identical to the baseline model. Hence, we conclude that the results of the baseline model are robust with respect to the type

of technological heterogeneity discussed in this section.

5.2 Homothetic Consumer Preferences

In this section, we briefly compare the baseline model discussed above to the standard model with homothetic preferences, see e.g. Brainard (1997). We restrict the discussion to the basic intuition and refer to Appendix A.3 for the formal model. Consider homothetic preferences given by $U = x^{\beta}C^{1-\beta}$, where $C = \left(\int_{\mathcal{J}} c(j)^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}}$ with $\sigma > 1$. In other words, consumers have Cobb-Douglas preferences over food and differentiated products, and a constant-elasticity-of-substitution (CES) subutility, which aggregates differentiated products into a composite good C. Cobb-Douglas preferences imply that consumers spend a constant share β of their income on food, and the rest on differentiated products. One can show that with CES subutility all consumers in both regions purchase all differentiated products available, even in the presence of (finite) trade costs. Consumers with different income levels differ only with respect to the amount they buy of each product. In this sense, the CES utility function restricts a consumers choice to the intensive margin of consumption, leaving her no choice about variety. In Appendix A.3, we show that due to the assumption of homothetic preferences the distribution of income within regions has no effect on aggregate demand, and therefore on the number of exporters and MNCs, respectively. Aggregate demand only depends on aggregate income of a region. Furthermore, we argue that a mixed equilibrium where some producers export and others engage in FDI exists only under a knife-edge condition. Hence, the number of exporters and multinationals is indeterminate. In sum, in the standard model it is meaningless to distinguish between different market segments since the income distribution is irrelevant.

5.3 Skill vs. Income Distribution

We argued in the baseline model that demand side effects lead to the emergence of MNCs. In equilibrium, the distribution of income affects a producer's decision to serve a particular segment of the (foreign) market either by engaging in FDI or by exporting. We showed in the previous section that such an equilibrium only exists under knife-edge conditions if we shut down the demand channel in the baseline model by assuming homothetic preferences.

However, one could argue that the income distribution reflects the distribution of skills in the economy, i.e. there is a mapping of the skill to the income distribution. Thus, we construct a simple factor proportions model with homothetic consumer behavior where producers combine low, medium, and high-skilled labor in the production of goods, so that (relative) differences in the skill distribution of regions determines the emergence of multinationals versus exporters. Changes in the skill, and therefore income distribution have no effect on aggregate demand but affect aggregate supply by changing (relative) production costs. The question is whether the link between skill, respectively, income distribution is different from the baseline model in a way that could be taken into account if we go to the data. Our model is based on Markusen and Venables (2000), and Egger and Pfaffermayr (2005). See Appendix A.4 for the formal model.

Markusen and Venables (2000) argue in a similar model with skilled and unskilled labor that MNCs are more common when countries are similar in absolute and relative factor endowments. Egger and Pfaffermayr (2005) discuss a model similar to Markusen and Venables (2000) but with three different production factors (skilled and unskilled labor, and physical capital). They show that an increase in the endowment of skilled labor and capital, respectively, of country i relative to country l leads to an increase, and a decrease, respectively, in the number of MNCs relative to exporters in country i. One key result of their analysis is that whereas exports and foreign affiliate sales increase with the similarity in country size, FDI (defined as capital exports) increase with the size of the source country.

Nevertheless, both do not discuss the association between changes in the host country's income distribution induced by changes in its skill distribution, and its effect on the number of multinationals and exporters active in the parent country. In Appendix A.4 we simulate and discuss in detail the same experiments (i)-(iv) as in the baseline model. To preserve space, we only state the comparative statics results. Our simulations show that in case (i) there is a positive correlation between per capita income of the middle class in Foreign and the number of MNCs with HQ in Home, whereas in case (ii) there is a negative correlation. Remember, our baseline model predicts a positive association between per capita income of the middle class in Foreign and the number of MNCs with HQ in Home in both case (i) and (ii). The simulations also reveal a positive relationship between the size of the middle class in Foreign and the number of MNCs with HQ in Home for both case (iii) and (iv), whereas the baseline model predicted no effect, and also a positive relationship, respectively. We conclude that the predictions of the two models diverge with respect to the relationship between the market size of the middle class in the host country and FDI activity in the host country.

6 Empirics

This section illustrates the market size theory with regard to its predictions about FDI activity. In particular, we focus on the market size of the middle class in the host country and its effect on FDI activity in the host country as predicted by cases (i)-(iv), which are summarized in Proposition 2 and 3. Based on the theory, we would expect a positive relationship between per capita income of the middle class in the host country and FDI activity in the data. Furthermore, the theory suggests either no association between the size of the middle class in the host country and FDI activity, or a positive one.

6.1 Data

We use data on outward FDI positions from the OECD (2012) FDI statistics database. The database covers bilateral outward FDI positions, measured in nominal USD, of all OECD countries in 235 countries (including all OECD countries) over the time period of 1985-2011.[14]

[14]The OECD (1999) recommends market value as the conceptual basis for both the valuation of direct investment stocks (i.e. equity and debt instruments) and flows. Note that the inclusion of inter-company debt and of loans from subsidiaries to parent companies may result in some cases in negative values of direct

In 2011, OECD countries held around 80 per cent of the global outward FDI stock (OECD 2013). To approximate FDI positions in real PPP terms we use a GDP deflator from the World Bank (2012), and a PPP conversion factor from Penn World Tables (Heston, Summers and Aten 2012).

In the model, FDI activity is reflected in the number of MNCs setting up production plants in the foreign country designed to serve local consumers (horizontal FDI), whereas in the data, we proxy FDI activity with outward FDI positions. First, in the data recorded foreign direct investment is defined as obtaining a lasting interest in an entity resident in an economy other than that of the investor. Usually, the lasting interest is defined as obtaining at least 10 per cent of ordinary or voting stock (OECD 1999). Second, it is impossible to distinguish e.g. vertical from horizontal, or greenfield from brownfield investment in the data. Of course, this approximation of FDI activity is far from perfect. However, due to the availability and quality of aggregate data it is still a reasonable choice.

The construction of the market size measures is based on empirical income distributions kindly provided by Bernasconi (2013). She uses data on deciles and quintiles from the World Income Inequality Database UNU-WIDER (2008) and GDP per capita from Heston, Summers and Aten (2012), to compute empirical income distributions without making parametric assumptions. In particular, Bernasconi (2013) assigns an average income level to each decile (quintile), and redistributes the corresponding area uniformly on an income interval. The resulting densities are then divided into common income intervals on USD $1, 5000, \ldots, 145000, 150000$. We define global income classes by imposing a common lower $\underline{y}$ and upper threshold $\overline{y}$ on each country's income distribution, where $\overline{y} > \underline{y}$. This creates a low income class with per capita incomes $y \leq \underline{y}$, a middle income class with $\overline{y} \geq y > \underline{y}$, and a high income class with $y > \overline{y}$. We measure the size of the different market segments in the host country as aggregate income Y_k and number of people P_k in each income class $k = \{low, middle, high\}$. For a more detailed description see Appendix A.5 and Bernasconi (2013).

Data on control variables are obtained from various sources. Data on regional trade agreements, customs union, and (relative) skill levels are provided by Blonigen and Piger (2011), on schooling by Barro and Lee (2010), on corporate tax and urban concentration by the World Bank Development Indicators (World Bank 2012), on GDP and GDP per capita, trade openness (exports plus imports divided by GDP), and remoteness (distance of country j from all other countries in the world weighted by those other countries' share of world GDP excluding country j) by Heston, Summers and Aten (2012), on (geodesic) distance by Mayer and Zignago (2001), and on common language and colonial relationship by Helpman, Melitz and Rubinstein (2008).[15]

Due to limited availability of data on the market size measure and control variables, we finally use data on the outward FDI positions of 29 OECD countries in 66 host countries

investment stocks. In the sample this concerns less than 2 per cent of observations, which we drop.

[15]For the following variables yearly data is not available, and we average over the time periods data is available: regional trade agreements, customs union, skill levels, schooling, corporate taxes, and urban concentration.

from 1997 to 2007. The OECD reports whether a FDI position is missing, zero or confidential. Since we use only data on FDI positions reported either positive or zero, we are left with 11,817 observations. The outward FDI position is zero for about 25 percent of all observations in the sample. In Appendix A.5, the list of countries is given in Table 3, and summary statistics are provided in Tables 4 and 5.

6.2 Empirical Model

We estimate the following model with Poisson pseudo-maximum likelihood (PPML)

$$\begin{aligned} \log\left(FDI_{ijt}\right) &= \alpha + \beta_1 \log\left(Y_{middle,jt}\right) + \beta_2 \log\left(P_{middle,jt}\right) + \beta_3 \log\left(Y_{k,jt}\right) + \beta_4 \log\left(P_{k,jt}\right) \\ &+ X_{ijt}\gamma + A_i + A_t + \varepsilon_{ijt}, \quad k \in \{low, high\} \end{aligned} \tag{9}$$

where FDI_{ijt} denotes parent country i's FDI position in host country j at time t. In order to include observations where FDI positions are zero, we estimate equation (9) with PPML as proposed by Santos Silva and Tenreyro (2006) in the context of gravity equations for bilateral trade flows. The different market segments are captured by aggregate income $Y_{k,jt}$ and number of people $P_{k,jt}$ in income class $k = \{low, middle, high\}$.[16] We run equation (9) either excluding the high or low income class, respectively. The coefficient β_1 can be interpreted as the marginal effect of increasing per capita income of the middle class in the host country (by increasing the middle class' total income), simultaneously decreasing per capita income of the rich or poor class, respectively, such that aggregate and average income in the economy are constant. This corresponds to the experiments in cases (i) and (ii) discussed in Section 4. The sum of the coefficients β_1 and β_2 can be interpreted as the marginal effect of increasing the size of the middle class in the host country and holding their per capita income constant, while changing size and per capita income of the rich or poor class, respectively, such that aggregate and average income in the economy remain constant.[17] This corresponds to the experiments in cases (iii) and (iv) discussed in Section 4.

The vector X includes the following control variables: (log) host real GDP and real GDP per capita, (log) host remoteness, (log) host urban concentration, (log) host trade openness, (log) host corporate tax, (log) distance, (log) squared skill difference (proxy for relative skilled labor endowments), and dummy variables on common official language, regional trade agreement, customs union, colonial relationship, and host region. The inclusion of these control variables is guided by Blonigen and Piger (2011). They use Bayesian statistical techniques (i.e. Bayesian Model Averaging) to select from a large set of control variables used in the literature those that are most likely determinants of FDI activity. From their specification using logged FDI

[16] Note that we transform the data by taking logs. The market size as measured by the number of people (measured in thousands) and their respective aggregate income (measured in millions) has zero incidents. To preserve those information we proceed by adding 1 to each observation. Adding 1 to each observation has some tradition in the literature, see e.g. Eichengreen and Irwin (1998), Limao and Venables (2001), Calderon, Chong and Stein (2007) or Bloom, Draca and Van Reenen (2011). We experiment adding 0.1, 0.5, 1.5, or 2 and the results are very similar.

[17] We can write $\beta_1 \log(yP) + \beta_2 \log(P)$ where $y = Y/P$ so that $\beta_1 \log(y) + (\beta_1 + \beta_2) \log(P)$.

stocks in 2000 as a measure of FDI, we include those covariates with an inclusion probability of 50 per cent or higher, excluding parent country covariates which we capture with a parent country fixed effect A_i. That disciplines the empirical exercise since the baseline model does not provide a structural equation. To address the concern that our market size measure might reflect largely skill levels (see discussion Section 5.3), we additionally include the percent of population that completed no schooling, primary, secondary, and tertiary education (in logs) in the host country. We also add a host region fixed effect A_r and a year fixed effect A_t.[18] We include a region fixed effect rather than a host country fixed effect because there is little variation in the measure of market size over time due to its construction (see Appendix A.5). In other words, the identification of the effect of $Y_{k,jt}$ and $P_{k,jt}$ comes mainly from its variation across countries.

Definition of the Middle Class

There is no consensus in the literature on how to define a global middle class, and hence on the choice of the income thresholds $\{\underline{y}, \overline{y}\}$. For a detailed discussion on the definition of the middle class see e.g. Ravallion (2010). We apply three different definitions commonly used in the literature. First, we choose the thresholds according to Milanovic and Yitzhaki (2002), see also World Bank (2007), which define the middle class as those individuals with per capita incomes between USD 4,500 and USD 19,000 (PPP, 2005). The lower bound corresponds to Brazil's per capita income, and the upper bound to Italy's per capita income. This is one of the most widely used definitions of the middle class in the literature. Second, we construct a world income distribution from Bernasconi's (2013) country income distributions, which has median income USD 5,000 and mean income ranging from USD 7,500 to USD 10,100 over the period of 1997-2007. Defining the middle class as mean income $\pm 25\%$ yields a lower threshold of USD 5,000 and an upper threshold of USD 10,000. We use the mean rather than the median since by construction we can vary income thresholds only in USD 5,000 steps. This definition has some tradition in the literature, see e.g. Thurow (1987). Although arbitrary these thresholds have some economic rationale. For example, Muhammad et al. (2011) estimate that households below a per capita income of approximately USD 6,500 (PPP, 2005), which corresponds to a real per capita income less than 15 per cent of the US level, spend on average between 50 and 60 per cent of their income on food and housing. The McKinsey Global Institute (2010) classifies households in the income bracket of USD 10,000 - 20,000 (PPP, 2005) as the consuming middle class, and those with incomes below USD 5,000 as satisfying basic consumer needs. Ali and Dadush (2012) propose the number of passenger cars in circulation as a proxy for the number of people in the middle class. They argue that the car ownership rate accelerates around the per capita income threshold USD 3,400 and decelerates sharply once per capita income exceeds USD 25,000 (PPP, 2005). Ali and Dadush (2012) show that their ranking of the middle class across countries is broadly in line with the ranking based on Milanovic and

[18]The World Bank classification uses regions East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa, South Asia, Sub-Saharan Africa, and Western Europe. We complement Northern America, and Oceania.

Yitzhaki's (2002) definition. Third, we estimate equation (9) for a set of possible combinations of income thresholds, i.e. $\underline{y} \in \{5000, 10000\}$ and $\overline{y} \in \{10000, \ldots, 35000\}$, which includes the two definitions above. In principle, we can then compare the R-squared across different definitions of the middle class.[19] We choose the poverty threshold in the US defined by the US Census Bureau as an upper bound on the lower threshold $\underline{y}$. The United States Census Bureau (2013) considers individuals living in the United States to be poor if their annual income is less than USD 10,160 (in 2005 USD). As an upper bound on the income threshold $\overline{y}$ we choose the median GDP per capita across the 29 OECD countries in the sample, which is equal to USD 34,133 in 2007. According to Ali and Dadush (2012) this is one of the narrowest definitions used in the literature.

6.3 Results and Discussion

This section discusses the link between per capita income and the size of the middle class in the host country, respectively, and FDI positions in the host country held by OECD countries.

Changing Income and Size of the Middle Class relative to the Rich Class

Table 1 below shows the results from estimating equation (9) with PPML, excluding the rich class, and setting the lower threshold at (a) USD 5,000 or (b) USD 10,000, and varying the upper threshold from USD 10,000 to 35,000.

To illustrate the results, consider column one in panel (a) of Table 1. First, we find that a 1 per cent increase in per capita income of the middle class in the host country, while simultaneously decreasing per capita income of the rich class, increases the FDI position in the host country held by OECD countries by 2.478 per cent (β_1) on average, holding in particular income and size of the poor class, GDP per capita and GDP constant. Second, we find that a 1 per cent increase in the size of the middle class in the host country, while simultaneously decreasing the size of the rich class, decreases the FDI position in the host country held by OECD countries by 0.575 per cent ($\beta_1 + \beta_2$) on average, again holding income and size of the poor class, GDP per capita and GDP constant. We see that GDP per capita has no effect whereas GDP has a significantly positive effect on outward FDI positions of OECD countries.

These results relate to cases (i) and (iii) discussed in Section 4 as follows. They lend support to the prediction of case (i) that an increase in the per capita income of the middle class in the host country, by decreasing per capita income of the rich class, leads to an increase in FDI activity in the host country, which is measured here as the FDI position in the host country held by OECD countries. According to case (iii) there should be no effect on FDI activity if we increase the size of the middle class, and hold their per capita income constant (adjusting

[19] We compute a pseudo R^2 as the square of the correlation between the model's predicted values and the actual values, which ranges from 0 to 1 (see Wooldridge 2009). The greater the correlation between the predicted values and the actual values, the greater the R^2. We adjust the R^2 for the number of regressors as follows $1 - \left(1 - R^2\right)(n-1)/(n-p-1)$, where n denotes sample size and p the number of regressors. Even though the pseudo R^2 cannot be compared across datasets it is still valid and useful in evaluating multiple models predicting the same outcome on the same dataset (see Introduction to SAS: UCLA: Statistical Consulting Group 2013).

Table 1: Outward FDI positions (29 OECD countries 1997-2007, pooled, PPML)

(a) with lower threshold $\underline{y} = 5,000$

	$\log(FDI_{ijt})$					
	$\overline{y} = 10,000$	$\overline{y} = 15,000$	$\overline{y} = 20,000$	$\overline{y} = 25,000$	$\overline{y} = 30,000$	$\overline{y} = 35,000$
$\log(Y_{middle,jt})$	2.478**	1.997**	2.930***	3.300***	3.362***	2.555***
	(1.120)	(0.980)	(0.856)	(0.828)	(0.955)	(0.792)
$\log(P_{middle,jt})$	-3.053**	-2.704**	-3.790***	-4.149***	-4.098***	-3.209***
	(1.316)	(1.164)	(1.036)	(1.004)	(1.074)	(0.940)
$\log(Y_{low,jt})$	-0.303	-0.256	-0.160	-0.094	-0.121	-0.229
	(0.245)	(0.230)	(0.205)	(0.204)	(0.207)	(0.222)
$\log(P_{low,jt})$	0.585	0.522	0.574	0.557	0.511	0.375
	(0.385)	(0.361)	(0.359)	(0.350)	(0.345)	(0.347)
log(host GDP pc$_{jt}$)	0.850	0.669	0.737	0.815	0.824	0.552
	(0.901)	(0.832)	(0.796)	(0.759)	(0.732)	(0.775)
log(host GDP$_{jt}$)	1.066**	1.261***	1.282***	1.215***	1.160***	1.338***
	(0.443)	(0.444)	(0.435)	(0.418)	(0.413)	(0.438)
adj pseudo R^2	0.794	0.802	0.811	0.815	0.816	0.809
#observations	11817	11817	11817	11817	11817	11817

(b) with lower threshold $\underline{y} = 10,000$

	$\log(FDI_{ijt})$					
	$\overline{y} = 10,000$	$\overline{y} = 15,000$	$\overline{y} = 20,000$	$\overline{y} = 25,000$	$\overline{y} = 30,000$	$\overline{y} = 35,000$
$\log(Y_{middle,jt})$		2.055***	2.202***	2.547**	3.152	1.694**
		(0.648)	(0.696)	(1.144)	(3.915)	(0.724)
$\log(P_{middle,jt})$		-2.702***	-2.862***	-3.154**	-3.482	-2.125**
		(0.802)	(0.874)	(1.246)	(3.326)	(0.893)
$\log(Y_{low,jt})$		-0.042	-0.130	-0.223	-0.468	-0.584
		(0.505)	(0.526)	(0.541)	(0.526)	(0.564)
$\log(P_{low,jt})$		-0.258	-0.231	-0.142	0.276	0.224
		(0.815)	(0.877)	(0.903)	(1.097)	(0.946)
log(host GDP pc$_{jt}$)		0.159	0.077	0.150	0.672	0.398
		(0.940)	(1.020)	(1.050)	(1.624)	(1.141)
log(host GDP$_{jt}$)		1.752***	1.830***	1.769***	1.299	1.589**
		(0.535)	(0.593)	(0.623)	(1.395)	(0.645)
adj pseudo R^2		0.818	0.816	0.814	0.815	0.806
#observations		11817	11817	11817	11817	11817

Notes: * p<0.1, ** p<0.05, *** p<0.01. Clustered (by host country) standard errors in parentheses. Excluding rich class. Controls: host remoteness, host urban concentration, host trade openness, host corporate tax, distance, squared skill difference, percent of population that completed no, primary, secondary, and tertiary schooling, dummies for common language, regional trade agreement, customs union, colonial relationship, parent country, host region, and year.

income and size of the rich class such that aggregate and average income in the economy is constant). However, in the data we see a negative relationship between the size of the middle class in the host country and its FDI positions held by OECD countries. We think of the

following possible explanation, which can be reconciled with the baseline model. Suppose for the moment that consumers adjust their consumption not only along the extensive but also the intensive margin. As the number of consumers in the middle class expands more producers enter that market segment, ceteris paribus. However, since per capita income of the middle class has not changed they reduce the units bought of each product in order to afford the additional varieties offered in the market, ceteris paribus. It might be that the negative effects on FDI (less units sold by each producer) outweigh the positive ones (more producers active in the market). Nevertheless, in the data the magnitude of the effect of per capita income of the middle class on the FDI position is about five times larger than the effect of its size.

Table 1 shows that these results are robust with respect to the definition of the middle class. The results are similar with respect to estimating equation (9) for every year separately. See Table 6 in Appendix A.5 for details.[20] Of the control variables included in the main specification shown in Table 1, remoteness, openness, common language and colonial ties have a significantly positive effect, whereas distance, percentage in the population with completed primary or secondary schooling have a significantly negative effect on outward FDI positions.[21] The signs of the control variables are the same as in Blonigen and Piger (2011).

Changing Income and Size of the Middle Class relative to the Poor Class

Table 2 below shows the results from estimating equation (9) with PPML, excluding the poor class, and setting the lower threshold at (a) USD 5,000 or (b) USD 10,000, and varying the upper threshold from USD 10,000 to 35,000.

The results in Table 2 correspond to cases (ii) and (iv) discussed in Section 4. The interpretation is similar to the one in Table 1. We see that increasing per capita income of the middle class in the host country and simultaneously decreasing per capita income of the poor, while holding aggregate and average income of the rich class, GDP per capita and GDP constant, leads on average to an increase in the FDI position in the host country held by OECD countries. The magnitude of the increase is between 2.072 per cent and 3.541 per cent for a 1 per cent increase in per capita income of the middle class, depending on the definition of the middle class. This is in line with the prediction of case (ii) in the baseline model. Again, we observe that an increase in the size of the middle class in the host country, holding their per capita income constant, and adjusting income and size of the poor class such that GDP per capita and GDP are constant, implies a decrease in the FDI position of the host country. On average, a 1 per cent increase in the size of the middle class implies a decrease in the FDI position between 0.532 per cent and 0.984 per cent. Again, this contradicts the prediction of case (iv), which suggests a positive sign.

From Table 2 we see that these results are fairly robust with respect to the definition of the

[20] We also estimate (9) including a parent country-year fixed effect A_{it} and the results are very similar with respect to the size and significance levels of the coefficients. This is also the case if we exclude the poor class.

[21] Suppose we interpret primary and secondary schooling as medium-skilled labor. In the factor endowment model discussed in Section 5.3 increasing the supply of medium-skilled labor decreases its relative price and makes engaging in FDI relative to exporting cheaper, ceteris paribus. Thus, the number of producers engaging in FDI should increase.

Table 2: Outward FDI positions (29 OECD countries 1997-2007, pooled, PPML)

(a) with lower threshold $\underline{y} = 5,000$

	$\log(FDI_{ijt})$					
	$\overline{y} = 10,000$	$\overline{y} = 15,000$	$\overline{y} = 20,000$	$\overline{y} = 25,000$	$\overline{y} = 30,000$	$\overline{y} = 35,000$
$\log(Y_{middle,jt})$	2.072	-1.322	2.394***	3.355***	3.488***	2.720***
	(1.311)	(1.488)	(0.831)	(0.798)	(0.865)	(0.826)
$\log(P_{middle,jt})$	-2.559*	0.569	-3.326***	-4.339***	-4.409***	-3.451***
	(1.479)	(1.544)	(1.007)	(0.983)	(1.050)	(1.009)
$\log(Y_{high,jt})$	1.165**	0.482	0.315	0.718	1.012***	0.384*
	(0.582)	(0.572)	(0.862)	(0.538)	(0.352)	(0.210)
$\log(P_{high,jt})$	-1.598**	0.495	-0.197	-0.978	-1.593***	-0.742**
	(0.791)	(1.059)	(1.336)	(0.795)	(0.505)	(0.319)
log(host GDP pc$_{jt}$)	-0.017	0.351	-0.201	-0.480	-0.280	0.433
	(0.358)	(0.347)	(0.375)	(0.311)	(0.320)	(0.362)
log(host GDP$_{jt}$)	1.689***	0.579	1.656***	2.078***	2.292***	1.886***
	(0.325)	(0.606)	(0.553)	(0.341)	(0.331)	(0.276)
adj pseudo R^2	0.797	0.810	0.810	0.810	0.821	0.816
#observations	11817	11817	11817	11817	11817	11817

(b) with lower threshold $\underline{y} = 10,000$

	$\log(FDI_{ijt})$					
	$\overline{y} = 10,000$	$\overline{y} = 15,000$	$\overline{y} = 20,000$	$\overline{y} = 25,000$	$\overline{y} = 30,000$	$\overline{y} = 35,000$
$\log(Y_{middle,jt})$		2.578***	3.019***	3.541**	3.235**	2.324***
		(0.938)	(0.743)	(1.709)	(1.408)	(0.701)
$\log(P_{middle,jt})$		-3.351***	-3.732***	-4.251**	-3.971***	-3.054***
		(1.076)	(0.884)	(1.670)	(1.320)	(0.895)
$\log(Y_{high,jt})$		-0.913	-0.771	0.209	0.623**	0.257
		(0.646)	(0.570)	(0.533)	(0.296)	(0.215)
$\log(P_{high,jt})$		1.253	0.869	-0.546	-1.131***	-0.611*
		(0.838)	(0.850)	(0.787)	(0.429)	(0.330)
log(host GDP pc$_{jt}$)		0.875***	0.871**	0.592	0.700*	1.063**
		(0.339)	(0.346)	(0.362)	(0.378)	(0.417)
log(host GDP$_{jt}$)		1.255***	1.439***	1.851***	2.018***	1.863***
		(0.226)	(0.324)	(0.364)	(0.349)	(0.284)
adj pseudo R^2		0.821	0.819	0.815	0.824	0.818
#observations		11817	11817	11817	11817	11817

Notes: * p<0.1, ** p<0.05, *** p<0.01. Clustered (by host country) standard errors in parentheses. Excluding poor class. Controls: host remoteness, host urban concentration, host trade openness, host corporate tax, distance, squared skill difference, percent of population that completed no, primary, secondary, and tertiary schooling, dummies for common language, regional trade agreement, customs union, colonial relationship, parent country, host region, and year.

middle class. Only for the definition of the middle class with per capita incomes between USD 5,000 and USD 15,000 are the signs on the market size measures reversed, but not significant. Again, the results are similar with respect to estimating equation (9) for every year separately.

For details, see Table 7 in Appendix A.5. The signs and significance levels of the control variables are the same as in the case where we exclude the rich group.

6.4 Summary

In sum, we find a positive relationship between per capita income of the middle class in the host country and its FDI stock held by OECD countries, changing per capita income of the rich, respectively, poor class such that aggregate and average income in the economy are constant. Furthermore, we find a negative link between the size of the middle class in the host country and its FDI stock, holding per capita income of the middle class constant, while adjusting the size and income of the rich, respectively, poor class such that GDP and GDP per capita remain constant. This supports the predictions of the baseline model with respect to the effect of the middle class' per capita income in the host country but not with respect to the effect of the size of the middle class. However, we observe that per capita income of the middle class in the host country is a much more important determinant of FDI positions in the host country than the size of the middle class.[22]

We interpret these results as suggestive rather than conclusive evidence for the predictions about FDI activity of the baseline model. Obviously, the purpose of the empirical exercise is to illustrate the baseline model, and cannot be interpreted as a rigorous test of the model. Nevertheless, it is a first encouraging step towards empirically studying demand side effects in the context of FDI determinants. A more serious attempt to test the theory would take the firm's decision to export into account. However, trade flows are clearly endogenous since firms decide simultaneously whether to export or engage in FDI. A solution to this problem would require a valid instrument, with no obvious candidate available (e.g. one would have to find a policy change that affects trade flows but has no effect on long-term investment incentives). The estimation of the baseline specification (9) follows the literature, which has largely ignored the issue (see Blonigen 2005). Additional support for the theory might be found in firm-level data on export and foreign affiliate's sales by destination and host market. We think this could be a promising avenue worth exploring in the future.

7 Conclusion

This paper investigates how the distribution of aggregate income in the host country affects capital flows/stocks and international trade. Motivated by anecdotal evidence it provides a simple general-equilibrium model where firms choose the foreign market entry mode depending on the market segment they supply. Firms facing a proximity-concentration trade-off choose to engage in FDI if they serve the mass market abroad, and decide to export if they sell exclusively to a few rich consumers abroad. For firms serving a large market abroad economies of scale are

[22] Our specification generates an adjusted pseudo R^2 between 0.794 and 0.824 depending on the definition of the middle class. Estimating equation (9) excluding the measures for market size yields a coefficient of 0.683 (0.424) on GDP per capita, and of 0.813 (0.134) on GDP, with p-values in parentheses. The adjusted pseudo R^2 is 0.773.

large enough to compensate for higher fixed costs associated with FDI so that average costs are lower compared to exporting. The analysis highlights the importance of the middle class in the host country in terms of per capita income and size as a determinant of FDI activity in the host country. A point that has been neglected in the previous literature, which attributed no role to the distribution of GDP and approximated market size by GDP or GDP per capita. The model can be interpreted in the light of an emerging middle class in developing countries. For example, the model suggests that as the middle class in Brazil, Russia, India or China expands these countries should become more attractive for foreign direct investment (relative to exports). Using data on outward FDI positions of OECD countries we illustrate the role of per capita income of the middle class in the host country as a determinant of FDI positions in the host country.

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A Appendix

A.1 Baseline Model

This section presents the formal baseline model and its solution.

Resource and Budget Constraints, and the Balance of Payments

The resource constraint in Home, i.e. labor market clearing, is given by

$$\begin{aligned}\left(\theta_1^H s_1^H + \theta_2^H s_2^H + \theta_3^H s_3^H\right) L^H &= \left[\overline{x}\left(s_1^H + s_2^H\right) L^H + x_3^H s_3^H L^H\right] a \\ &+ M^H\left[f_E + f_D + b\left(s_1^H + s_2^H\right) L^H\right] \\ &+ N_{X,2}^H\left[f_E + f_D + b\left(s_1^H + s_2^H\right) L^H + \tau b s_1^F L^F\right] \\ &+ N_{X,1}^H\left[f_E + f_D + b s_1^H L^H + \tau b s_1^F L^F\right] \\ &+ N_1^H\left[f_E + f_D + b s_1^H L^H\right] + M^F\left[f_D + b\left(s_1^H + s_2^H\right) L^H\right].\end{aligned}$$

Similarly, the resource constraint in Foreign is given by

$$\begin{aligned}\left(\theta_1^F s_1^F + \theta_2^F s_2^F + \theta_3^F s_3^F\right) L^F &= \left[\overline{x}\left(s_1^F + s_2^F\right) L^F + x_3^F s_3^F L^F\right] a \\ &+ M^F\left[f_E + f_D + b\left(s_1^F + s_2^F\right) L^F\right] \\ &+ M^H\left[f_D + b\left(s_1^F + s_2^F\right) L^F\right].\end{aligned}$$

Budget Constraints

Consumers' budget constraints in Home are given by

$$\begin{aligned}\theta_1^H w^H + v_1^H &= p_x^H \overline{x} + \left(M^H + M^F\right)\tau z_2^F + N_{X,2}^H z_2^H + N_{X,1}^H \tau z_1^F + N_1^H z_1^H \\ \theta_2^H w^H + v_2^H &= p_x^H \overline{x} + \left(M^H + M^F\right)\tau z_2^F + N_{X,2}^H z_2^H \\ \theta_3^H w^H + v_3^H &= p_x^H x_3^H.\end{aligned}$$

The budget constraints of consumers in Foreign are given by

$$\begin{aligned}\theta_1^F w^F + v_1^F &= p_x^F \overline{x} + \left(M^H + M^F\right) z_2^F + N_{X,2}^H \tau z_2^H + N_{X,1}^H z_1^F \\ \theta_2^F w^F + v_2^F &= p_x^F \overline{x} + \left(M^H + M^F\right) z_2^F \\ \theta_3^F w^F + v_3^F &= p_x^F x_3^F.\end{aligned}$$

Note that $w^H = w^F = 1$ and $v_k^i = 0$ for all i, k in equilibrium.

Balance of Payments

The balance of payments is implied by the resource constraint, the zero-profit conditions of producers and the budget constraints of consumers. The balance of payments from the viewpoint of Foreign is given by

$$\begin{aligned} & - \quad \left(N_{X,2}^{H}\tau z_{2}^{H} + N_{X,1}^{H} z_{1}^{F}\right) s_{1}^{F} L^{F} \\ & + \quad \left[\left(\tau z_{2}^{F} - b\right)\left(s_{1}^{H} + s_{2}^{H}\right) L^{H} - f_{D}\right] M^{F} - \left[\left(z_{2}^{F} - b\right)\left(s_{1}^{F} + s_{2}^{F}\right) L^{F} - f_{D}\right] M^{H} \\ & = \quad 0 \end{aligned}$$

where the first two lines denote the current account, which consists of the trade balance (first line) and net factor payments (second line). Note that a static framework cannot account for changes in net foreign asset holdings (due to free entry asset values are zero in a static equilibrium). Thus, the balance of payments corresponds to the current account. The trade balance reports that Foreign's net exports are equal to $\left(N_{X,2}^{H}\tau z_{2}^{H} + N_{X,1}^{H} z_{1}^{F}\right) s_{1}^{F} L^{F}$, which are negative in the case we consider. This trade deficit is accommodated by positive net factor payments, which consist of (total) repatriated profits of MNCs with HQ in Foreign earned from foreign affiliate sales in Home equal to $\left[\left(\tau z_{2}^{F} - b\right)\left(s_{1}^{H} + s_{2}^{H}\right) L^{H} - f_{D}\right] M^{F}$, minus (total) repatriated profits of MNCs with HQ in Home earned from foreign affiliate sales in Foreign equal to $\left[\left(z_{2}^{F} - b\right)\left(s_{1}^{F} + s_{2}^{F}\right) L^{F} - f_{D}\right] M^{H}$.

Solution

We solve for the integrated mixed equilibrium using the budget constraints of consumers and the resource constraint of Foreign. It is easy to check that the resource constraint of Home is redundant due to Walras' law.

Prices

Since technology in the food sector is identical and wage rates equalize across regions the price of food is the same in both regions, and is given by

$$p_{x}^{H} = p_{x}^{F} = a.$$

This implies that the income threshold is the same in both countries and equal to $\overline{y} = a\overline{x}$. From the zero-profit conditions we solve for the willingness to pay of consumers, which are

given by

$$\begin{aligned} z_1^H &= \frac{f_E + f_D + b s_1^H L^H}{s_1^H L^H} \\ z_2^H &= \frac{f_E + f_D + b\left(s_1^H + s_2^H\right) L^H + \tau b s_1^F L^F}{\left(s_1^H + s_2^H\right) L^H + \tau s_1^F L^F} \\ z_1^F &= \frac{f_E + f_D + b s_1^H L^H + \tau b s_1^F L^F}{\tau s_1^H L^H + s_1^F L^F} \\ z_2^F &= \frac{f_E + 2f_D + b\left(s_1^H + s_2^H\right) L^H + b\left(s_1^F + s_2^F\right) L^F}{\tau\left(s_1^H + s_2^H\right) L^H + \left(s_1^F + s_2^F\right) L^F}. \end{aligned}$$

Assumption 2 implies that parameters are restricted such that $z_1^H \geq \tau z_1^F \geq \tau^2 z_2^H \geq \tau^3 z_2^F$ holds. Note that $z_2^F > b$ implies that $\left(f_E + 2f_D\right) / \left(s_1^H + s_2^H\right) L^H > (\tau - 1) b$, and $\partial z_2^F / \partial s_2^F < 0$, which is consistent with Proposition 1.

Number of Producers

The number of multinational producers who supply all groups above $\overline{y}$ in both regions with headquarters in Home is determined by

$$\begin{aligned} M^H &= \frac{\left(\theta_2^F - \overline{y}\right)\left[\tau\left(s_1^H + s_2^H\right) L^H + \left(s_1^F + s_2^F\right) L^F\right]\left[f_E + f_D + b\left(s_1^F + s_2^F\right) L^F\right]}{\left[f_E + 2f_D + b\left(s_1^H + s_2^H\right) L^H + b\left(s_1^F + s_2^F\right) L^F\right] f_E} \\ &- \frac{\sum_{k=1}^{2}\left(\theta_k^F - \overline{y}\right) s_k^F L^F}{f_E}. \end{aligned}$$

It can be shown that M^H is increasing in θ_2^F if and only if $\left[f_E + f_D + b\left(s_1^F + s_2^F\right) L^F\right] / z_2^F s_2^F L^F > 1$, and increasing in s_2^F if the following sufficient (but not necessary) condition holds

$$\varepsilon_{zs}\left[\frac{f_E + f_D + b\left(s_1^F + s_2^F\right) L^F}{z_2^F s_2^F L^F}\right] > \frac{\left(z_2^F - b\right)}{z_2^F}$$

where we assume that the price elasticity with respect to population size $\varepsilon_{zs} \equiv -\left(\partial z_2^F / z_2^F\right) / \left(\partial s_2^F / s_2^F\right)$ is larger than one. Similarly, the number of producers engaged in FDI with headquarters in Foreign is given by

$$\begin{aligned} M^F &= \frac{\sum_{k=1}^{2}\left(\theta_k^F - \overline{y}\right) s_k^F L^F}{f_E} \\ &- \frac{\left(\theta_2^F - \overline{y}\right)\left[\tau\left(s_1^H + s_2^H\right) L^H + \left(s_1^F + s_2^F\right) L^F\right]\left[f_D + b\left(s_1^F + s_2^F\right) L^F\right]}{\left[f_E + 2f_D + b\left(s_1^H + s_2^H\right) L^H + b\left(s_1^F + s_2^F\right) L^F\right] f_E} \end{aligned}$$

which is decreasing in θ_2^F if and only if $\left[f_D + b\left(s_1^F + s_2^F\right)L^F\right]/z_2^F s_2^F L^F > 1$, and decreasing in s_2^F if the following sufficient (but not necessary) condition holds

$$\varepsilon_{zs}\left[\frac{f_D + b\left(s_1^F + s_2^F\right)L^F}{z_2^F s_2^F L^F}\right] > \frac{\left(z_2^F - b\right)}{z_2^F}$$

with $\varepsilon_{zs} > 1$. The total number of producers engaged in FDI across both regions is determined by

$$\sum_i M^i = \frac{\left(\theta_2^F - \overline{y}\right)}{z_2^F} = \frac{\left(\theta_2^F - \overline{y}\right)\left[\tau\left(s_1^H + s_2^H\right)L^H + \left(s_1^F + s_2^F\right)L^F\right]}{f_E + 2f_D + b\left(s_1^H + s_2^H\right)L^H + b\left(s_1^F + s_2^F\right)L^F}$$

which is increasing in θ_2^F, and increasing in s_2^F if and only if $\partial z_2^F/\partial s_2^F < 0$, and vice versa. Note that the following parameter restrictions apply in an equilibrium where $M^i > 0$ for all i

$$\frac{f_E + f_D + b\left(s_1^F + s_2^F\right)L^F}{z_2^F s_2^F L^F} > \frac{\left(\theta_1^F - \overline{y}\right)s_1^F L^F + \left(\theta_2^F - \overline{y}\right)s_2^F L^F}{\left(\theta_2^F - \overline{y}\right)s_2^F L^F} > \frac{f_D + b\left(s_1^F + s_2^F\right)L^F}{z_2^F s_2^F L^F} > 1$$

where the last inequality holds since repatriated profits of MNCs with headquarters in Home from foreign affiliate sales $\left[\left(z_2^F - b\right)\left(s_1^F + s_2^F\right)L^F - f_D\right]$ are positive (this can also be seen from the resource constraint of Home). The number of exporters that supply the middle and rich classes in Home and only the rich class in Foreign is given by

$$N_{X,2}^H = \frac{\left[\left(\theta_2^H - \overline{y}\right) - \tau\left(\theta_2^F - \overline{y}\right)\right]\left[\left(s_1^H + s_2^H\right)L^H + \tau s_1^F L^F\right]}{f_E + f_D + b\left(s_1^H + s_2^H\right)L^H + \tau b s_1^F L^F}$$

which is decreasing in θ_2^F, and independent of s_2^F. Next, the number of exporters which sells only to the rich class in both regions is given by

$$N_{X,1}^H = \frac{\left\{\left[\left(\theta_1^F - \overline{y}\right) - \tau\left(\theta_2^H - \overline{y}\right)\right] + \left(\tau^2 - 1\right)\left(\theta_2^F - \overline{y}\right)\right\}\left(\tau s_1^H L^H + s_1^F L^F\right)}{f_E + f_D + b s_1^H L^H + \tau b s_1^F L^F}$$

which is increasing in θ_2^F, and independent of s_2^F. Last, the number of those non-exporters that serve only the rich class in Home is determined by

$$N_1^H = \frac{\left\{\left[\left(\theta_1^H - \overline{y}\right) - \tau\left(\theta_1^F - \overline{y}\right)\right] + \left(\tau^2 - 1\right)\left[\left(\theta_2^H - \overline{y}\right) - \tau\left(\theta_2^F - \overline{y}\right)\right]\right\}s_1^H L^H}{f_E + f_D + b s_1^H L^H}$$

which is decreasing in θ_2^F, and again independent of s_2^F. Due to Assumption 2 the following holds: $N_{X,2}^H > 0$, $N_{X,1}^H > 0$, and $N_1^H > 0$. Note that substituting the solutions into Foreign's balance of payments shows that the trade deficit in the amount of $-\left(\theta_1^F - \theta_2^F\right)s_1^F L^F < 0$ is equalized by a surplus in net factor payments $\left(\theta_1^F - \theta_2^F\right)s_1^F L^F > 0$.

A.2 Extension: Technological Differences

This section provides the formal appendix to the extension of differences in technologies across regions. We keep all our assumptions except that producers in Foreign cannot engage in FDI. We look at an equilibrium where all producers who sell to the middle and rich classes in both regions locate in both regions whereas all producers who exclude at least the middle class in Foreign locate in Home. Even though there is a homogeneous goods sector which demands labor, for full employment in Foreign there must be some producers of differentiated products located in Foreign if Assumption 2 holds.

Zero-profit Conditions

Only the profits of a producer who sells to the middle and rich classes in both regions and decides to locate in Foreign change. This producer has now only the option to export. In that case, she makes profits equal to

$$\pi_X^F = \left(z_2^F - bw^F\right)\left(s_1^F + s_2^F\right)L^F + \left(\tau z_2^F - \tau bw^F\right)\left(s_1^H + s_2^H\right)L^H - w^F\left(f_E + f_D\right).$$

In an equilibrium where this type of producer is active in both regions we must have $\pi_M^H = \pi_X^F$, which implies that relative wage rates w^H/w^F are determined by

$$\omega \equiv \frac{w^H}{w^F} = \frac{f_E + \tau b\left(s_1^H + s_2^H\right)L^H}{f_E + f_D + b\left(s_1^H + s_2^H\right)L^H}.$$

If relative wages fall short of the equilibrium wage rate ω we have $\pi_M^H > \pi_{X,2}^F$, and vice versa. Note that ω is larger than one if and only if $(\tau - 1)b > f_D/\left(s_1^H + s_2^H\right)L^H$, and is independent of s_2^F. Producers who choose to supply the middle and rich classes in Home but only the rich class in Foreign locate in Home if and only if $\phi_1 > \omega$, and vice versa. Similarly, all producers who decide to serve the rich class in Home and Foreign locate in Home if and only if $\phi_2 > \omega$, and vice versa. Finally, all producers who sell only to the rich class in Home locate in Home if and only if $\phi_3 > \omega$, and vice versa. Note that the ϕ's are defined as follows

$$\phi_1 \equiv \frac{f_E + f_D + \tau b\left(s_1^H + s_2^H\right)L^H + bs_1^F L^F}{f_E + f_D + b\left(s_1^H + s_2^H\right)L^H + \tau bs_1^F L^F}, \quad \phi_2 \equiv \frac{f_E + f_D + \tau bs_1^H L^H + bs_1^F L^F}{f_E + f_D + bs_1^H L^H + \tau bs_1^F L^F},$$
$$\phi_3 \equiv \frac{f_E + f_D + \tau bs_1^H L^H}{f_E + f_D + bs_1^H L^H}$$

where ϕ_1 is greater than one if and only if $\left(s_1^H + s_2^H\right)L^H > s_1^F L^F$, ϕ^2 is larger than one if and only if $s_1^H L^H > s_1^F L^F$, and ϕ_3 exceeds one if and only if $\tau > 1$. Note that Assumption 3 ensures that $\phi_1 > 1$ and $\phi_2 > 1$. One can show that $\phi_3 > \phi_2$ since $f_E + f_D + (\tau - 1)bs_1^H L^H > 0$, and $\phi_1 > \phi_2$ since $f_E + f_D + (\tau - 1)bs_1^F L^F > 0$. Hence, we assume that $\phi_2 > \omega$ holds, from which then follows that $\phi_1 > \omega$ and $\phi_3 > \omega$. No producer located in Home has an incentive to

deviate from its chosen mode of serving the foreign market if and only if

$$\frac{f_D}{s_1^F L^F} > (\tau\omega - 1)b > \frac{f_D}{\left(s_1^F + s_2^F\right) L^F}.$$

Due to our assumption producers located in Foreign have no choice but to export. Note that if producers located in the Foreign could in principle engage in FDI, they won't do so if and only if

$$\frac{f_D}{s_1^H L^H} > \frac{f_D}{\left(s_1^H + s_2^H\right) L^H} > \left(\tau\frac{1}{\omega} - 1\right) b$$

which follows from comparing profits of Foreign producers from engaging in FDI with profits from exporting.

Resource and Budget Constraints

We have to modify the resource constraints as follows. The resource constraint in Home is now given by

$$\begin{aligned}
\left(\theta_1^H s_1^H + \theta_2^H s_2^H + \theta_3^H s_3^H\right) L^H &= \left[\overline{x}\left(s_1^H + s_2^H\right) L^H + x_3^H s_3^H L^H\right] a \\
&+ M^H\left[f_E + f_D + b\left(s_1^H + s_2^H\right) L^H\right] \\
&+ N_{X,2}^H\left[f_E + f_D + b\left(s_1^H + s_2^H\right) L^H + \tau b s_1^F L^F\right] \\
&+ N_{X,1}^H\left[f_E + f_D + b s_1^H L^H + \tau b s_1^F L^F\right] \\
&+ N_1^H\left[f_E + f_D + b s_1^H L^H\right].
\end{aligned}$$

Similarly, the resource constraint in Foreign is now determined by

$$\begin{aligned}
\left(\theta_1^F s_1^F + \theta_2^F s_2^F + \theta_3^F s_3^F\right) L^F &= \left[\overline{x}\left(s_1^F + s_2^F\right) L^F + x_3^F s_3^F L^F\right] a \\
&+ N_X^F\left[f_E + f_D + b\left(s_1^F + s_2^F\right) L^F + \tau b\left(s_1^H + s_2^H\right) L^H\right] \\
&+ M^H\left[f_D + b\left(s_1^F + s_2^F\right) L^F\right].
\end{aligned}$$

Note that the budget constraints do not change, except that $w^H = w^F$ no longer holds.

Prices

The price of food now differs across regions, and is given by

$$p_x^i = w^i a.$$

The willingness to pay of consumers is determined by

$$\begin{aligned}
z_1^H &= \frac{w^H\left[f_E+f_D+bs_1^HL^H\right]}{s_1^HL^H}\\
z_2^H &= \frac{w^H\left[f_E+f_D+b\left(s_1^H+s_2^H\right)L^H+\tau bs_1^FL^F\right]}{\left(s_1^H+s_2^H\right)L^H+\tau s_1^FL^F}\\
z_1^F &= \frac{w^H\left[f_E+f_D+bs_1^HL^H+\tau bs_1^FL^F\right]}{\tau s_1^HL^H+s_1^FL^F}\\
z_2^F &= \frac{w^F\left[f_E+f_D+\tau b\left(s_1^H+s_2^H\right)L^H+b\left(s_1^F+s_2^F\right)L^F\right]}{\tau\left(s_1^H+s_2^H\right)L^H+\left(s_1^F+s_2^F\right)L^F}.
\end{aligned}$$

Let us choose labor in Foreign as the numeraire, and set $w^F=1$. Again, Assumption 2 implies that parameters are restricted so that $z_1^H\geq\tau z_1^F\geq\tau^2z_2^H\geq\tau^3z_2^F$ holds. Notice that $z_2^F>b$ holds since $(f_E+f_D)>0$, and that $\partial z_2^F/\partial s_2^F<0$.

Number of Producers

The number of producers that supply the middle class and the rich in Home and Foreign is determined by

$$M^H = \frac{\left(\theta_2^F-\overline{y}\right)\left[f_E+f_D+\tau b\left(s_1^H+s_2^H\right)L^H+b\left(s_1^F+s_2^F\right)L^F\right]}{z_2^F\left[f_E+\tau b\left(s_1^H+s_2^H\right)L^H\right]}-\frac{\sum_{k=1}^2\left(\theta_k^F-\overline{y}\right)s_k^FL^F}{f_E+\tau b\left(s_1^H+s_2^H\right)L^H}$$

which is increasing in θ_2^F if and only if $\left[f_E+f_D+b\left(s_1^F+s_2^F\right)L^F+\tau b\left(s_1^H+s_2^H\right)L^H\right]/z_2^Fs_2^FL^F$ exceeds 1, and increasing in s_2^F if the following sufficient (but not necessary) condition holds

$$\varepsilon_{zs}\left[\frac{f_E+f_D+\tau b\left(s_1^H+s_2^H\right)L^H+b\left(s_1^F+s_2^F\right)L^F}{z_2^Fs_2^FL^F}\right]>\frac{\left(z_2^F-b\right)}{z_2^F}$$

where we again assume $\varepsilon_{zs}\equiv-\left(\partial z_2^F/z_2^F\right)/\left(\partial s_2^F/s_2^F\right)$ to be greater than one. The number of producers located in the Foreign that sells to all consumers above the income threshold is given by

$$N_X^F=\frac{\sum_{k=1}^2\left(\theta_k^F-\overline{y}\right)s_k^FL^F}{f_E+\tau b\left(s_1^H+s_2^H\right)L^H}-\frac{\left(\theta_2^F-\overline{y}\right)\left[f_D+b\left(s_1^F+s_2^F\right)L^F\right]}{z_2^F\left[f_E+\tau b\left(s_1^H+s_2^H\right)L^H\right]}$$

which is decreasing in θ_2^F if and only if $1>\left[f_D+b\left(s_1^F+s_2^F\right)L^F\right]/z_2^Fs_2^FL^F$, and decreasing in s_2^F if the following sufficient (but not necessary) condition holds

$$\varepsilon_{zs}\left[\frac{f_D+b\left(s_1^F+s_2^F\right)L^F}{z_2^Fs_2^FL^F}\right]>\frac{\left(z_2^F-b\right)}{z_2^F}$$

where $\varepsilon_{zs} > 1$. The total number of producers that serves the middle class and the rich in both regions can be written as

$$M^H + N_X^F = \frac{\left(\theta_2^F - \overline{y}\right)}{z_2^F} = \frac{\left(\theta_2^F - \overline{y}\right)\left[\tau\left(s_1^H + s_2^H\right)L^H + \left(s_1^F + s_2^F\right)L^F\right]}{f_E + f_D + \tau b\left(s_1^H + s_2^H\right)L^H + b\left(s_1^F + s_2^F\right)L^F}$$

which is increasing in θ_2^F and s_2^F. In an equilibrium, where $M^H > 0$ and $N_X^F > 0$ the following condition must hold

$$\begin{aligned} & \frac{f_E + f_D + b\left(s_1^F + s_2^F\right)L^F + \tau b\left(s_1^H + s_2^H\right)L^H}{z_2^F s_2^F L^F} > \frac{\left(\theta_1^F - \overline{y}\right)s_1^F L^F + \left(\theta_2^F - \overline{y}\right)s_2^F L^F}{\left(\theta_2^F - \overline{y}\right)s_2^F L^F} \\ > & \frac{f_D + b\left(s_1^F + s_2^F\right)L^F}{z_2^F s_2^F L^F} > 1 \end{aligned}$$

where the last inequality holds since repatriated profits from MNCs with HQ in Home are positive. The number of producers who serve the middle and rich classes in Home and the rich class in Foreign is determined by

$$N_{X,2}^H = \frac{\left[\left(\theta_2^H - \overline{y}\right)w^H - \tau\left(\theta_2^F - \overline{y}\right)\right]\left[\left(s_1^H + s_2^H\right)L^H + \tau s_1^F L^F\right]}{w^H\left[f_E + f_D + b\left(s_1^H + s_2^H\right)L^H + \tau b s_1^F L^F\right]}$$

where w^H is determined above and $\overline{y} = a\overline{x}$. We see that $N_{X,2}^H$ is decreasing in θ_2^F, and independent of s_2^F since w^H/w^F is independent of s_2^F. Similarly, the number of producers that supplies only the rich class in both regions is given by

$$N_{X,1}^H = \frac{\left\{\left[\left(\theta_1^F - \overline{y}\right) - \tau\left(\theta_2^H - \overline{y}\right)w^H\right] + \left(\tau^2 - 1\right)\left(\theta_2^F - \overline{y}\right)\right\}\left(\tau s_1^H L^H + s_1^F L^F\right)}{w^H\left[f_E + f_D + b s_1^H L^H + \tau b s_1^F L^F\right]}.$$

We see that $N_{X,1}^H$ rises in θ_2^F, and does not depend on s_2^F. Eventually, the number of producers that only sells to the rich class in Home is given by

$$N_1^H = \frac{\left\{\left[\left(\theta_1^H - \overline{y}\right)w^H - \tau\left(\theta_1^F - \overline{y}\right)\right] + \left(\tau^2 - 1\right)\left[\left(\theta_2^H - \overline{y}\right)w^H - \tau\left(\theta_2^F - \overline{y}\right)\right]\right\}s_1^H L^H}{w^H\left[f_E + f_D + b s_1^H L^H\right]}$$

which is decreasing in θ_2^F, and also independent of s_2^F. Assumption 2 guarantees that all measures of producers are positive. Last, the balance of payments for Foreign is now given by

$$\begin{aligned} & - \left(N_{X,2}^H \tau z_2^H + N_{X,1}^H z_1^F\right)s_1^F L^F + N_X^H \tau z_2^F\left(s_1^H + s_2^H\right)L^H \\ & - \left[\left(z_2^F - b\right)\left(s_1^F + s_2^F\right)L^F - f_D\right]M^H \\ & = 0 \end{aligned}$$

where the first line denotes the trade balance, which now includes exports of the Foreign to the Home, and the second line net factor payments.

A.3 Extension: Homothetic Preferences

This section follows partly Brainard (1997) and Antras and Nunn (2009) in describing the baseline model with homothetic preferences. Consumer preferences are given by

$$U = x^{\beta} C^{1-\beta}$$

where $C = \left(\int_{\mathcal{J}} c(j)^{\frac{\sigma-1}{\sigma}} dj \right)^{\frac{\sigma}{\sigma-1}}$, where $\sigma > 1$, denotes the subutility which aggregates differentiated products into a composite good C. Cobb-Douglas preferences between food x and the composite good C imply that consumers spend a constant share β of their income y on food, and the rest on differentiated products (note that these preferences allow for two-stage budgeting). Demand for differentiated product j can then be derived as follows. Consumers maximize subutility C subject to their budget constraint. The first-order conditions are determined by

$$\begin{aligned} \left(\int_{\mathcal{J}} c(j)^{\frac{\sigma-1}{\sigma}} dj \right)^{\frac{\sigma}{\sigma-1}-1} c(j)^{\frac{\sigma-1}{\sigma}-1} - \lambda p(j) &= 0 \\ (1-\beta)y - \int_{\mathcal{J}} p(j)c(j)dj &= 0. \end{aligned}$$

It is straightforward to show that if $c(j) \to 0$, marginal utility $\partial U / \partial c(j) \to \infty$. Hence, consumers will always purchase all differentiated products available on the market. We stick to our assumptions about the distribution of endowments except that we will now assume aggregate incomes to be the same across regions, i.e. $Y^i = Y$ for all $i, l = \{H, F\}$. The Marshallian demand function of a consumer belonging to group k who resides in region i for product j is given by

$$c_{ik}(j) = A_k^i p(j)^{-\sigma}$$

where $A_k^i \equiv (1-\beta) y_k^i / \left(\int_{\mathcal{J}} p(j)^{-(\sigma-1)} dj \right)$ is residual demand (which producers take as given). Note that $y_k^i = \theta_k^i w_k^i + v_k^i$, with $v_k^i = 0$ for all k in equilibrium. From the Marshallian demand curve it becomes evident that the distribution of income within region i does not matter for aggregate demand of good j, only aggregate income Y^i matters. To see this, sum individual demand $c_{ik}(j)$ over all groups k in region i, which yields

$$C_i(j) \equiv \sum_k s_k^i L^i c_{ik} = p(j)^{-\sigma} A^i = \frac{p(j)^{-\sigma}(1-\beta) Y^i}{\int_{\mathcal{J}} p(j)^{-(\sigma-1)} dj}$$

where $Y^i \equiv \sum_k s_k^i L^i y_k^i$ denotes aggregate income in region i, and $A^i \equiv \sum_k s_k^i L^i A_k^i$ aggregate residual demand. This is a property of homothetic preferences. The price elasticity of aggregate demand is given by $\sigma > 1$. The better substitutes products j and j' are for each other, i.e. $\sigma \to \infty$, the more strongly relative demand reacts to changes in relative prices. We also keep the assumptions about technology from the baseline model, and now turn to the profit maximization problem of a producer located in region i. She sells her product to all groups in

both regions. If she decides to export, she makes profits equal to

$$\pi_X^i(j) = \left[p_{ii}(j) - bw^i\right] C_{ii}(j) + \left[p_{il}(j) - \tau bw^i\right] C_{il}(j) - w^i \left(f_E + f_D\right).$$

The first-order conditions imply that all differentiated products $j \in \mathcal{J}$ made region i are sold at prices $p_{ii} = \left(\frac{\sigma}{\sigma-1}\right) w^i b$ on the domestic market, and at prices $p_{il} = \left(\frac{\sigma}{\sigma-1}\right) \tau bw^i$ on the foreign market. Optimal profits can be written as follows

$$\pi_X^i = B^i + \tau^{-(\sigma-1)} B^l - w^i \left(f_E + f_D\right)$$

where $B^i \equiv (\sigma-1)^{\sigma-1}\sigma^{-\sigma}\left(bw^i\right)^{-(\sigma-1)} A^i$ for $i, l = \{H, F\}$. If producer j chooses to set up a foreign production facility instead, she earns profits given by

$$\pi_M^i(j) = \left[p_{ii}(j) - bw^i\right] C_{ii}(j) + \left[p_{ll}(j) - bw^l\right] C_{ll}(j) - \left[w^i \left(f_E + f_D\right) + w^l f_D\right].$$

The producer's optimality conditions imply that all products j manufactured in region i are sold at prices $p_{ii} = \left(\frac{\sigma}{\sigma-1}\right) w^i b$ in the domestic market. Optimal profits are then determined by

$$\pi_M^i = B^i + B^l - \left[w^i \left(f_E + f_D\right) + w^l f_D\right].$$

In a (symmetric) equilibrium with free entry all producers must earn zero profits, i.e. $\pi_M^H = \pi_M^F = 0$. This implies that relative wages equalize so that $w^H = w^F = 1$ if we choose labor in Home as the numeraire. In both cases, if we impose symmetry, i.e. $B^H = B^F = B$. In a symmetric equilibrium where all producers export, aggregate demand is equal to $B = \left(f_E + f_D\right) / \left(1 + \tau^{-(\sigma-1)}\right)$, whereas in a symmetric equilibrium where all producers engage in FDI, the aggregate demand level is determined by $\left(f_E + f_D\right)/2$. From the budget constraint of consumers, the Marshallian demand functions, and the aggregate demand level B, follows the number of producers in region i. In an equilibrium with pervasive exporting in each region, the number of exporters is determined by

$$N^i = \frac{(1/\sigma)(1-\beta)Y}{f_E + f_D}.$$

In an equilibrium with pervasive FDI, the number of multinationals is given by

$$M^i = \frac{(1/\sigma)(1-\beta)Y}{f_E + 2f_D}.$$

It becomes apparent here that the distribution within regions has no effect on the number of producers that export or are engaged in FDI. This is intuitive since with homothetic preferences the distribution within regions has no effect on aggregate demand. The equilibrium with pervasive exporting is an equilibrium if and only if no producer has an incentive to deviate and serve the foreign market by engaging in FDI. Thus, profits from setting up a foreign

production plant, $2B - (f_E + 2f_D)$, must be negative. This implies that if and only if the following condition holds, no producer has an incentive to deviate

$$\frac{f_D}{f_E + f_D} > \frac{1 - \tau^{-(\sigma-1)}}{1 + \tau^{-(\sigma-1)}}.$$

This condition is the equivalent to condition (8) in the baseline model. We observe that market size, i.e. aggregate demand (number of people times per capita consumption), is absent in the condition above. The intuition is that higher aggregate demand induces more entry to the point where the demand level of an individual producer becomes independent of market size (see Antras and Nunn, 2009). In other words, a larger market has two opposing effects. On the one hand, it increases market size, which means higher profits for producers. On the other hand, a larger market implies fiercer competition and therefore lower profits. With CES preferences these two effects exactly offset each other in equilibrium (constant markups). Similarly, the equilibrium with pervasive FDI is an equilibrium if and only if no producer has an incentive to supply the foreign market through exports rather than engaging in FDI. It is straightforward to show that this is the case if the inequality above is reversed. However, this implies that a mixed equilibrium where some producers export and others engage in FDI only emerges if the condition above holds with equality. In sum, a mixed equilibrium occurs only in a knife-edge case where the number of exporters and multinationals is indeterminate (i.e. the parameter space for which this equilibrium exists has measure zero).

A.4 Extension: Skill versus Income Distribution

This section presents the formal model discussing the effects of skill versus income distribution. We will focus on a mixed equilibrium where both multinationals and exporters are active. It follows in part the factor endowment models of Markusen and Venables (2000), and Egger and Pfaffermayr (2005). We assume that the distribution of efficiency units of labor θ_k^i maps into a distribution of skills. In particular, we now assume θ_k^i to reflect the skills of group $k = \{1, 2, 3\}$ and region $i, l = \{H, F\}$. Suppose that in both regions group 1 supplies high-skilled, group 2 medium-skilled, and group 3 low-skilled labor.

We keep the assumption about homothetic consumer preferences. Thus, aggregate demand for food in region i is given by $X^i = \beta Y^i / p_x^i$, where $Y^i = \sum_k s_k^i L^i \theta_k^i w_k^i$ in equilibrium. Aggregate demand for any differentiated product j produced and sold in region i is given by $C_{ii} = (1-\beta) Y^i p_{ii}^{-\sigma} / P^i$, and by $C_{il}/\tau = (1-\beta) Y^l \left(\tau p_{ll}\right)^{-\sigma} / P^l$ if the product is sold in region, with $P^i = \left(M_i + N_i + M_l\right) p_{ii}^{-(\sigma-1)} + N_l \left(\tau p_{ll}\right)^{-(\sigma-1)}$.

However, on the production side we make the assumption that producers combine different skills to produce using the same technology across regions. The differentiated product sector is more skill-intensive combining medium and high-skilled labor than the food sector, which uses only low-skilled labor. For simplicity, we assume that the food sector uses a units of low-skilled labor to produce 1 unit of output. Food is not traded and produced under conditions of perfect competition, which implies that its price is equal to marginal costs, $p_x^i = a w_3^i$. In the

differentiated sector, producers use f_E units of high-skilled labor to create a new product, and use f_D, and b units of medium-skilled labor to set up a new production facility, and produce 1 unit of output, respectively. We assume that multinational producers employ high-skilled labor in their region of origin, and medium-skilled labor in the region of production. They operate under conditions of monopolistic competition. Optimal monopoly prices for all products made and sold in region i are given by $p_{ii} = \left(\frac{\sigma}{\sigma-1}\right) bw_2^i$, and $p_{il} = \left(\frac{\sigma}{\sigma-1}\right) \tau bw_2^i$ for exported products. Optimal profits of multinational, and exporters, respectively, in region i are determined by

$$\begin{aligned}
\pi_M^i &= (\sigma-1)^{-1}\left(bw_2^i\right) C_{ii} + (\sigma-1)^{-1}\left(bw_2^l\right) C_{ll} - w_1^i f_E - w_2^i f_D - w_2^l f_D \\
\pi_X^i &= (\sigma-1)^{-1}\left(bw_2^i\right) C_{ii} + (\sigma-1)^{-1}\left(\tau bw_2^i\right) C_{il} - w_1^i f_E - w_2^i f_D
\end{aligned}$$

which must both be equal to zero in a free entry equilibrium where multinationals and exporters co-exist. Consider for the moment a symmetric (mixed) equilibrium. Free entry and zero-profits in equilibrium, i.e. $\pi_X^i = \pi_M^i = 0$, imply

$$\frac{1-\tau^{-(\sigma-1)}}{1+\tau^{-(\sigma-1)}} = \frac{w_2 f_D}{w_1 f_E + w_2 f_D}$$

where the right-hand side is decreasing in w_1/w_2. Only multinationals are active in equilibrium if and only if the left-hand side above exceeds the right-hand side, and vica versa. Thus, if the relative wage rate w_1/w_2 is low, exporting is more attractive than engaging in FDI, ceteris paribus. Notice that if the same type of labor is used to create new products and set up new factories, i.e. if $w_1/w_2 = 1$, this condition reduces to the knife-edge condition of the previous section. However, in this model the parameter space for which a mixed equilibrium exists has non-zero measure. Finally, labor market clearing in region i demands that

$$\begin{aligned}
s_1^i L^i \theta_1^i &= \left(M^i + N^i\right) f_E \\
s_2^i L^i \theta_2^i &= M^i\left(f_D + C_{ii} b\right) + N^i\left(f_D + C_{ii} b + C_{il} b\right) + M^l\left(f_D + C_{ii} b\right) \\
s_3^i L^i \theta_3^i &= X^i a
\end{aligned}$$

holds. Note that the balance of payments is implied by the zero-profit conditions, labor market clearing and budget constraints (this is an accounting identity). Due to Walras' law we are free to drop the market clearing condition for food in Foreign, and set its price equal to one, i.e. $p_x^F = 1$. Hence, we have 23 (non-linear) equations in 23 unknowns (C_{ii}, C_{il}), Y^i, (p_{ii}, p_{ll}), p_x^i, P^i, $\left(w_1^i, w_2^i, w_3^i\right)$, $\left(M^i, N^i\right)$, X^i for $i, l = \{H, F\}$, and where $p_x^F = 1$. It is not possible to solve this model analytically. Thus, we simulate the model to perform comparative statics by looking at small changes in parameters.

The simulations in Figure 4 below illustrate how a decrease in the average labor endowment θ_2^F of medium-skilled in Foreign affects the number of multinationals relative to exporters in Home if we increase (i) θ_1^F, and (ii) θ_3^F so that the total skill endowment $\sum_k s_k^F L^F \theta_k^F$ is constant. The simulations in Figure 5 show how the number of MNCs with HQ in Home changes when we decrease the population share s_2^F of the middle-skilled in Foreign, and increase (iii) s_1^F and

(iv) s_3^F such that aggregate skill endowment in Foreign is constant. In our simulations we choose parameters such that high/middle/low skills translate into high/middle/low per capita incomes. Figure 4 shows that in case (i) there is a positive link between per capita income of the middle class in Foreign and the number of MNCs with HQ in Home, whereas in case (ii) the link is negative. In Figure 5 we see that a shrinking size of the middle class leads in both case (iii) and (iv) to a decline in the number of MNCs with HQ in Home. The basic intuition is that if the supply of medium-skilled labor is relatively low, the wage rate for medium-skilled labor is high (i.e. w_1/w_2 is low), ceteris paribus. This means that exporting becomes more attractive relative to engaging in FDI, ceteris paribus.

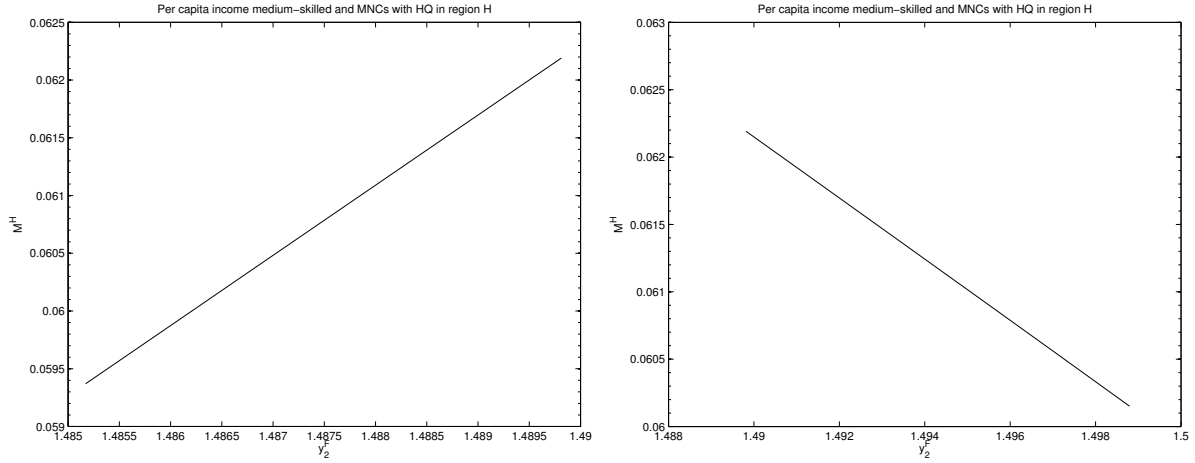

Figure 4: Effect of changes in Foreign's skill distribution on MNCs with HQ in Home: case (i) on left-hand side, case (ii) on right-hand side. Parameter values: $\beta = 0.1$, $\sigma = 2$, $\tau = 1.13$, $a = b = 2$, $f_E = 2.5$, $f_D = 0.33$, $s_1^i = 0.2$, $s_2^i = 0.5$, $s_3^i = 0.3$, $L^i = 1$, and $\theta_k^i = 1$ as starting values, for all i, k.

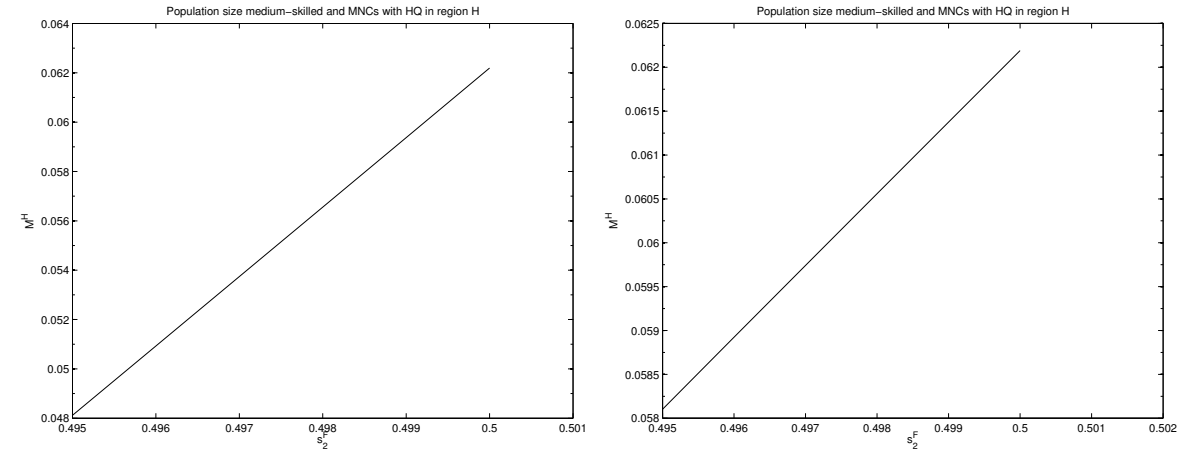

Figure 5: Effect of changes in Foreign's skill distribution on MNCs with HQ in Home: case (iii) on left-hand side, case (iv) on right-hand side. Parameter values: $\beta = 0.1$, $\sigma = 2$, $\tau = 1.13$, $a = b = 2$, $f_E = 2.5$, $f_D = 0.33$, $s_1^i = 0.2$, $s_2^i = 0.5$, and $s_3^i = 0.3$ as starting values, $L^i = 1$, and $\theta_k^i = 1$ for all i, k.

A.5 Empirics

This appendix provides detailed information on the income data used, summary statistics, and some robustness checks.

Income Data

Bernasconi (2013) constructs discrete empirical income distributions for 94 countries for the time period 1997-2007 using income shares of deciles and quintiles from UNU-WIDER (2008) and GDP per capita from Heston, Summers and Aten (2012). See Bernasconi (2013) for a detailed description of how she transforms the inequality data into income distributions. In short, she assigns an average income level to each decile (quintile), and then redistributes the corresponding area uniformly on an income interval. However, she does not make parametric assumptions about the functional form of the income distribution across income intervals. Finally, the resulting densities are divided into common income intervals on USD $1, 5000, \ldots, 145000, 150000$. Note that Bernasconi (2013) assumes that the income shares do not change over time (i.e. the Lorenz curve is constant over time). However, the income distributions change over time as average incomes of deciles (quintiles) change. She selects data on the basis of consistency (e.g. income versus expenditure inequality) and quality in order to increase data consistency (see Bernasconi, 2013). This assumption implies that there is less variation over time but makes the data useful to study cross-section data.

Note that we adjust the empirical income distributions such that the aggregate income computed from the distributions is close to GDP (Y) from Heston, Summers and Aten (2012). We calculate the mean income of bin l as the generalized mean $\widetilde{y}_l = \left(\underline{y}_l^\theta/2 + \overline{y}_l^\theta/2\right)^{1/\theta}$ where $\underline{y}_l$ denotes the lower bound of bin i and $\overline{y}_l$ the upper bound, and θ is a non-zero real number. For each country (and year) we choose θ such that aggregate income, i.e. $\widetilde{Y} = \sum_l \widetilde{y}_l P_l$ where P_l denotes the number of people in bin l, is at most 35 percent above or below Y. We compute $\widetilde{Y}$ by iterating $\theta = 1, 1/2, \ldots, 1/1000$ until our convergence criteria, i.e. $0.65 < \widetilde{Y}/Y < 1.35$, is satisfied. In a less than 2 percent of all cases, a thousand steps are not enough to converge. In these cases the last iteration step is taken. In general, the chosen θ is such that the computed mean incomes deviate more from the simple arithmetic averages in low income bins than in high income bins. This suggests that the discrepancy between $\widetilde{Y}$ and Y is because $\widetilde{Y}$ overestimates the mean incomes in the lower income bins. Note that if $\theta = 1$ the generalized mean collapses to the simple arithmetic mean. However, since we control for GDP from Heston, Summers and Aten (2012) in the regressions this issue is of second order.

Summary Statistics and Robustness

The list of countries can be found in Table 3. Summary statistics about the dependent and independent variables are given in Table 4. As an example, Table 5 shows the mean over 1997-2007 of the log of the market size measure for the income thresholds $\{\underline{y}, \overline{y}\} = \{5000, 20000\}$ for all host countries in the sample. Table 6 and 7 show the estimation of

equation (9) separately for each year 1997-2007, with a lower threshold of USD 5,000. The results for a lower threshold of USD 10,000 are similar.

Table 3: Country list

Parent countries	**Host countries**		
Australia	Argentina	Honduras	Turkey
Austria	Australia	Hungary	Uganda
Benelux	Austria	Indonesia	United Kingdom
Canada	Bangladesh	Iran, Islamic Rep.	United States
Chile	Benelux	Ireland	Venezuela, Bolivar Rep.
Denmark	Benin	Israel	Vietnam
Finland	Bolivia	Italy	Yemen, Rep.
Fmr Czechoslovakia	Brazil	Jamaica	Zambia
France	Bulgaria	Korea, Rep.	
Germany	Cambodia	Mexico	
Greece	Canada	Morocco	
Hungary	Chile	Nepal	
Iceland	Colombia	Netherlands	
Ireland	Costa Rica	Nicaragua	
Israel	Denmark	Norway	
Italy	Dominican Rep.	Pakistan	
Japan	Ecuador	Panama	
Korea, Rep.	Egypt, Arab Rep.	Paraguay	
Netherlands	El Salvador	Peru	
New Zealand	Finland	Philippines	
Norway	Fmr Czechoslovakia	Poland	
Poland	Fmr USSR	Portugal	
Portugal	Fmr Yugoslavia	Romania	
Spain	France	South Africa	
Sweden	Germany	Spain	
Switzerland	Greece	Sri Lanka	
Turkey	Guatemala	Sweden	
United Kingdom	Guyana	Tanzania	
United States	Haiti	Thailand	

Notes: Australia includes external territories, Benelux includes Belgium and Luxembourg, Denmark includes Faroe Islands, France includes Andorra and Monaco, Israel includes West Bank, Italy includes San Marino and Vatical City, New Zealand includes Norfolk, Cocos and Christmas Islands, Switzerland includes Liechtenstein, Indonesia includes Macao, South Africa includes Rep. of South Africa, Botswana, Lesotho, Namibia, and Swaziland.
We drop Mexico as a parent country from the sample since they report only 4 outward FDI positions over 1997-2007.

Table 4: Summary statistics, 1997-2007

	min	p25	p50	mean	p75	max	sd	N
FDI position$_{ijt}$ (m USD, PPP)	0	0	195	5910	2506	4.00e+05	22868	11817
$\log(Y\left[y\|y \leq 5,000\right]_{jt})$	5.637	7.698	8.909	8.924	10.120	12.831	1.667	11817
$\log(P\left[y\|y \leq 5,000\right]_{jt})$	4.726	7.010	8.399	8.443	9.981	11.914	1.885	11817
$\log(Y\left[y\|y \leq 10,000\right]_{jt})$	6.665	9.311	10.218	10.263	11.514	14.003	1.592	11817
$\log(P\left[y\|y \leq 10,000\right]_{jt})$	5.415	7.846	8.926	9.013	10.253	12.405	1.721	11817
$\log(Y\left[y\|10,000 \leq y > 5,000\right]_{jt})$	0.000	8.680	9.869	9.728	11.131	13.800	1.986	11817
$\log(P\left[y\|10,000 \leq y > 5,000\right]_{jt})$	0.000	6.688	7.854	7.755	9.141	11.786	1.864	11817
$\log(Y\left[y\|15,000 \leq y > 5,000\right]_{jt})$	0.000	9.249	10.998	10.558	11.705	14.326	1.952	11817
$\log(P\left[y\|15,000 \leq y > 5,000\right]_{jt})$	0.000	7.032	8.770	8.344	9.437	12.091	1.813	11817
$\log(Y\left[y\|20,000 \leq y > 5,000\right]_{jt})$	0.000	10.087	11.434	11.093	12.414	14.505	1.921	11817
$\log(P\left[y\|20,000 \leq y > 5,000\right]_{jt})$	0.000	7.616	9.015	8.703	9.897	12.185	1.757	11817
$\log(Y\left[y\|25,000 \leq y > 5,000\right]_{jt})$	0.000	10.570	11.620	11.430	12.646	14.652	1.945	11817
$\log(P\left[y\|25,000 \leq y > 5,000\right]_{jt})$	0.000	7.874	9.191	8.919	10.156	12.255	1.746	11817
$\log(Y\left[y\|30,000 \leq y > 5,000\right]_{jt})$	0.000	10.837	11.846	11.652	12.771	14.721	1.984	11817
$\log(P\left[y\|30,000 \leq y > 5,000\right]_{jt})$	0.000	8.118	9.270	9.051	10.259	12.269	1.752	11817
$\log(Y\left[y\|35,000 \leq y > 5,000\right]_{jt})$	0.000	10.942	12.002	11.799	12.956	14.996	2.013	11817
$\log(P\left[y\|35,000 \leq y > 5,000\right]_{jt})$	0.000	8.217	9.330	9.133	10.298	12.284	1.758	11817
$\log(Y\left[y\|15,000 \leq y > 10,000\right]_{jt})$	0.000	8.743	10.099	9.726	11.229	13.643	2.249	11817
$\log(P\left[y\|15,000 \leq y > 10,000\right]_{jt})$	0.000	6.219	7.573	7.283	8.703	11.118	1.935	11817
$\log(Y\left[y\|20,000 \leq y > 10,000\right]_{jt})$	0.000	9.732	10.818	10.518	11.996	13.970	2.315	11817
$\log(P\left[y\|20,000 \leq y > 10,000\right]_{jt})$	0.000	7.025	8.118	7.916	9.341	11.361	1.962	11817
$\log(Y\left[y\|25,000 \leq y > 10,000\right]_{jt})$	0.000	10.325	11.322	10.952	12.243	14.271	2.387	11817
$\log(P\left[y\|25,000 \leq y > 10,000\right]_{jt})$	0.000	7.463	8.494	8.234	9.520	11.513	2.003	11817
$\log(Y\left[y\|30,000 \leq y > 10,000\right]_{jt})$	0.000	10.570	11.568	11.225	12.570	14.670	2.448	11817
$\log(P\left[y\|30,000 \leq y > 10,000\right]_{jt})$	0.000	7.730	8.685	8.419	9.624	11.671	2.038	11817
$\log(Y\left[y\|35,000 \leq y > 10,000\right]_{jt})$	0.000	10.786	11.759	11.402	12.697	14.958	2.487	11817
$\log(P\left[y\|35,000 \leq y > 10,000\right]_{jt})$	0.000	7.855	8.784	8.530	9.783	11.858	2.060	11817
$\log(Y[y\|y > 10,000]_{jt})$	0.000	11.553	12.490	12.077	13.560	16.392	2.668	11817
$\log(P[y\|y > 10,000]_{jt})$	0.000	8.247	9.041	8.831	10.106	12.535	2.124	11817
$\log(Y[y\|y > 15,000]_{jt})$	0.000	11.125	12.336	11.705	13.426	16.371	3.182	11817
$\log(P[y\|y > 15,000]_{jt})$	0.000	7.656	8.809	8.351	9.764	12.455	2.461	11817
$\log(Y[y\|y > 20,000]_{jt})$	0.000	10.845	12.194	11.247	13.288	16.334	3.791	11817
$\log(P[y\|y > 20,000]_{jt})$	0.000	7.207	8.419	7.869	9.614	12.345	2.829	11817
$\log(Y[y\|y > 25,000]_{jt})$	0.000	10.645	12.088	10.913	13.173	16.281	4.092	11817
$\log(P[y\|y > 25,000]_{jt})$	0.000	6.918	8.194	7.501	9.322	12.211	2.969	11817
$\log(Y[y\|y > 30,000]_{jt})$	0.000	10.253	11.909	10.547	12.997	16.213	4.320	11817
$\log(P[y\|y > 30,000]_{jt})$	0.000	6.582	7.912	7.108	9.007	12.061	3.064	11817
$\log(Y[y\|y > 35,000]_{jt})$	0.000	9.718	11.738	9.993	12.912	16.132	4.739	11817
$\log(P[y\|y > 35,000]_{jt})$	0.000	5.834	7.626	6.621	8.722	11.897	3.274	11817
log(GDP pc$_{jt}$)	6.507	8.554	9.162	9.193	10.295	10.855	1.109	11817
log(GDP$_{jt}$)	3.188	7.101	7.796	7.789	8.870	11.785	1.581	11817
log(remoteness$_{jt}$)	8.609	8.665	8.827	8.915	9.128	9.441	0.260	11817
log(urban pop$_{jt}$)	2.493	3.793	4.166	4.002	4.328	4.501	0.467	11817
log(openness$_{jt}$)	2.863	3.934	4.166	4.194	4.477	5.165	0.440	11817
log(tax rate$_{jt}$)	2.795	3.628	3.842	3.827	4.003	4.683	0.321	11817
log(distance$_{jt}$)	5.050	7.538	8.747	8.349	9.155	9.875	1.007	11817
log(squared skill diff$_{jt}$)	-12.296	0.946	2.718	2.085	3.769	5.153	2.280	11817
dummy common language$_{ijt}$	0.000	0.000	0.000	0.162	0.000	1.000	0.369	11817
dummy regional trade agreement$_{ijt}$	0.000	0.000	0.000	0.090	0.000	1.000	0.286	11817
dummy customs union$_{ijt}$	0.000	0.000	0.000	0.219	0.000	1.000	0.414	11817
dummy colonial ties$_{ijt}$	0.000	0.000	0.000	0.029	0.000	1.000	0.168	11817
log(percent no schooling$_{jt}$)	-2.310	0.911	1.851	1.748	2.743	4.392	1.461	11817
log(percent primary schooling$_{jt}$)	0.453	2.382	2.945	2.701	3.234	3.806	0.756	11817
log(percent secondary schooling$_{jt}$)	-0.066	2.643	3.075	2.948	3.481	3.927	0.731	11817
log(percent tertiary schooling$_{jt}$)	-1.390	1.494	2.198	1.949	2.575	3.404	0.983	11817

Table 5: Mean of (log) market size measure by host country for $\{\underline{y}, \overline{y}\} = \{5000, 20000\}$

Country	$\log(Y_{low})$	$\log(P_{low})$	$\log(Y_{middle})$	$\log(P_{middle})$	$\log(Y_{high})$	$\log(P_{high})$
South Africa	7.923	10.386	11.639	9.475	13.123	8.918
Morocco	10.143	9.892	11.253	9.006	11.524	8.194
Egypt, Arab Rep.	11.155	10.904	11.735	9.476	12.515	8.792
Benin	8.492	8.791	8.785	6.810	0.000	0.000
Uganda	9.763	10.113	10.006	7.744	0.000	0.000
Tanzania	10.187	10.486	5.769	4.422	0.000	0.000
Zambia	8.147	9.167	9.263	6.869	5.519	3.631
Canada	8.126	7.210	11.587	8.942	13.819	10.022
United States	10.468	9.551	13.715	11.107	16.212	12.258
Argentina	10.072	9.156	12.324	9.974	12.848	8.878
Bolivia	9.102	8.851	9.337	7.072	9.943	6.473
Brazil	11.123	11.546	13.072	10.848	14.269	10.205
Chile	9.273	8.357	11.322	9.000	12.237	8.043
Colombia	10.405	10.153	11.565	9.314	12.433	8.458
Ecuador	9.383	9.132	10.220	7.940	10.999	7.148
Mexico	11.523	10.606	12.987	10.735	13.676	9.706
Paraguay	8.624	8.373	9.384	7.157	9.748	6.207
Peru	10.064	9.813	11.039	8.812	11.544	7.824
Venezuela, Bolivar Rep.	9.920	9.003	11.714	9.413	12.124	8.285
Costa Rica	8.154	7.238	9.842	7.557	10.322	6.456
El Salvador	8.620	8.369	9.622	7.399	9.965	6.350
Guatemala	9.245	8.994	10.185	7.910	10.855	7.036
Honduras	8.879	8.627	9.081	6.827	9.366	6.034
Nicaragua	8.132	8.431	8.746	6.352	8.063	4.948
Dominical Rep.	9.263	8.347	10.440	8.186	10.783	6.942
Haiti	8.604	8.904	9.161	6.659	5.208	2.917
Jamaica	7.530	7.279	8.988	6.762	9.831	5.879
Guyana	6.229	6.424	7.462	4.976	1.308	0.615
Panama	7.671	7.420	9.183	6.932	9.840	5.955
Israel	7.025	6.109	10.605	8.063	11.689	7.938
Iran, Islamic Rep.	8.098	10.033	12.524	10.286	13.095	9.354
Turkey	10.457	10.443	12.324	10.117	12.774	9.263
Yemen, Rep.	10.145	9.894	0.000	0.000	0.000	0.000
Bangladesh	11.955	11.703	12.261	10.067	0.000	0.000
Cambodia	9.267	9.333	9.630	7.255	8.356	5.427
Sri Lanka	9.128	9.658	10.196	7.848	11.533	7.561
Indonesia	12.135	11.883	13.199	10.912	13.214	9.956
Korea, Rep.	9.254	8.337	12.593	10.029	13.510	9.894
Nepal	9.272	9.986	10.892	8.454	0.000	0.000
Pakistan	11.985	11.734	12.795	10.385	1.531	1.075
Philippines	11.354	11.103	11.712	9.471	12.131	8.701
Thailand	10.706	10.455	12.166	9.893	12.915	9.027
Vietnam	11.504	11.126	11.672	9.358	10.902	7.758
Benelux	6.831	5.916	10.364	7.677	12.769	9.015
Denmark	6.544	5.630	10.010	7.368	11.982	8.163
France	8.775	7.858	12.578	9.895	14.261	10.579
Germany	8.978	8.062	12.612	9.933	14.648	10.975
Greece	7.509	6.593	11.032	8.442	12.227	8.536
Ireland	5.867	4.955	9.331	6.670	11.768	7.968
Italy	8.926	8.010	12.524	9.882	14.214	10.470
Netherlands	7.145	6.229	10.491	7.823	13.156	9.480
Portugal	7.614	6.698	11.229	8.699	11.970	8.197
Spain	8.576	7.660	12.201	9.557	13.786	10.055
United Kingdom	8.809	7.892	12.522	9.852	14.283	10.539
Austria	6.461	5.547	9.802	7.136	12.474	8.797
Finland	6.135	5.222	9.904	7.198	11.822	8.189
Norway	5.722	4.810	8.606	6.036	12.210	8.293
Sweden	6.681	5.767	10.430	7.724	12.402	8.738
Bulgaria	8.703	7.787	10.586	8.384	9.818	6.396
Fmr Czechoslovakia	7.761	6.846	11.866	9.297	11.736	8.195
Hungary	7.503	6.588	11.426	8.907	11.053	7.529
Poland	9.568	8.652	12.564	10.204	12.262	8.632
Romania	9.736	8.820	11.695	9.508	10.702	7.363
Fmr Yugoslavia	8.450	7.534	11.575	9.300	10.544	7.138
Fmr USSR	12.276	11.360	14.230	12.006	13.733	10.207
Australia	7.956	7.040	10.921	8.330	13.477	9.567

Notes: low is $y|y \leq \underline{y}$, middle is $y|\overline{y} \leq y > \underline{y}$, high is $\underline{y}|y > \overline{y}$. Y is in millions, and P in thousands.

Table 6: Outward FDI positions (29 OECD countries 1997-2007, PPML) with lower threshold $\underline{y} = 5000$

		$\log(FDI_{ijt})$	$\log(FDI_{ijt})$	$\log(FDI_{ijt})$	$\log(FDI_{ijt})$	$\log(FDI_{ijt})$	$\log(FDI_{ijt})$
		$\overline{y} = 10,000$	$\overline{y} = 15,000$	$\overline{y} = 20,000$	$\overline{y} = 25,000$	$\overline{y} = 30,000$	$\overline{y} = 35,000$
1997	$\log(Y_{middle,jt})$	1.658	0.806	2.146	2.987**	2.846***	2.128**
		(1.517)	(1.337)	(1.347)	(1.296)	(1.053)	(0.936)
	$\log(P_{middle,jt})$	-2.270	-1.375	-2.956*	-3.874**	-3.722***	-2.863**
		(1.832)	(1.658)	(1.681)	(1.583)	(1.303)	(1.173)
1998	$\log(Y_{middle,jt})$	1.644	1.396	2.626*	3.568***	3.059***	1.968*
		(1.632)	(1.415)	(1.373)	(1.321)	(1.119)	(1.008)
	$\log(P_{middle,jt})$	-2.229	-2.071	-3.515**	-4.543***	-3.944***	-2.652**
		(1.975)	(1.765)	(1.709)	(1.587)	(1.374)	(1.270)
1999	$\log(Y_{middle,jt})$	2.428	1.862	2.904**	3.586***	3.271***	2.290**
		(1.730)	(1.535)	(1.333)	(1.229)	(1.142)	(1.041)
	$\log(P_{middle,jt})$	-3.182	-2.675	-3.894**	-4.629***	-4.203***	-3.057**
		(2.080)	(1.883)	(1.648)	(1.503)	(1.373)	(1.281)
2000	$\log(Y_{middle,jt})$	2.914*	2.403*	3.173***	3.643***	3.615***	2.571**
		(1.623)	(1.457)	(1.216)	(1.144)	(1.206)	(1.003)
	$\log(P_{middle,jt})$	-3.674*	-3.254*	-4.155***	-4.637***	-4.470***	-3.298***
		(1.927)	(1.758)	(1.485)	(1.400)	(1.354)	(1.213)
2001	$\log(Y_{middle,jt})$	6.640***	5.535***	5.473***	6.480***	7.183***	4.864***
		(1.665)	(1.303)	(0.995)	(1.817)	(1.592)	(1.802)
	$\log(P_{middle,jt})$	-8.093***	-7.079***	-6.888***	-7.644***	-7.496***	-5.492***
		(2.022)	(1.606)	(1.232)	(1.784)	(1.357)	(1.448)
2002	$\log(Y_{middle,jt})$	3.495*	2.999*	3.640***	3.738***	3.569***	2.659***
		(1.855)	(1.696)	(1.246)	(1.024)	(1.056)	(0.966)
	$\log(P_{middle,jt})$	-4.320**	-3.925*	-4.639***	-4.664***	-4.341***	-3.340***
		(2.195)	(2.027)	(1.498)	(1.237)	(1.200)	(1.148)
2003	$\log(Y_{middle,jt})$	3.037**	2.078	3.122***	3.660***	3.589***	2.790***
		(1.320)	(1.336)	(1.116)	(1.003)	(1.159)	(0.974)
	$\log(P_{middle,jt})$	-3.627**	-2.711*	-3.884***	-4.384***	-4.194***	-3.351***
		(1.546)	(1.558)	(1.322)	(1.182)	(1.261)	(1.140)
2004	$\log(Y_{middle,jt})$	3.084*	2.401	3.466***	3.605***	3.523***	2.703***
		(1.601)	(1.510)	(1.290)	(1.059)	(1.083)	(1.013)
	$\log(P_{middle,jt})$	-3.702*	-3.128*	-4.374***	-4.452***	-4.208***	-3.323***
		(1.905)	(1.814)	(1.571)	(1.302)	(1.259)	(1.222)
2005	$\log(Y_{middle,jt})$	2.541**	1.659	2.854***	2.984***	3.750**	2.540**
		(1.182)	(1.204)	(1.096)	(0.934)	(1.858)	(1.061)
	$\log(P_{middle,jt})$	-2.975**	-2.167	-3.555***	-3.609***	-4.047**	-2.913**
		(1.405)	(1.446)	(1.345)	(1.157)	(1.654)	(1.158)
2006	$\log(Y_{middle,jt})$	1.912	1.365	2.585**	2.650**	2.907***	2.345**
		(1.213)	(1.288)	(1.226)	(1.085)	(1.063)	(0.987)
	$\log(P_{middle,jt})$	-2.216	-1.783	-3.246**	-3.279**	-3.419***	-2.794**
		(1.430)	(1.546)	(1.502)	(1.329)	(1.245)	(1.186)
2007	$\log(Y_{middle,jt})$	1.775	1.379	2.360*	2.619**	3.083***	2.518**
		(1.294)	(1.285)	(1.238)	(1.185)	(1.185)	(1.031)
	$\log(P_{middle,jt})$	-2.120	-1.836	-3.052**	-3.336**	-3.706***	-3.078**
		(1.521)	(1.535)	(1.510)	(1.440)	(1.363)	(1.224)

Notes: * p<0.1, ** p<0.05, *** p<0.01. Clustered (by host country) standard errors in parentheses. Omitting rich class. Low is $y|y \leq \underline{y}$, middle is $y|\overline{y} \leq y > \underline{y}$, high is $y|y > \overline{y}$ for j, t. Controls: host remoteness, host urban concentration, host trade openness, host corporate tax, distance, squared skill difference, percent of population that completed no, primary, secondary, and tertiary schooling, dummies for common language, regional trade agreement, customs union, colonial relationship, parent country, and host region. Sample sizes (year): 661 (1997), 781 (1998), 832 (1999), 895 (2000), 992 (2001), 1013 (2002), 1175 (2003), 1278 (2004), 1264 (2005), 1424 (2006), 1493 (2007).

Table 7: Outward FDI positions (29 OECD countries 1997-2007, PPML) with lower threshold $\underline{y} = 5000$

		$\log(FDI_{ijt})$	$\log(FDI_{ijt})$	$\log(FDI_{ijt})$	$\log(FDI_{ijt})$	$\log(FDI_{ijt})$	$\log(FDI_{ijt})$
		$\overline{y} = 10,000$	$\overline{y} = 15,000$	$\overline{y} = 20,000$	$\overline{y} = 25,000$	$\overline{y} = 30,000$	$\overline{y} = 35,000$
1997	$\log(Y_{middle,jt})$	3.046	-5.684**	1.638	3.568**	5.763***	2.821***
		(4.483)	(2.621)	(1.343)	(1.480)	(1.338)	(0.847)
	$\log(P_{middle,jt})$	-3.796	5.315*	-2.269	-4.579**	-7.469***	-3.801***
		(4.738)	(2.755)	(1.616)	(1.793)	(1.682)	(1.083)
1998	$\log(Y_{middle,jt})$	2.975	-3.885*	2.723**	5.686***	4.410***	2.998***
		(5.466)	(2.313)	(1.267)	(1.335)	(1.038)	(0.910)
	$\log(P_{middle,jt})$	-3.821	3.380	-3.520**	-7.168***	-5.884***	-4.073***
		(5.737)	(2.461)	(1.552)	(1.583)	(1.346)	(1.174)
1999	$\log(Y_{middle,jt})$	2.499	-1.871	3.388***	6.074***	4.827***	4.040***
		(5.204)	(2.244)	(1.221)	(1.209)	(0.973)	(1.058
	$\log(P_{middle,jt})$	-3.439	1.076	-4.510***	-7.760***	-6.423***	-5.416***
		(5.454)	(2.402)	(1.492)	(1.467)	(1.249)	(1.353)
2000	$\log(Y_{middle,jt})$	1.639	-0.749	3.719***	5.713***	4.639***	4.789***
		(5.655)	(2.160)	(1.171)	(1.031)	(0.878)	(1.126)
	$\log(P_{middle,jt})$	-2.709	-0.237	-4.906***	-7.270***	-6.002***	-6.291***
		(5.882)	(2.300)	(1.389)	(1.260)	(1.118)	(1.446)
2001	$\log(Y_{middle,jt})$	7.944*	3.133*	5.501***	7.439***	5.967***	5.546***
		(4.078)	(1.702)	(0.955)	(1.493)	(0.645)	(0.900)
	$\log(P_{middle,jt})$	-9.643**	-4.702**	-6.929***	-8.795***	-7.574***	-7.094***
		(4.348)	(1.885)	(1.143)	(1.474)	(0.796)	(1.141)
2002	$\log(Y_{middle,jt})$	3.471	1.651	3.866***	4.513***	4.301***	4.032***
		(3.681)	(2.503)	(1.084)	(0.918)	(0.839)	(1.019)
	$\log(P_{middle,jt})$	-4.377	-2.737	-4.971***	-5.715***	-5.531***	-5.138***
		(3.897)	(2.690)	(1.324)	(1.153)	(1.031)	(1.260)
2003	$\log(Y_{middle,jt})$	2.316*	0.258	2.624***	3.698***	3.898***	3.303***
		(1.208)	(2.378)	(0.940)	(0.911)	(0.957)	(0.987)
	$\log(P_{middle,jt})$	-2.918**	-1.144	-3.570***	-4.605***	-4.845***	-4.049***
		(1.451)	(2.559)	(1.188)	(1.108)	(1.107)	(1.185)
2004	$\log(Y_{middle,jt})$	2.648*	0.480	3.479***	3.965***	3.588***	2.733***
		(1.561)	(2.316)	(1.275)	(1.114)	(0.972)	(1.022)
	$\log(P_{middle,jt})$	-3.161*	-1.347	-4.562***	-5.067***	-4.549***	-3.446***
		(1.837)	(2.482)	(1.592)	(1.389)	(1.161)	(1.256)
2005	$\log(Y_{middle,jt})$	2.022*	-1.655	2.454**	2.338***	2.800***	2.278***
		(1.225)	(1.851)	(1.094)	(0.892)	(0.900)	(0.875)
	$\log(P_{middle,jt})$	-2.323*	1.066	-3.204**	-2.979***	-3.504***	-2.939***
		(1.412)	(1.955)	(1.355)	(1.099)	(1.047)	(1.068)
2006	$\log(Y_{middle,jt})$	2.131*	-1.178	2.462**	2.314**	2.711***	2.181**
		(1.225)	(2.234)	(1.148)	(0.955)	(0.995)	(1.024
	$\log(P_{middle,jt})$	-2.302	0.606	-3.253**	-3.009**	-3.363***	-2.791**
		(1.404)	(2.324)	(1.450)	(1.201)	(1.175)	(1.263)
2007	$\log(Y_{middle,jt})$	1.953	-1.304	1.122	1.693	3.214***	2.669**
		(1.286)	(2.704)	(1.527)	(1.044)	(1.178)	(1.098)
	$\log(P_{middle,jt})$	-2.096	0.709	-1.969	-2.392*	-4.075***	-3.490***
		(1.469)	(2.723)	(1.722)	(1.276)	(1.401)	(1.331)

Notes: * p<0.1, ** p<0.05, *** p<0.01. Clustered (by host country) standard errors in parentheses. Omitting poor class. Low is $y|y \leq \underline{y}$, middle is $y|\overline{y} \leq y > \underline{y}$, high is $y|y > \overline{y}$ for j, t. Controls: host remoteness, host urban concentration, host trade openness, host corporate tax, distance, squared skill difference, percent of population that completed no, primary, secondary, and tertiary schooling, dummies for common language, regional trade agreement, customs union, colonial relationship, parent country, and host region. Sample sizes (year): 661 (1997), 781 (1998), 832 (1999), 895 (2000), 992 (2001), 1013 (2002), 1175 (2003), 1278 (2004), 1264 (2005), 1424 (2006), 1493 (2007)