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Do multinational retailers affect the export competitiveness of host countries?

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Do multinational retailers affect the export competitiveness of host countries?

Angela Cheptea*

The accelerated overseas expansion of multinational retailers (MRs) over the last decade transformed these companies into major regional and global actors. In this paper we question how MRs arriving in foreign markets affect the export performance of local firms. We develop a theoretical framework that explains the mechanisms by which multinational retailers establishing outlets abroad impact the export performance of local firms and test its predictions empirically for the agri-food sector. The adopted approach draws on recent empirical evidence of the effects of foreign direct investment (FDI) in the retail sector and recent developments in the literature on international trade with heterogeneous firms and on trade and intermediaries.

First, incoming multinational retailers may increase the overall export capacity of local firms to any foreign market via an increase in their productivity. The growing competitive pressure in the upstream sector, induced by global retail chains, drives least productive firms out of the market and the average productivity of the sector increases. In addition, retail sector FDI generates productivity gains at the firm level: local suppliers of multinational retailers benefit from the retailers' financial and technological support and become more productive in time. Thus, although the productivity threshold for exporting remains unchanged, some firms reach this threshold and start exporting, while firms above this threshold that experience productivity gains increase their volume of exports.

Second, we consider the role of multinational retailers in matching foreign sellers and buyers. With their wide transnational networks of outlets and contacts, multinational retailers can become natural intermediaries between suppliers and consumers in countries where they operate. The local suppliers of a foreign retailer may sell more easily their products in retailer's outlets situated in other countries, or, with the retailer's help, identify at a lower cost potential buyers in these markets. Lower export sunk costs for retailer's supplying firms determines the latter to export larger amounts to destination markets served by this retailer. For other destination markets these suppliers face the same export costs as other host country firms.

These effects were first discussed empirically by Head, Jing and Swenson (2010), but only from an empirical point of view. They find evidence of the capability effect, but not for the linkage effect for the exports of Chinese cities. Unlike Head et al. (2010), we use a large panel of countries and data on the world's top one hundred food retailers. We find evidence of both capability and linkage effects, but the latter does not apply to a country's exports to the origin country of the foreign retailers it hosts.

Keywords: multinational retailers, export competitiveness, productivity gains, transnational networks, intermediaries.

JEL codes: F12, F14, Q17, F23.

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1. Introduction

Multinational retailers (MRs) are major actors of the global economy. In 2010, the sales of world's largest one hundred retailers were comparable to the size of the Italian economy. Most of these companies are based in industrialized countries, but saturated home markets, fierce competition and restrictive legislation have persistently pushed them to internationalize. The overseas expansion was especially strong for German and French retail companies, with foreign sales representing over 40% of their turnover. Emerging and transition countries with friendly legislation and high demand potential were their main targeted destinations. Recent studies show that the arrival of multinational retailers changes considerably the host country's retail supply chain, and increases the productivity of local firms. Durand (2007) and Javorcik, Keller and Tybout (2008) describe changes in supply chain governance on the Mexican market after the entry of Wal-Mart. Both papers find that the growing competitive pressure brought by Wal-Mart drove least productive supplying firms out of the market, and accelerated the modernization, innovation and growth of surviving local firms. Javorcik and Li (2013, 2014) show that in Romania the expansion of global retail chains led to a significant increase in the total factor productivity in the supplying manufacturing industries. Iacovone, Javorcik, Keller and Tybout (2011) build a theoretical model where the access of MRs to global sourcing networks forces local producers to compete with foreign (larger and more productive) suppliers and the least competitive firms to exit the market and validate the model's prediction on the case of Wal-Mart in Mexico.

In the current paper we take a step further and look how changes in the local retail and supplying sectors induced by the entry of a multinational retailer affect the host country's exports. Our analysis joins the empirical work by Nordås et al. (2008) and Head et al. (2010) on the role of multinational retailers in international trade. Nordås et al. (2008) document the presence of a connection between retail foreign direct investment (FDI) and host countries' foreign trade patterns, using case study and econometric analyses, but does not provide clear insights into the mechanisms at work. Head et al. (2010) identify two possible effects, but consider a very specific framework: the Chinese market and its global procurement centers. They suggest that incoming MRs may increase the overall export capacity of local firms to any foreign market via an increase in their productivity (capability effect), and/or increase the exports of local firms to other foreign markets where these MRs are established by granting the former an access to their global connections networks (linkage effect). The present paper aims to offer a theoretical understanding of these mechanisms and evaluate them empirically in a more general setting.

We build a theoretical framework that draws on the empirical evidence of the effects of foreign direct investment (FDI) in the retail sector mentioned above, and recent developments in the literature on international trade with heterogeneous firms and on trade and intermediaries. Recent works in international trade literature stress that the decisions to export and import are taken at firm (not country) level, and that even in narrowly defined sectors firms differ greatly in terms of size and productivity. The growing theoretical and empirical literature on international trade with firm heterogeneity of firms show that only the most productive firms become exporters (e.g., Melitz, 2003, Bernard and Jensen, 2004, Eaton et al.,

2006, Melitz and Ottaviano, 2008). This result arises because when a firm engages in exporting, apart from costs associated with each unit of goods (e.g., transport costs, import tariffs), it encounters additional sunk costs associated with finding and establishing business contacts abroad, learning about the foreign environment, specific administrative forms and procedures, etc. Combining the results of the FDI literature with those of the trade literature on heterogeneous firms suggests that incoming MRs may increase the overall export capacity of local firms (to any foreign market) via an increase in their productivity. This reflects the *capability effect*. The productivity of local firms increases due to reinforced competition in the upstream sector. In addition, firms that become suppliers of MRs increase their productivity even more as they benefit from financial and technological support from the latter. In our model, the competitive pressure on local firms generated by the arrival of a MR occurs through a decrease in the average level of prices in the market and a possible increase in the number of foreign varieties available to host country consumers. This forces least productive firms to exit the market and increases the average productivity in the sector. The productivity threshold for exporting remains unaltered, but firm-level productivity gains can transform non-exporting firms into exporters and allow firms that already export to sell larger amounts on foreign markets. Our model predicts that productivity gains induced by the MR increase the aggregate host country exports to any destination, but the effect is larger for remote countries with a high level of trade protection.

Still, finding a suitable and trustable foreign partner and learning about foreign business practices and consumer tastes is time and money consuming, even for most productive firms. Therefore, *intermediaries* with a deep knowledge of external markets and a wide network of contacts at home and abroad can play a central role in matching foreign sellers and buyers. This argument is defended by a growing body of literature emphasizing the importance of networks and intermediaries for international transactions (e.g., Rauch and Watson, 2004, Ahn et al., 2010, Bernard et al., 2010, Blum et al., 2010). A recent study by Raff and Schmitt (2011) shows that "*retailers play an important role in international trade, not only because they carry many imported goods, but also because they directly intermediate a lot of trade"*. Indeed, multinational retailers possess wide networks of outlets and contacts in a large number of countries. Therefore, they can become natural worldwide intermediaries between suppliers and consumers, at least for goods they sell (intermediate). A MR can let its local supplying firms sell their products in outlets it operates in other countries, or help them find a foreign partner using its wide network of connections and contacts in these countries. Thus, the access to a multinational retailer's global network offers to its supplying firms a cheaper access to other markets where the retailer operates. Facing lower export costs, local firms increase their exports to these destinations. This resumes the *linkage* or *network effect*. Therefore, building a long and trustable relationship with this client may help local producers overcome frictions that inhibit them from placing their goods in foreign markets. The effect is smaller if the MR charges its local suppliers for the export intermediation services it provides. For a high cost of intermediation, the linkage effect even vanishes.

Head et al. (2010) investigate the capability and linkage (network) effects for four multinational retailers established in China and the bilateral exports of Chinese cities. Authors

find evidence for the capability effect but not for the linkage effect, which comes at odds with the literature on intermediaries and networks in international trade (e.g., Rauch and Watson, 2004, Ahn, Khandelwal and Wei, 2010, Bernard, Jensen, Redding and Schott, 2010, Blum, Claro and Horstmann, 2010). This outcome may be specific to the case of Chinese products that acquired world-wide notoriety through other channels and may not need additional intermediation in finding partners in foreign markets, result from the use of city-level data on the investments of only four global retailers, or be disguised by additional mechanisms at work. Therefore, the second aim of our paper is to closely investigate the two effects from an empirical point of view using a large panel of retailers and host countries.

The role of multinational retailers is particularly relevant for agri-food products extensively sold in retail chains. Therefore, for the empirical analysis, we focus only on food retailers and host countries' exports of grocery products. Our data panel includes the world's largest 100 food retailers, of which 91 are multinationals companies, and covers the 2000-2010 period. These global retail chains come from 25 countries (mostly OECD countries) and operate outlets in 107 countries. We investigate how the overseas expansion of these retailers impacts the world bilateral trade patterns in agri-food products sold in supermarkets. We consider both the volume of exports and the number of exported products (defined at the level of HS 6-digit lines), and find evidence of both capability and linkage effects. We divide the linkage effect into a direct linkage effect, which concerns host country exports to the MR's country of origin, and a third-country effect, which affects host country exports to all other countries that host this MR. We find that the presence of a foreign multinational retailer increases the overall export capacity of host country firms. We also find that countries hosting a MR export more to other countries within the retailer's network, but not to its country of origin. Retail sector FDI also leads to a higher overall product diversity of exported products (all destinations combined), but we find a product cannibalization effect (lower product diversity) for exports to retailer's origin country.

The rest of the paper is structured as follows. The next five sections explain the underlying economic mechanisms of the capability and linkage effects in a theoretical trade model with heterogeneous firms. Section 7 presents the empirical approach and the data. We discuss the estimation results in section 8. Our main conclusions are resumed in section 9.

2. A theoretical framework with domestic and foreign retailers

We consider a country with a continuum of firms, each producing one variety ω of a differentiated good. Consumers demand (and buy) a quantity $q(\omega)$ of each variety that procures them the highest level of utility:

$$U = \left(\int_{\omega \in \Omega} q(\omega)^{\frac{\sigma-1}{\sigma}} d\omega \right)^{\frac{\sigma}{\sigma-1}}. \quad (1)$$

σ is the elasticity of substitution of any two varieties ω available to consumers.[1] Firms have different productivities and are in monopolistic competition with each other. Each firm produces the exact quantity it can sell on the market, and sets the price that maximizes its profits. The model consists of a three-stage game:

1st stage: Producing firms can sell their products only in the outlets of traditional domestic retailers. Firms learn their productivities φ and the distribution cost $\gamma > 1$ demanded by traditional retailers, and decide whether or not to enter the market (start producing), and the price to charge for their goods.

2nd stage: A foreign retailer enters the market. Local firms can now sell their products via traditional retailers, or via the foreign (multinational) retailer. The multinational retailer (MR) sets the share $0 < \beta < 1$ of the variable profits of producing firms it chargers for selling in its outlets.

3rd stage: Firms decide whether to switch to the multinational retailer or to continue selling to traditional domestic retailers, and at which price to sell their goods. If all firms switch to the multinational retailer, the local public authority invokes a countervailing clause or an anti-trust law and bans the retailer's activity on this market.

Firms incur a fixed entry cost f and a variable cost w/φ. In the absence of multinational retailers, local firms sell their products in traditional (local/urban) markets, incurring a variable distribution cost $\gamma > 1$. The total costs of a firm with productivity φ selling a quantity $q(\varphi)$ of its products on the domestic market are equal to $c(\varphi) = f + (\gamma w/\varphi)q(\varphi)$. The entry of a MR permits firms to sell their products in its outlets. We assume that each firm sells all its production either to traditional domestic retailers, or to the MR. Selling to the MR has the advantage of no longer incurring the distribution cost γ, but implies splitting profits with the retailer. We assume that all firms that sell their products to the MR incur a larger fixed cost than firms that continue to sell to traditional retailers: $f_{MR} > f$. The difference $(f_{MR} - f)$ can be interpreted as the cost of preparing a proposal according to the technical specifications requested by the MR, and/or to upgrade the products' quality to meet the MR's private standards.[2]

Firms that sell their products to the MR face a lower market price:

$$p_{MR}(\varphi) = \frac{\sigma}{\sigma - 1}\frac{w}{\varphi} < \frac{\sigma}{\sigma - 1}\frac{\gamma w}{\varphi} = p(\varphi)\,, \qquad (2)$$

[1] We can extend this setting to a multi-sector framework with H similar differentiated-goods sectors and a numeraire sector with a non-tradable homogeneous good. The overall utility of consumers is $\Psi = {q_0}^{\mu_0}\prod_h {U_h}^{\mu_h}$, where q_0 is the consumption of the numeraire good, U_h is the sector-level utility defined as in equation (1) but with a sector-specific elasticity of substitution, and μ_0 and μ_h are expenditure shares corresponding to each sector: $\mu_0 + \sum_h \mu_h = 1$. The derivations of results for one sector would hold for any other sector as well.

[2] Multinational retailers usually set higher quality standards than other companies in the market. Private standards help retailers to sell food products of consistent safety and quality and facilitate the application of the due diligence principle, i.e. the obligation to perform an investigation before contracting.

but an increase in the demand for their goods:

$$q_{MR}(\varphi) = \mu Y \left(\frac{\sigma}{\sigma-1}\right)^{-\sigma} \left(\frac{w}{\varphi}\right)^{-\sigma} P^{\sigma-1} > \mu Y \left(\frac{\sigma}{\sigma-1}\right)^{-\sigma} \left(\frac{\gamma w}{\varphi}\right)^{-\sigma} P^{\sigma-1} = q(\varphi), \quad (3)$$

where Y is the country's income, μ is the fraction of income spent on goods within the considered sector, and P is the average price index of this sector's goods sold in the country.[3] The share of firms' variable profits charged by the MR, β, can be interpreted as the MR's bargaining power.

Given the conditions of the game (stage 2 and 3), the multinational retailer sets the value of parameter β such that some, but not all, firms choose to sell their goods in its outlets. Technically this condition can be written as $\tilde{\varphi} > \varphi^* > 0$, where $\tilde{\varphi}$ is the threshold productivity of the firm which makes the same amount of profits by selling in the traditional markets or to the multinational retailer, and φ^* is the threshold productivity for entering the market. Thus, to solve for β, we need first to find thresholds $\tilde{\varphi}$ and φ^*.

Firms that sell their products in traditional markets make profits:

$$\pi(\varphi) = \frac{\mu}{\sigma} Y \left(\frac{\gamma w}{P\varphi}\right)^{1-\sigma} \left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} - f. \quad (4)$$

Those that sell to the foreign multinational retailer make the following profits:

$$\pi_{MR}(\varphi) = (1-\beta)\frac{\mu}{\sigma} Y \left(\frac{w}{P\varphi}\right)^{1-\sigma} \left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} - f_{MR}. \quad (5)$$

Setting these two profits equal, we find the threshold productivity $\tilde{\varphi}$:

$$\tilde{\varphi} = \left(\frac{\mu}{\sigma} Y\right)^{\frac{1}{1-\sigma}} \frac{\sigma}{\sigma-1} \frac{w}{P} \left(\frac{f_{MR} - f}{1 - \beta - \gamma^{1-\sigma}}\right)^{\frac{1}{\sigma-1}}. \quad (6)$$

The existence of an equilibrium where traditional retailers coexist with the multinational retailer requires $\tilde{\varphi}$ to be positive. This implies that the denominator of the last term of equation (6) is also positive (all the other terms are positive by definition), which is satisfied when the MR's bargaining power is not too large: $\beta < 1 - \gamma^{1-\sigma}$.

The threshold productivity for entering the market is the lowest of the threshold productivities of selling to the traditional domestic retailers or to the MR:

$$\varphi^* = \min_{\varphi^*} \{ \varphi^*[\pi(\varphi^*) = 0],\ \varphi^*[\pi_{MR}(\varphi^*) = 0] \}; \quad (7)$$

$$\frac{\varphi^*[\pi_{MR}(\varphi^*) = 0]}{\varphi^*[\pi(\varphi^*) = 0]} = \left(\frac{f_{MR}}{f}\left(\frac{1-\beta}{\gamma^{\sigma-1}}\right)\right)^{\frac{1}{\sigma-1}}.$$

[3] $P = \left(\int_{\omega \in \Omega} p(\omega)^{1-\sigma}\, d\omega\right)^{\frac{1}{1-\sigma}}$.

Recall that $f_{MR} > f$, and notice that $\tilde{\varphi} > 0$ requires $1 - \beta > \gamma^{\sigma-1}$. Accordingly, the above ratio is larger than one and $\varphi^* = \varphi^*[\pi(\varphi^*) = 0] = \left(\frac{\mu}{\sigma}Y\right)^{\frac{1}{1-\sigma}} \frac{\sigma}{\sigma-1}\frac{\gamma w}{P} f^{\frac{1}{\sigma-1}}$.

Rewriting condition $\tilde{\varphi} > \varphi^*$, using the expression of the two thresholds, yields: $\beta > 1 - \gamma^{1-\sigma}(f_{MR}/f)$. In other words, the share of profits collected by the MR needs to be sufficiently large, so that the additional investment for selling to the MR is recovered by firms only if they sell a sufficiently large amount of goods. Low productivity firms charge high prices and face a low demand, thereby being refrained from making the switch. For lower values of β, all firms find it more profitable to sell to the MR and make the switch, leading the MR to acquire monopoly power and be banned from the market. [4]

Thus, solving the game backwards leads the MR to set a parameter β verifying:

$$1 - \gamma^{1-\sigma}\left(\frac{f_{MR}}{f}\right) < \beta < 1 - \gamma^{1-\sigma}. \tag{8}$$

The right hand side inequality ensures that at least some firms find it profitable to switch to the multinational retailer: $\exists \varphi > \varphi^*$ such that $\pi(\varphi) < \pi_{MR}(\varphi)$. The left hand side inequality ensures that this switch is profitable only for a sub-unitary fraction of firms in the market: $\exists \varphi > \varphi^*$ such that $\pi(\varphi) < \pi_{MR}(\varphi)$. It can be shown that for every range of parameters $(\gamma, \sigma, f_{MR}, f)$, there is a value of $0 < \beta < 1$ that satisfies the double inequality (8).

Only most productive firms ($\varphi \geq \tilde{\varphi}$), sell their products to the multinational retailer: the ones which can compensate the cut in variable profits and the larger fixed costs through an increase in the sold quantity.

Firms choose the intermediary (traditional retailers and the MR) through which to sell their products by comparing profits. To make computations straightforward, we express the productivity of each firm as a function of the threshold productivity $\tilde{\varphi}$: $\varphi = \alpha\tilde{\varphi}$.

$$\begin{aligned}\pi_{MR}(\varphi) - \pi(\varphi) &= \frac{\mu}{\sigma}Y\left(\frac{w}{P\varphi}\right)^{1-\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma}(1-\beta-\gamma^{1-\sigma}) - (f_{MR}-f) \\ &= \alpha^{\sigma-1}(\tilde{\varphi})^{\sigma-1}\frac{\mu}{\sigma}Y\left(\frac{w}{P}\frac{\sigma}{\sigma-1}\right)^{1-\sigma}(1-\beta-\gamma^{1-\sigma}) - (f_{MR}-f) \\ &= \alpha^{\sigma-1}(f_{MR}-f) - (f_{MR}-f) = (f_{MR}-f)(\alpha^{\sigma-1}-1)\end{aligned} \tag{9}$$

Expression (9) is negative for low-productivity firms ($\alpha < 1$), and positive for high-productivity firms ($\alpha > 1$). Therefore, low-productivity firms sell in traditional markets ($\pi(\varphi) > \pi_{MR}(\varphi), \forall \varphi < \tilde{\varphi}$), while high-productivity firms make larger profits when selling to the MR ($\pi(\varphi) < \pi_{MR}(\varphi), \forall \varphi > \tilde{\varphi}$).

[4] The condition of banning the MR from acquiring monopoly power is driven by the fact that in this case traditional domestic retailers are driven out of the market and local authorities are very unlikely to let a whole domestic sector vanish. If local authorities allow all firms switch to the MR, the latter will set parameter β low enough for this a situation to become the game equilibrium (the MR's profits are maximized when all firms make the switch): $\beta < 1 - \gamma^{1-\sigma}(f_{MR}/f) < 1 - \gamma^{1-\sigma}$. In this case $\tilde{\varphi} < \varphi^*$. See Appendix A for a detailed discussion of this case.

3. Intra-industry productivity gains

The relationship between parameters γ, β and σ determines the share of firms that sell to the MR and the share of firms that sell in traditional markets. Firms that start selling their products to the multinational retailer face a drop in the price of their goods. Accordingly, the entry of the MR leads to a drop in the country price index P:

$$\frac{\partial P}{\partial p(\varphi)} = P^{-\sigma} M p(\varphi)^{-\sigma} > 0$$

This reinforces the competition between firms in the market, regardless of how they sell their products. Therefore, all firms face a drop in their profits: $\partial \pi(\varphi)/\partial P > 0$, $\partial \pi_{MR}(\varphi)/\partial P > 0$. A drop in the price index also increases the threshold productivity for entering the market:

$$\frac{\partial \varphi^*}{\partial P} = -1 < 0$$

and forces least productive firms to exit.

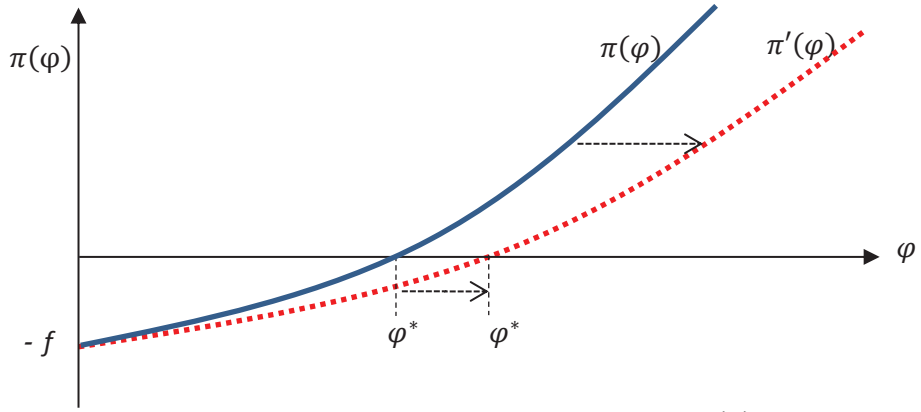
These evolutions and the resulting increase in *sector-level productivity* are displayed in Figure 1. The upper part of the figure shows the effects for firms that continue to sell to the traditional domestic retailers after the entry of the foreign retailer. The full-line curve depicts firm profits prior to MR entry, and the dotted line corresponds to profits in the presence of the MR. The only drop in the profits faced by these firms comes from the decrease in the price index, i.e. the pro-competitive pressure brought by the MR. Since the lowest profit a firm can make is always the loss of its fixed cost, the drop in profits leads to a flatter profit function.

The middle part of Figure 1 refers to firms that switch to the MR. These firms experience two effects: a change in the shape of the profit line due to a change in the structure of costs (the dashed line), and a drop in profits induced by the decrease in the price index (the dotted line). Note that, in line with our model, the productivity threshold for selling to the MR is higher that the threshold to enter the market: $\varphi_{MR}{}^* > \varphi^*$.

The lower part of Figure 1 combines the effects for the two types of firms on a single diagram. The profits line in the absence of the MR (the full-line curve) is the same for all firms. The profits line when the MR enters the market (the dotted-line curve) is the highers of the dotted profit lines from parts a) and b) of the figure. The intersection of these two profits lines gives the productivity threshold for switching to the MR, $\tilde{\varphi}$. Firms on the left of threshold $\tilde{\varphi}$ continue to sell to traditional domestic retailers, while firms on the right side of this threshold prefer to sell to the MR. The productivity level at which the dotted-line profits curve cuts the horizontal axis is the new threshold for entering (surviving in) the market, φ^*. Firms with productivity levels between the old and new entry thresholds can no longer make positive profits and exit the market. This determines the average productivity in the sector to increase. This illustrates how FDI in retailing generates intra-industry productivity gains.

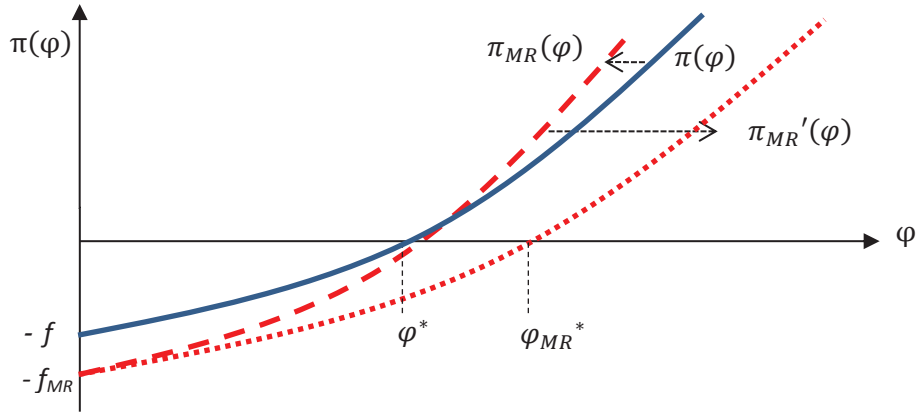
FIGURE 1: Intra-industry productivity gains

a) Firms that continue to sell in traditional markets



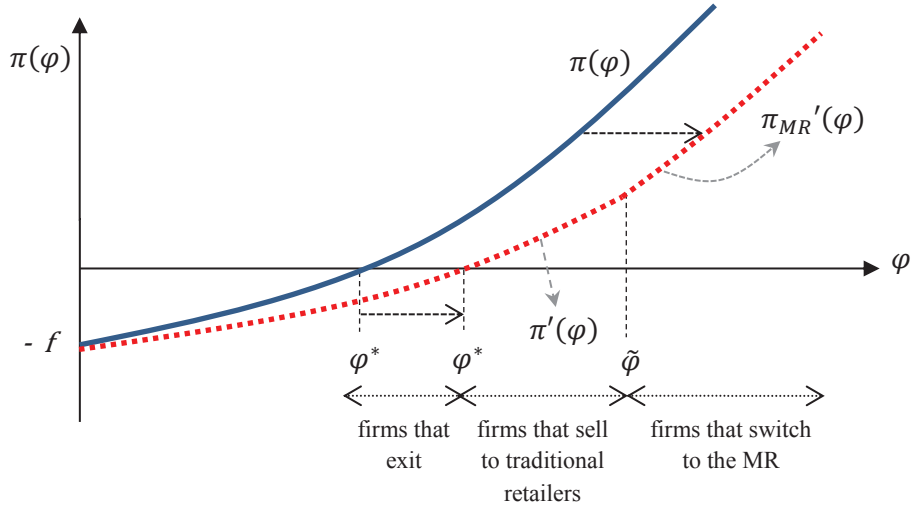
The decrease in the price index P leads to a decrease in firms' profits $\pi(\varphi)$.

b) Firms that switch to the multinational retailer



Switching to the MR leads to a change in the profits function: from $\pi(\varphi)$ to $\pi_{MR}(\varphi)$.
The decrease in the price index P leads to a further decrease in firms' profits to $\pi_{MR}{}'(\varphi)$.

c) All firms in the market: combine diagrams a) and b)



Notes: full-line curve = profits before the entry of the MR; dotted-line curve = profits after the entry of the MR.

4. Foreign trade and the integrated equilibrium

The results derived in the previous sections hold regardless of the fact that the country engages or not in international trade. We allow firms to export their goods at both stage 1 and 3 of the game. We refer to the country experiencing MR entry as the Home. All its firms incur the same variable cost τ_j and fixed cost f_j when exporting to a foreign country j. Reaching foreign consumers also requires intermediation. For simplicity, we assume that foreign retailers charge the same distribution cost γ as traditional domestic retailers.[5] Thus, each firm from Home sells its products to consumers in country j at the same price in the absence and the presence of the MR:

$$p_j(\varphi) = p_{j,MR}(\varphi) = \frac{\sigma}{\sigma-1}\frac{\tau_j \gamma w}{\varphi}. \tag{10}$$

The entry of the MR does not affect the Home's productivity threshold of exporting, φ_X^*, of because firms maximize their profits separately on each market. This threshold is equal to the lowest of the productivity threshold for exporting to each foreign market j:

$$\varphi_X^* = \min_j\{\varphi_j^*\} = \min_j\left\{\left(\frac{\mu}{\sigma}Y_j\right)^{\frac{1}{1-\sigma}}\frac{\sigma}{\sigma-1}\frac{\tau_j \gamma w}{P_j}\left(f+f_j\right)^{\frac{1}{\sigma-1}}\right\}. \tag{11}$$

Therefore, the same firms export the same amount as they did prior to MR entry. However, since least productive firms exit the market after the entry of the MR, the share of exporting firms increases.[6]

Similarly, foreign firms are also allowed to export their goods. Therefore, the price index of faced by domestic consumers is the average of domestic and foreign goods sold in the domestic market.[7] We assume that foreign consumers maximize the same utility function (1) as domestic consumers, and foreign firms face the same type of competition and costs structure as domestic firms.[8] Country j firms exporting to Home face the same intermediation choice as the domestic firms. The price they charge to Home consumers is equal to the price charged by domestic firms with similar productivity, inflated by the term $\tau_j w_j / w$. For every country j exporting to Home, there is a threshold productivity $\tilde{\varphi}_{j\rightarrow}$ above which its firms sell their products in the MR's outlets situated in Home.[9] But unlike for domestic firms, this threshold does not have to be larger than the productivity of the least productive firm in

[5] This assumption rules out the possibility for firms to export without serving the domestic market.

[6] In the extreme case, the new productivity threshold for surviving in the market (make non-negative profits) is greater or equal to the productivity threshold for exporting ($\varphi_j^* \leq \varphi^*$) and all firms in the market export.

[7] $P = \left(\int_{\omega\in\Omega} p(\omega)^{1-\sigma}\, d\omega\right)^{1/1-\sigma} = \left(M\int_{\varphi^*}^{\infty} p(\varphi)^{1-\sigma}\, dG(\varphi) + \sum_j M_j \int_{\varphi_{j\rightarrow}^*}^{\infty} p_j(\varphi)^{1-\sigma}\, dG(\varphi)\right)^{1/1-\sigma}$, where M is mass of firms in the domestic market, M_j is the mass of firms in foreign (exporting) country j, φ^* is the productivity threshold to enter the domestic market, $\varphi_{j\rightarrow}^*$ is the country j's productivity threshold for exporting to the domestic market, $p(\varphi)$ and $p_j(\varphi)$ are the prices of domestic and respectively foreign goods sold to domestic consumers, and $G(\varphi)$ is the productivity CDF.

[8] The only source of difference in the costs of firms from different countries is the difference in wages w.

[9] $\tilde{\varphi}_{j\rightarrow} = \left(\frac{\mu}{\sigma}Y\right)^{1/(1-\sigma)}\frac{\sigma}{\sigma-1}\frac{\tau_j w_j}{P}\left(\frac{f_{MR}-f}{1-\beta-\gamma^{1-\sigma}}\right)^{1/(\sigma-1)}$.

country *j* exporting to Home prior to the MR's entry, $\varphi^*_{j\rightarrow}$.[10] For a high export fixed cost $f_{j\rightarrow}$, all of country *j* firms exporting to Home sell their products in the MR's outlets. Moreover, in this case the threshold productivity for exporting to Home declines by a fraction $1/\gamma$ and more country *j* firms export to Home. This leads to an increase in the variety of foreign goods available to consumers in Home. For low values of $f_{j\rightarrow}$, the set of firms exporting to Home remains unchanged. In both cases, the price of foreign products decreases when the MR establishes in Home. This reinforces the pro-competitive effects described in section 3.

Accordingly, the price index faced by Home consumers is an average of domestic and foreign produced goods, and takes into account the fact that some firms switch to the MR:

$$\begin{aligned} P^{1-\sigma} = M\int_{\varphi^*}^{\tilde{\varphi}}\left(\frac{\sigma}{\sigma-1}\frac{\gamma w}{\varphi}\right)^{1-\sigma} dG(\varphi) + M\int_{\tilde{\varphi}}^{\infty}\left(\frac{\sigma}{\sigma-1}\frac{w}{\varphi}\right)^{1-\sigma} dG(\varphi) \\ + \sum\nolimits_j 1\left[\tilde{\varphi}_{j\rightarrow} > \varphi^*_{j\rightarrow}\right] M_j \int_{\varphi^*_{j\rightarrow}}^{\tilde{\varphi}_{j\rightarrow}}\left(\frac{\sigma}{\sigma-1}\frac{\gamma w_j \tau_j}{\varphi}\right)^{1-\sigma} dG(\varphi) \\ + \sum\nolimits_j M_j \int_{\tilde{\varphi}_{j\rightarrow}}^{\infty}\left(\frac{\sigma}{\sigma-1}\frac{w_j \tau_j}{\varphi}\right)^{1-\sigma} dG(\varphi) \end{aligned} \tag{12}$$

where $1\left[\tilde{\varphi}_{j\rightarrow} > \varphi^*_{j\rightarrow}\right]$ is equally to one if $\tilde{\varphi}_{j\rightarrow} > \varphi^*_{j\rightarrow}$ and to zero otherwise. The first two terms of equation (12) refer to the price of domestic goods sold in traditional markets and in the MR's outlets. The last two terms of (12) summarize the prices charged by foreign firms. The third term of the price index vanishes when all firms exporting to Home sell their goods to the MR. Unless the Home market is difficult to accessed from any foreign country ($f_{j\rightarrow}$ is high for all *j*), this term will be positive at least for some firms exporting to Home.

To find the equilibrium of the game, we need to solve jointly for all endogenous variables of the model. Firms decide how to sell their products in the domestic market and where (if) to export and the price of their goods, taking as given the distribution (intermediation) costs, and the strategies of consumers and of other producing firms. The foreign retailer chooses how to charge its intermediation services based on firm's choices. In section 2 we showed that his decision depends entirely on the parameters of the model. Therefore, it does not affect the integrated equilibrium. Consumers decide how much to consume of each domestically- and foreign-produced good, given its price. Firms and consumers make their decisions simultaneously, and the equilibrium is reached when none of the economic agents has an incentive to deviate.

We consider that firms from each country follow a Pareto productivity distribution with the same shape parameter k:[11] $dG(\varphi) = k\varphi^{-k-1}$. Following Chaney (2008), we assume that global profits are equally divided across workers in all countries, wages are exogenously determined dues to the existence of a non-tradable goods sector, and the mass of firms (potential entrants) in each country is exogenously given: $M = w \cdot L = Y/(1+\pi)$ and

[10] $\varphi^*_{j\rightarrow} = \left(\frac{\mu}{\sigma}Y\right)^{1/(1-\sigma)} \frac{\sigma}{\sigma-1}\frac{\tau_j \gamma w_j}{P}\left(f + f_{j\rightarrow}\right)^{1/(\sigma-1)}$.

[11] To ensure that the CDF is finite, we assume that $k - 1 > \sigma > 1$.

$M_j = w_j \cdot L_j = Y_j/(1+\pi)$, where L is the number of workers and π is the average per-worker share of global profits. We rewrite the average price index given by equation (12), using these new assumptions and plugging in the expressions of productivity thresholds:

$$P = \lambda_1 Y^{1/k-1/(\sigma-1)} \left(\frac{1+\pi}{Y_W}\right)^{1/k} \theta. \tag{13}$$

λ_1 is a constant,[12] Y_W is the world output, and θ is a weighted average of costs for selling in the Home, faced by domestic and foreign firms.[13]

Similarly, we find the average price faced by firms and consumers in foreign country j:

$$P_j = \lambda_1 Y_j^{1/k-1/(\sigma-1)} \left(\frac{1+\pi}{Y_W}\right)^{1/k} \theta_j \tag{14}$$

with θ_j defined analogously to θ.[14]

Now, we can derive firm-level and aggregate exports to country j. Firms whose productivity is larger than the threshold level for exporting to this market is exports to country j the amount:

$$x_j(\varphi) = q_j(\varphi) \cdot p_j(\varphi) = \lambda_2 (1+\pi)^{(\sigma-1)/k} \left(\frac{Y_j}{Y_W}\right)^{\frac{\sigma-1}{k}} \left(\frac{\tau_j w}{\theta_j}\right)^{1-\sigma} \varphi^{\sigma-1} \tag{15}$$

with λ_2 being a constant.[15] Integrating this amount across all firms exporting to country j, $\varphi \geq \varphi_j^*$, and yields the aggregate volume of exports:

$$X_j = M \int_{\varphi_j^*}^{\infty} x_j(\varphi) dG(\varphi) = \mu \frac{Y \cdot Y_j}{Y_W} \left(\frac{\tau_j w}{\theta_j}\right)^{-k} \left(f + f_j\right)^{\frac{\sigma-k-1}{\sigma-1}}. \tag{16}$$

The volume of firm-level and aggregate exports is not affected by the presence of a foreign retailer. The entry of the MR changes only the way firms sell their products on the domestic market. Although this generates intra-industry productivity gains, it does not affect the firms' decisions to export or how firms price their goods in foreign markets. In the next section we show how intra-firm productivity gains induced by the MR impact the exports of Home.

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[12] $\lambda_1 = \left(\frac{\sigma}{\sigma-1}\right)\left(\frac{k}{k-\sigma+1}\right)^{-1/k}\left(\frac{\mu}{\sigma}\right)^{1/k-1/(\sigma-1)}$.

[13] $\theta^k = \frac{Y}{Y_W} w^{-k} \left(\gamma^{-k} f^{\frac{\sigma-k-1}{\sigma-1}} + (1-\gamma^{1-\sigma})\left(\frac{f_{MR}-f}{1-\beta-\gamma^{1-\sigma}}\right)^{\frac{\sigma-k-1}{\sigma-1}}\right) + \sum_j \frac{Y_j}{Y_W}(\tau_j w_j)^{-k} \left(1\left[f_{j\rightarrow} < \frac{\gamma^{\sigma-1}(f_{MR}-f)}{1-\beta-\gamma^{1-\sigma}} - f\right] \times \right.$
$\left. \times\ \gamma^{-k}\left(f + f_{j\rightarrow}\right)^{\frac{\sigma-k-1}{\sigma-1}} + (1-\gamma^{1-\sigma})\left(\frac{f_{MR}-f}{1-\beta-\gamma^{1-\sigma}}\right)^{\frac{\sigma-k-1}{\sigma-1}}\right)$.

θ is an aggregate index of the country's remoteness or multilateral resistance.

[14] $\theta_j = \left(\frac{Y_j}{Y_W} w_j^{-k} f^{1-k/(\sigma-1)} + \sum_{l\neq j} \frac{Y_l}{Y_W}(\tau_{lj} w_l)^{-k}\left(f + f_{lj}\right)^{1-k/(\sigma-1)}\right)^{-1/k}$.

[15] $\lambda_2 = \sigma\left(\frac{\mu}{\sigma} \cdot \frac{k-\sigma+1}{k}\right)^{\frac{\sigma-1}{k}}$.

5. Intra-firm productivity gains and the capability effect of FDI in retailing

To obtain a change in firms' exporting patterns in line with the empirical evidence provided by Javorcik, Keller and Tybout (2008), we need to allow for *intra-firm productivity gains*. We model this by assuming that the productivity distribution of producing firms becomes flatter after the entry of the MR. This means that the fraction of high-productivity firms increases to the detriment of low-productivity firms. With Pareto distributed productivities, we have $dG(\varphi) = (k\delta^{-MR}) \cdot \varphi^{-(k\delta^{-MR})-1}$, where MR is a dummy variable designating the presence of a MR and $\delta > 1$ is a constant. Prior to the MR's entry, firms were distributed according to the probability density function $dG(\varphi) = k\varphi^{-k-1}$; after the MR enters the market, the distribution becomes $dG_{MR}(\varphi) = (k/\delta)\varphi^{-k/\delta-1}$.

In other words, we assume that the entry of the MR generates in time firm-level productivity gains at least for some firms. These can be the MR's local suppliers, which benefit directly from knowledge and technology transfers, and financial and managerial assistance from the MR, as well as other local firms, which collect traditional industry-level externalities.[16] The change in the CDF implies that for any level of productivity φ for which $G(\varphi) - G_{MR}(\varphi) \geq 1/n$, where n is the number of firms in the economy, at least one firm with productivity below φ increases its productivity to a level above φ. Since n is usually very large, condition $G(\varphi) - G_{MR}(\varphi) \geq 1/n$ is violated only for very low and very high productivities ($\varphi \to 1$ or $\varphi \to \infty$). We can safely conclude that the above inequality is satisfied for the threshold productivity of exporting, as well as for all productivities in its vicinity.[17] Accordingly, the change in CDF indicates that at least some non-exporting firms become productive enough to start exporting. Similarly, we deduce that there are also non-exporting firms that increase their productivities without reaching the export threshold, and exporting firms that become more productive. These intra-firm productivity gains are pictured in Figure 2. A flatter probability density function does not rule out the possibility that some firms experience negative productivity shocks.

Firms that reach the productivity threshold φ_X^* start exporting, while firms that were already exporting and experience productivity gains increase the volume of their exports. Aggregating firm-level exports at country level, we obtain an increase in the overall volume of exports, regardless of their destination:

$$\frac{X_{MR,j}}{X_j} = \frac{\int_{\varphi_j^*}^{\infty} \mu Y_j \left(\frac{\sigma}{\sigma-1}\frac{\tau_j w}{P_j \varphi}\right)^{1-\sigma} dG(\varphi)}{\int_{\varphi_j^*}^{\infty} \mu Y_j \left(\frac{\sigma}{\sigma-1}\frac{\tau_j w}{P_j \varphi}\right)^{1-\sigma} dG_{MR}(\varphi)} = \lambda_1 \cdot \left(\varphi_j^*\right)^{k-k/\delta} \tag{17}$$

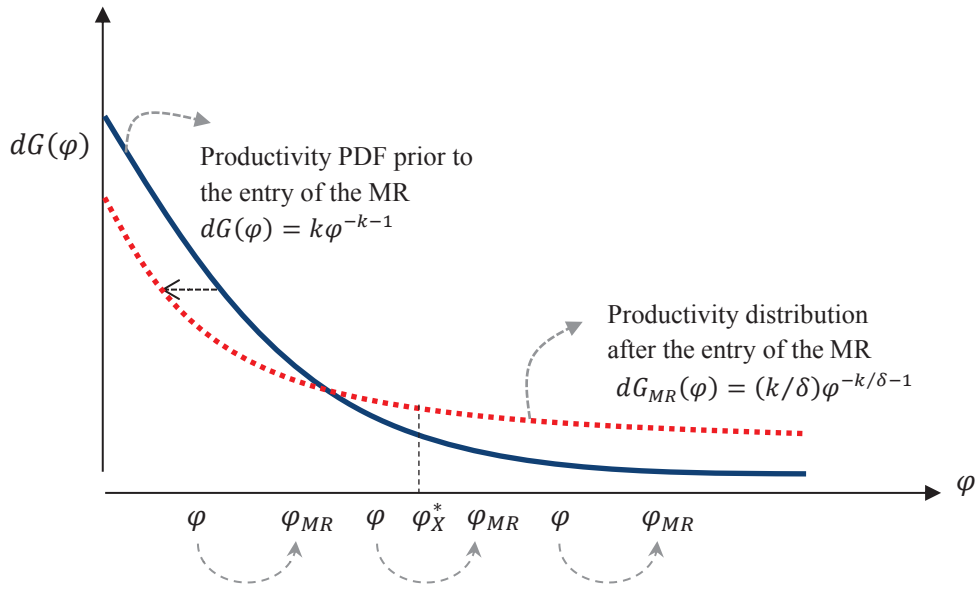
[16] Alternatively, we can assume that only firms that switch to the MR experience a positive productivity shock: all of them increase their productivity by the same fraction $\delta > 1$: $\varphi_{MR} = \delta\varphi$. This also increases the share of high-productivity firms, but generates a discontinuity in the probability distribution function $dG(\varphi) = 0$, $\forall\varphi\epsilon]\tilde{\varphi}; \delta\tilde{\varphi}[$. Firms with productivity levels within this interval simply do no longer exist after the productivity upgrade generated by the MR. To avoid such discontinuities, we stick to the fist assumption.

[17] If $\varphi_X^* \to 1$, all firms would be productive enough to produce and to export; if $\varphi_X^* \to \infty$ there will be no exporting firms. Both cases contradict the empirical evidence.

where X_j and $X_{MR,j}$ are aggregated exports to country j prior to and after the arrival of the MR, and $\lambda_1 = \left(\frac{k/\delta}{k/\delta-\sigma+1}\right)/\left(\frac{k}{k-\sigma+1}\right) > 1$. Moreover, exports to countries that are harder to access (due to their remoteness or trade protection) increase more.[18]

The change in the productivity distribution is used here only to illustrate the impact of intra-firm productivity gains on the exports of local firms. This assumption does not apply to the rest of the paper.

FIGURE 2: Intra-firm productivity gains



The mechanisms depicted in Figures 1 and 2 illustrate the impact of the arrival of a foreign retailer thought the *capability effect*. Indeed, our model predicts that the volume of host country's exports *to any destination* is larger in the presence of MRs. Beyond obtaining the same qualitative result as Head, Jing and Swenson (2010), we offer a thorough understanding of the underlying mechanisms. The pro-competitive effect is expressed in our model by a decrease of the country's price index with the entry of a foreign MR. We also derive a new testable prediction: the increase in the volume of exports induced by intra-firm productivity gains generated by the MR is larger for remote and highly protected countries.

6. The linkage (network) effect of FDI in retailing

We turn now to explaining the linkage effect. We assume that local suppliers of the MR have access to virtually the entire retailer's network.[19] They can sell their products in retailer's outlets situated in other countries where the retailer operates, or identify at lower costs potential buyers in these markets, using retailer's contacts in these markets. This means that

[18] This result is induced by the higher productivity threshold for exporting to these countries, φ_j^*.
[19] We define the retailers' global network as the set of all countries where the retailer operates.

local firms selling to the foreign retailer benefit from lower sunk export costs to other countries of the retailer's network than the rest of the local firms. For all other destination markets, MR's supplying firms face the same export costs as other host country firms. With subscripts $j \in MR$ and $j \notin MR$ denoting countries that belong or not to the retailer's global network, our assumption writes as: $f_{j\in MR} < f_j$ and $f_{j\notin MR} = f_j$. Accordingly, firms that sell to the MR make larger profits from exports to countries where the MR operates, and are more likely to export to these destinations:

$$\frac{\pi_{j\in MR}(\varphi)}{\pi_{j\notin MR}(\varphi)} = \frac{\mu Y_j \left(\frac{\sigma}{\sigma-1}\frac{\tau_j w}{P_j \varphi}\right)^{1-\sigma} - f_{j\in MR}}{\mu Y_j \left(\frac{\sigma}{\sigma-1}\frac{\tau_j w}{P_j \varphi}\right)^{1-\sigma} - f_j} > 1; \tag{18}$$

$$\frac{\varphi^*_{j\in MR}}{\varphi^*_{j\notin MR}} = \left(\frac{f + f_{j\in MR}}{f + f_j}\right)^{\frac{1}{\sigma-1}} < 1. \tag{19}$$

These relationships are illustrated graphically in Figure 3. The drop in fixed export cost for local suppliers of the MR implies an upward shift of their profits function. We distinguish two cases: (a) when the MR acts as a costless intermediary for its local suppliers willing to export to other markets within the MR's global network, and (b) when the MR receives a commission for connecting its local suppliers with buyers from these markets. In the second case, local suppliers of the MR incur lower sunk export costs, but larger per-unit trade costs, compared to other local firms, resulting in to a flatter profits function (the dotted curve). In both cases, the threshold productivity of exporting to a specific country j that belongs to the MR's network decreases, allowing new firms to start exporting. The change is smaller in the second case, when only firms facing a sufficiently high demand can benefit from the costly MR's export intermediation. In the extreme case, the commission charged by the MR can be so large that none of its local suppliers demands for the MR's intermediation. Graphically, this corresponds to the case when the intersection of the full and dotted profit lines yields negative profits. In this case the volume of aggregate exports does not change and the linkage effect is zero.[20] If we rule out this extreme case, the inequalities (18) and (19) are always satisfied. This leads to an increase in aggregated exports to countries within the MR's global network, as well as in the number of firms exporting to these countries. For the rest of destination countries, the threshold export productivity and aggregated exports remain unchanged.

We conclude that aggregated exports to countries within the MR's network are larger than exports to similar outside countries:

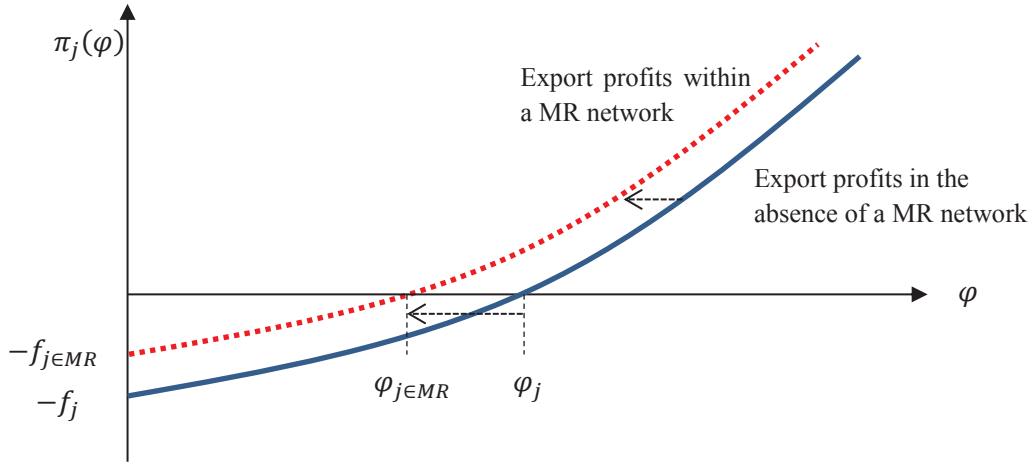
$$\frac{X_{j\in MR}}{X_{j\notin MR}} = \frac{\int_{\varphi^*_{j\in MR}}^{\infty} \mu Y_j \left(\frac{\sigma}{\sigma-1}\frac{\tau_j w}{P_j \varphi}\right)^{1-\sigma} dG(\varphi)}{\int_{\varphi^*_{j\notin MR}}^{\infty} \mu Y_j \left(\frac{\sigma}{\sigma-1}\frac{\tau_j w}{P_j \varphi}\right)^{1-\sigma} dG(\varphi)} = \left(\frac{\varphi^*_{j\in MR}}{\varphi^*_{j\notin MR}}\right)^{\sigma-k-1} > 1, \tag{20}$$

[20] Thus, a highly charged export intermediation of the MR for its local suppliers can explain the absence a linkage effect identified empirically by Head, Jing and Swenson (2010).

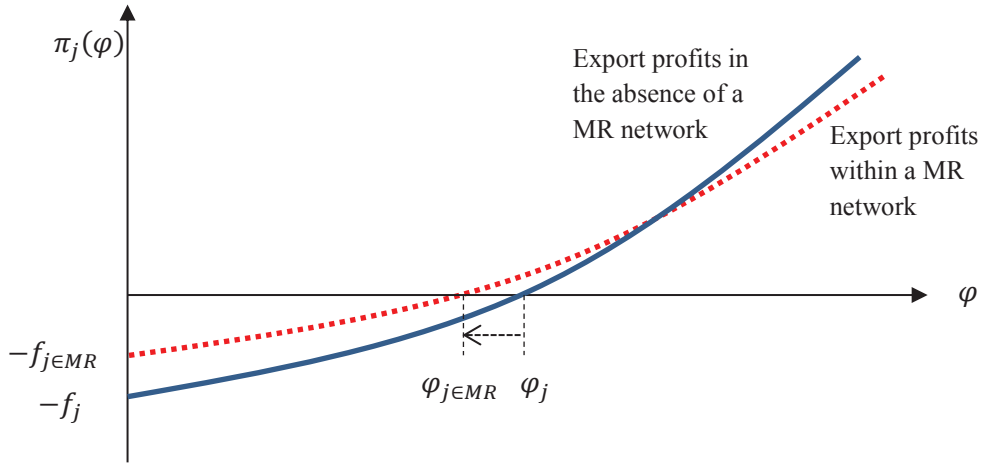
Note that the ratios of firm-level export profits and, respectively of productivity thresholds, given by (18) and (19) reflect also the difference between firms that sell to the MR and firms that continue to sell in traditional markets, for the same export country *j*. Similarly, Figure 2 can be interpreted as a comparison of export profits and productivity thresholds for exporting to country *j* between these two types of firms. Therefore, the ratio of aggregated exports also indicates that with the arrival of the MR increases the host country' overall exports to foreign countries where the MR operates. Exports to other destination, however, are unaffected. We have reached the exact prediction of the linkage effect: the arrival of the MR increases the export probability and the volume of exports only towards countries of the MR's overseas network.

FIGURE 3: The linkage effect for export market *j*

(a) the MR acts as a costless intermediary for its local suppliers



(b) the MR receives a commission for connecting its local suppliers with foreign buyers



7. The empirical model and data

To test empirically the theoretical implications derived in the previous section, we estimate a gravity-type equation for global bilateral trade in grocery products. We focus on food products (groceries) because these goods are sold extensively in retail chains. Thus, we expect identified effects to be the largest for this type of goods. To account for the overseas activity of global retailers, we employ data on the foreign presence of the top 100 world's food retailers using the dataset from Cheptea et al. (forthcoming, 2014).[21] This dataset is obtained from original firm-level data from the Planet Retail database, aggregating (summing) across retailers from the same country of origin. The employed dataset provides information on the volume of sales in each host market of all retailers from each country of origin. We exclude from the analysis export countries where are located the headquarters of multinational retailers. We estimate the impact of retailers' overseas activity on the volume of exports and the probability to export. Bilateral trade data is from the BACI database. We select only HS 2-digit chapters that correspond to grocery products sold in supermarkets and aggregate data across products.[22]

Combining the predictions given by equations (16), (17) and (20), we estimate a gravity-type equation similar where the presence of a foreign retailer affects the volume of host country exports. The amount of exports of country *j* to destination country *i* is determined by a set of country-specific and bilateral variables. Country specific terms include the inwards and outward multilateral resistance terms. To account for them, we use importer and exporter time invariant fixed effects. This requires us to drop other country-specific terms. To control for bilateral export costs, we use the traditional variables identified in the international trade literature. We end up with the following equation:

$$\begin{aligned} Exports_{ij,t} = \alpha_0 + \alpha_1 \ln dist_{ij} + \alpha_2\, border_{ij} + \alpha_3\, colony_{ij} + \alpha_4\, language_{ij} \\ + \alpha_5 \ln\left(1 + tariff_{ij,t}\right) + \Xi\, RETAILERS_{ij,t-1} + FE_j + FE_i + \varepsilon_{ij,t} \end{aligned} \quad (21)$$

Subscript i denotes the exporting country and subscript t the time dimension (year). Variable $dist_{ji}$ is the physical distance between the exporting and importing country, $border_{ij}$, $colony_{ij}$, and $language_{ij}$ are dummy variables indicating the presence of a common land border, of a common colonial past, and, respectively, of linguistic ties between the two countries. Data on these variables comes from the Cepii's GeoDist database. $language_{ij}$ is equal to one when at least 9% of the population in each country speak the same language. Variable $tariff_{ij,t}$ is the average import tariff of country *j* on agri-food products from *i*. Tariff data comes from the MAcMaps database and is available only for three years of our sample: 2001, 2004, and 2007. For each pair of trading countries, the average tariff is the weighted average of import tariffs defined at the HS6-digit level, across all products within the HS2 chapters used for computing aggregate exports, and using world trade in each HS6-digit product as weights.

[21] The dataset is available online on the journal's webpage.

[22] We include the following HS chapters: 02, 04, 07, 08, 09, 11, 12, 15, 17, 18, 19, 20, 21, 22.

In order to identify separately the capability and linkage effects, we need to control not only for the presence of foreign MRs, but also for the fact that the destination (importing) country belongs or not to the retailer's global network. Therefore, in equation (21) we include is a vector of variables $RETAILERS_{ij,t-1}$ characterizing the foreign multinational retailers present in the exporting country *i* and the importing country *j*:

(i) $any\ MR_{\ i,t-1}$
(ii) $importer\ MR_{\ ij,t-1}$
(iii) $3^{rd}\ country\ MR_{\ ij,t-1}$
(iv) $\ln Sales\ any\ MR_{\ i,t-1}$
(v) $\ln Sales\ importer\ MR_{\ ij,t-1}$
(vi) $\ln Sales\ 3^{rd}\ country\ MR_{\ ij,t-1}$

Variable $any\ MR_{\ j,t-1}$ is a simple indicator of the presence of a foreign MR in the exporting country. It takes the value one when the exporting country hosts a foreign MR, and zero otherwise. Estimating the impact of this variable on bilateral exports, we test the prediction of equation (18). A positive coefficient of $any\ MR_{\ i,t-1}$ in the estimation of equation (21) can be interpreted as evidence of a capability effect.

To test for the presence of a linkage effect, we need to include a variable that indicates the presence in exporting country *i* of a foreign MR that is also present in importing country *j*. A positive impact of this variable on *i*'s exports to *j* would suggest that the MR's suppliers in country *i* benefit from a preferential access to the MR's global network. However, we believe that the MR's suppliers do not have the same access to MR's foreign and domestic network. Therefore, we use two variables to identify the linkage effect: when the importing country *j* is the origin country of the MR, and when it is not. Thus, we split the linkage effect into a *direct linkage effect*, and the *third-country linkage effect*. Since two of the main determinants that push MRs to invest abroad are the saturation of the market and the high level of competition in their country of origin, we expect the third-country linkage effect to grasp most of the impact on exports.

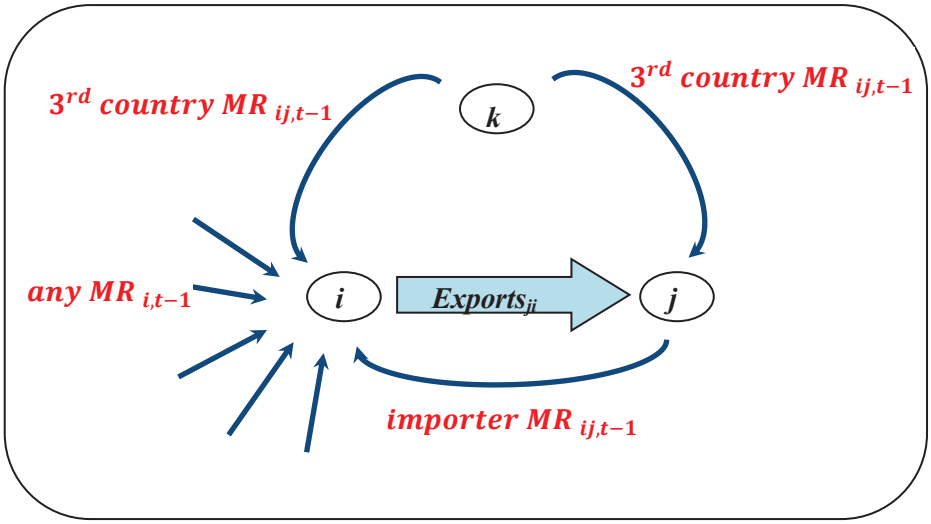
The second variable of our vector $RETAILERS_{ij,t-1}$, $importer\ MR_{\ ij,t-1}$, indicates the presence in exporting country *i* of a retailer from the importing country *j*. The impact of this variable on bilateral export estimated with equation (21) gives an evaluation of the direct linkage effect. Variable $3^{rd}\ country\ MR_{\ ij,t-1}$ is an indicator of the fact that a MR from a same third country operates both in the exporting and the importing country. By construction, this variable is symmetric: it takes the same value whether we consider *i*'s exports to *j* or *j*'s exports to *i* $\left(3^{rd}\ country\ MR_{\ ji,t-1} = 3^{rd}\ country\ MR_{\ ij,t-1}\right)$. The coefficient estimate associated to this variable in equation (21) reflects the rest of the linkage effect.

To construct variable $3^{rd}\ country\ MR_{\ ij,t-1}$, for every pair of exporting country *i* and importing country *j* we identify all foreign MRs that invest (operate) in both *i* and *j*.[23] For

[23] We exclude MRs that originate from the exporting country *i*.

every MR, we create a dummy equal to one when this condition is verified and to zero otherwise. Whenever one of these dummies is equal to one, variable $3^{rd}\ country\ MR_{ij,t-1}$ is also equal to one. $3^{rd}\ country\ MR_{ij,t-1}$ is zero only when all the constructed dummies are equal to zero. Since we use data aggregated at country level, we consider MRs originating from the same foreign country as the same MR. Therefore, in our data, the presence of a MR originating from the same foreign third country does not necessarily imply the same retailer.[24] However, since retailers from the same country of origin often associate into larger groups, and build their networks on similar fundamentals, this aspect should not affect the quality of our main results. The diagram represented in Figure 4 offers a visual interpretation of variables $any\ MR_{i,t-1}$, $importer\ MR_{ij,t-1}$, and $3^{rd}\ country\ MR_{ij,t-1}$. The thin arrows indicate the origin and direction of FDI in the retail sector. Of the 296,409 country pairs (spread on eleven years) for which we can compute the three variables, we identify FDI in retailing ($any\ MR_{i,t-1} = 1$) for 44% of the data. In 0.55% of the cases (i.e. for 1,629 observations), we find MRs from the importing country hosted by the exporting country ($importer\ MR_{ij,t-1} = 1$). 11.15% of the observations display third-country MRs present both in the exporting and the importing country ($3^{rd}\ country\ MR_{ij,t-1} = 1$).

FIGURE 4: Measuring the capability and linkage effects



As shown in sections 5 and 6, the magnitude of the capability and linkage effect depends on the share of host country firms that benefit from a productivity upgrade induced by the incoming MR, or can access the MR's network and thereby reduce their export costs. To

[24] Let us clarify this aspect using an example. The German retailer Aldi operates outlets in Denmark and Greece, but not in Romania and Ukraine. Rewe, another German retailer, operates in Romania and Ukraine, but not in the other two countries. If variable $3^{rd}\ country\ MR_{ji,t-1}$ were to be built with firm-level data, it would be equal to one only for trade between Denmark and Greece and between Romania and Ukraine. When we aggregate data at country level, variable $3^{rd}\ country\ MR_{ji,t-1}$ takes the value one for trade between any pair of these four countries.

capture this aspect, we take into account the volume of sales of MRs in each foreign market. For each of the three dummy variables discussed above, we construct and use an additional continuous variable. Variable $\ln Sales\ any\ MR_{i,t-1}$ represents the log of the sum of sales in the exporting country i of all foreign retailers that operate in this country. $\ln Sales\ importer\ MR_{ij,t-1}$ stands for the log of sales in the exporting country i of retailers originating from the importing country j. Finally, to compute variable $\ln Sales\ 3^{rd}\ country\ MR_{ij,t-1}$, we identify all foreign retailers that operate jointly in the importing country i and the exporting country j, the take the sum of their sales in these two countries, and take the logarithm of the obtained value. of retailers from the same third country k that operate both in i and j.

To include observations with zero exports, we express the dependent variable in levels and explanatory variables other than dummies in logarithms, and estimate equation (21) with pseudo-Poisson maximum likelihood (PPML), as suggested by Tenreyro and Santos Silva (2006). To allow for capability and linkage effects to be observed with some delay after the entry of a MR, we take one-year lagged values (in $t-1$) for all the six variables characterizing the activity (presence and volume of sales) of MRs. Note that to avoid colinearity, we use the dummy and the continuous variables in separate regressions.

We also estimate the effects separately for the extensive export margin, i.e. a selection into trade partners:

$$\begin{aligned} I(Exports_{ij,t} > 0) &= b_0 + b_1 \ln dist_{ij} + b_2\, border_{ij} + b_3\, colony_{ij} + b_4\, language_{ij} \\ &= + b_5 \ln(1 + tariff_{ij,t}) + \Psi\, Retailers_{ii,t-1} + FE_j + FE_i + e_{ij,t} \end{aligned} \quad (22)$$

In (22) the explanatory variable is a dummy equal to one if the volume of exports is strictly positive and to zero otherwise. To match the data with our theoretical model, we exclude from our panel exporting countries that have their own retailers with an overseas activity.

8. Estimation results

In this section, we estimate the impact of the foreign presence and the sales of multinational retailers in foreign markets on the bilateral food exports of a wide range of countries. Our results show that the overseas activity of retailers affects the productivity and the export participation of firms in the host country.

In Table 1 we report the coefficients from equation (21), obtained with the PPML estimator. Trade at time *t* between two countries is very likely to be influenced by the amount these countries traded in the past. This source of heteroscedasticity is not seized by any explanatory variable of (21) and translates directly into a correlation of error terms $\varepsilon_{ij,t}$. To control for it, in Table 1 we report robust standard errors obtained after clustering observations across pairs of one exporting and one importing country.

The first five explanatory variables in the table correspond to the standard determinants of trade costs used in the empirical literature on international trade. Their impact on the volume of agri-food exports is in line with previous findings in the literature, both in terms of the sign and the magnitude of the effects. We estimate an elasticity of trade with respect to physical distance of -0.86. Doubling the physical distance between countries decreases bilateral trade by $0.45[= 1 - \exp(2) \cdot \exp(-0.86)]$. Two countries with a common land border trade about $0.62[= \exp(0.48)]$ – $0.67[= \exp(0.51)]$ times more than if they were not neighbors. The same language spoken in the exporting and the importing country increases trade by an equal amount. Trade between countries sharing a common colonial past is $0.80[= \exp(0.59)]$ to $0.82[= \exp(0.60)]$ times larger trade than between identical countries without such a history. The average import tariff for observations in our panel is 16%. Reducing this tariff to 10%, generates a $7\%[= (-1.31) \cdot \ln(1.10/1.16)] \cdot 100$ average increase in bilateral exports.

The six columns of Table 1 correspond to the different variables measuring the foreign activity of multinational retailers. The first two columns reflect the estimates of the capability effect, while the last four columns evaluate the direct and third-country linkage effects. The positive coefficient of variable $any\ MR_{i,t-1}$ in column (1) indicates that the presence of a foreign MR increases the exports of the cost country, regardless of their destination. We interpret this as an evidence of the capability effect. In column (2) we estimate the same effect taking into account the volume size of sales of the MR in the host (exporting) country. The positive and significant coefficient for variable $\ln Sales\ any\ MR_{i,t-1}$ confirms our previous finding. In columns (3) and (4) we find that the presence and sales in host country of a retailer from the importing country have a positive, but statistically non-significant from zero, effect. This result testifies of the absence of a direct linkage effect. Estimates suggest that the access to the MR's global network does not help host country firms to increase their exports to the retailer's country of origin. A possible explanation is the high saturation and level of competition on the retailer's domestic market, which have actually pushed the latter to invest abroad in the first place. The last two columns of Table 1 present the impacts on the volume of trade of MRs that operate jointly in the exporting and importing country. The coefficients of variables $3^{rd}\ country\ MR_{ij,t-1}$ and $\ln Sales\ 3^{rd}\ country\ MR_{ij,t-1}$ are positive and statistically significant at the 1% level. This means that countries that host a MR export more to foreign markets where this MR operates, other than the MR's country of origin, than to other destinations. Thus, our data confirms the presence of a third-country linkage effect. The evidence found in columns (3) to (6) complies with the argument developed in our theoretical model that host country suppliers of a MR benefit from the MR's global network. They access more easily (face lower sunk costs on) the export markets where the retailer operates, but this does not apply for exports to the MRs' domestic market.

Including import tariffs in estimations leads to an important drop in the number of observations. To insure that our results are not driven by a sample selection problem, we run estimations displayed in Table 1 without tariffs and report the results in Table B1 of the Appendix B. The estimation sample includes a much larger number of observations in this

case, and covers all ten years.[25] Results are very similar to the ones obtained on the reduced sample. We can safely conclude that the capability and linkage effects identified above are not induced by sample selection.

Table 1. The impact of incoming foreign MRs on host country's exports

	Capability effect		**Direct linkage effect**		**Same 3rd country linkage effect**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
ln distance	-0.86***	-0.86***	-0.85***	-0.85***	-0.85***	-0.85***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
common border	0.50***	0.50***	0.49***	0.48***	0.50***	0.51***
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
colony	0.60***	0.60***	0.59***	0.59***	0.60***	0.60***
	(0.11)	(0.11)	(0.12)	(0.12)	(0.11)	(0.11)
language	0.49***	0.49***	0.50***	0.50***	0.48***	0.48***
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
ln (1+tariff)	-1.31***	-1.30***	-1.31***	-1.31***	-1.30***	-1.29***
	(0.46)	(0.46)	(0.44)	(0.44)	(0.45)	(0.46)
any MR	0.18**					
	(0.07)					
ln Sales all MR		0.03***				
		(0.01)				
importer MR			0.09			
			(0.14)			
ln Sales importer MR				0.01		
				(0.01)		
same 3rd country MR					0.23***	
					(0.06)	
ln Sales same 3rd country MR						0.01***
						(0.00)
Fixed effects	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer
Nb observations	33,416	33,416	33,416	33,416	33,416	33,416
Log-likelihood	-298472	-297171	-297653	-298007	-296736	-297915

Notes: PPML estimations allowing for an arbitrary correlation of errors within country pairs. Robust standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

The retailers' decision to invest abroad and their choice of host countries can be influenced by the same economic determinants that affect the volume of bilateral trade. This is a potential source of endogeneity, for which we need to control, when estimating equation (21). We use

[25] While tariff data is available only for three years of the studied period, the full sample covers observations for years 2001-2010. Data in 2000 is used to compute lagged values of variables describing the foreign activity of MRs. Accordingly, this year is dropped from the sample.

an instrumental variables approach to correct for a possible endogeneity bias of our estimates in Table 1. Note that the endogeneity bias applies mainly to results in columns (3) and (4), when the included MR variable refers to exactly the same relationship as the explained variable. The decision of a country's retailers to invest in a foreign country may be directly linked to the volume of trade with that country. We focus on estimates obtained when the included MR variable is a dummy. In a first step we estimate the corresponding MR dummy on all the explanatory variables in equation (22) and some additional instrumental variables that affect only the overseas expansion of MRs, but not bilateral exports of their host countries. In a second step, we re-estimate equation (21), where the MR dummy is replaced by the export probability predicted by the first-step estimation. We use a Probit estimator to obtain our first-step residuals, and PPML estimator for the second step.

We follow Reardon et al. (2003, 2007) and Cheptea et al. (forthcoming, 2014) to identify the appropriate instruments for each of the three MR dummies used in our estimations. According to Reardon et al. (2003, 2007), one of the main incentive for retailers to invest abroad is the saturation and intense competition on their home markets. We use the home market share of retailers to instrument their decision of making a FDI. Cheptea et al. (forthcoming, 2014) argue that the more developed is a country's domestic retail sector, the more likely it is to host a foreign retailer. As them, we use the share of purchases in modern retail stores in the total household expenditure on groceries as an instrument for the MRs' choice of host countries. The two variables are used jointly to instrument the decision of retailers from the importing country to invest in the exporting country, reflected by variable $importer\ MR_{\ ij,t-1}$ The share of purchases in modern retail stores is known only for countries that host at least one MR. Therefore, we cannot use this variable to instrument the presence of a MR in the exporting country, captured by variable $any\ MR_{\ i,t-1}$. Reardon et al. (2003, 2007) suggest that countries with a rapidly growing demand and a high level of urbanization are more likely to attract foreign retailers. Unlike rural consumers, urban population makes most of its grocery purchases in supermarkets. Therefore, a higher rate of urbanization can be associated to a larger demand potential faced by food retailers. We use the host country's urbanization rate to instrument the retailers' choice of countries where to invest (variables $any\ MR_{\ i,t-1}$ and $3^{rd}\ country\ MR_{\ ij,t-1}$).

Estimation results that correct the endogeneity bias are displayed in Table B2 of the Appendix B. Columns (1), (3), and (5) correspond to first-stage estimations, and columns (2), (4), and (6) to second-stage estimations. The second-stage estimations from Table B2 are to be compared to the results in columns (1), (3) and (5) of Tables 1 and B2. The coefficients of all instrumental variables in first-stage estimations are statistically significant and confirm our expectations. Indeed, we find that retail companies are more eager to invest abroad when they already hold a high share of the domestic market in their origin country, and they are more likely to select countries with a developed modern retail sector and with a growing urban demand. Coefficients of corresponding first-stage estimates indicate the impact of these decisions on host countries' exports, controlling for the endogeneity bias. The statistically significant coefficients of predicted export probabilities in second stage estimations (columns (2) and (6) of Table B2) point to the robustness of our results.

Next, we study the effects on the extensive margin of exports. We estimate equation (22) using a Probit and display results in Table 2. For the sample with data on import tariffs, countries that host a foreign MR always export to the MR's country of origin. Therefore, variables capturing the direct linkage effect predict perfectly the export probability in this sample. To bypass this problem, we choose to drop import tariffs from our explanatory variables, and estimate the resulting equation on the full sample. Again, we use importer and exporter fixed effects and allow for correlation of error terms across country pairs. Just like in Table 1, each column corresponds to a different variable characterizing the presence or sales of foreign MRs hosted by the exporting country. Once more, we find evidence for both capability and third-country linkage effects. Our results show that hosting a foreign MR increases the country's probability to export in general, and especially to other countries that host this MR. Moreover, in column (3) we find a large positive direct linkage effect, although the estimated coefficient is not very significant.

Table 2. The impact of incoming MRs on host country's probability to export

	Capability effect		**Direct linkage effect**		**Same 3rd country linkage effect**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
ln distance	-0.78***	-0.78***	-0.78***	-0.78***	-0.77***	-0.77***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
common border	0.40***	0.40***	0.40***	0.40***	0.39***	0.39***
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
colony	0.95***	0.95***	0.95***	0.95***	0.96***	0.97***
	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)	(0.17)
language	0.34***	0.34***	0.34***	0.34***	0.33***	0.33***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
any MR	0.13***					
	(0.02)					
ln Sales all MR		0.01***				
		(0.00)				
importer MR			0.27*			
			(0.15)			
ln Sales importer MR				0.01		
				(0.01)		
same 3rd country MR					0.18***	
					(0.02)	
ln Sales same 3rd country MR						0.01***
						(0.00)
Fixed effects	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer
Nb observations	273,181	273,181	273,181	273,181	273,181	273,181
Log-likelihood	-89963	-89941	-89999	-89999	-89918	-89920

Notes: Probit estimations allowing for an arbitrary correlation of errors within country pairs. Robust standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

The capability and linkage effects identified in the paper can apply not only to the volume of exports, but also to their composition. In a final estimation, we regress equation (21) taking the number of exported products, defined at the HS6-digit level, as the explained variable. The advantage of considering the product diversity, contrary to the geographic spread, of exports is that it permits to preserve the original structure of the data. Results are shown in Table 3. Each column corresponds to the column with the same number from Table 1. The magnitude of the effects in the two tables is no longer comparable. Still, we find that standard trade cost variables have a similar effect on the product diversity of exports. The presence of foreign MRs in the exporting country increases the number of exported products. This result is obtained when we consider the MRs from all foreign countries (columns (1) and (2)), as well as when we look at MRs that invest both in the exporting and importing country (columns (5) and (6)).

Table 3. The impact of MRs on the product diversity of host country exports

	Capability effect		**Direct linkage effect**		**Same 3rd country linkage effect**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
ln distance	-0.73***	-0.73***	-0.75***	-0.75***	-0.72***	-0.72***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
common border	0.21***	0.21***	0.22***	0.23***	0.21***	0.21***
	(0.07)	(0.07)	(0.06)	(0.06)	(0.07)	(0.07)
colony	0.33***	0.33***	0.35***	0.35***	0.33***	0.33***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)
language	0.52***	0.52***	0.51***	0.51***	0.51***	0.51***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
ln (1+tariff)	-0.81***	-0.80***	-0.82***	-0.83***	-0.81***	-0.80***
	(0.09)	(0.09)	(0.10)	(0.10)	(0.09)	(0.09)
any MR	0.18***					
	(0.02)					
ln Sales all MR		0.02***				
		(0.00)				
importer MR			-0.31***			
			(0.09)			
ln Sales importer MR				-0.02***		
				(0.01)		
same 3rd country MR					0.16***	
					(0.02)	
ln Sales same 3rd country MR						0.01***
						(0.00)
Fixed effects	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer
Nb observations	33,416	33,416	33,416	33,416	33,416	33,416
Log-likelihood	-298472	-298007	-297172	-296737	-297654	-297915

Notes: PPML estimations allowing for an arbitrary correlation of errors within country pairs. Robust standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

So far, we find confirmation for the capability effect and for the third-country linkage effect. Surprisingly, our results show that countries that host MRs export fewer products to the origin countries of these retailers. This product cannibalization effect can explain the absence of a direct linkage effect on the exports volume (in Table 1). Combining the two findings, we conclude that host country suppliers of a MR may actually benefit from lower export sunk costs and an improved access to the MR's domestic market. However, to comply with the harsh competition on this market, exporting firms concentrate on a smaller number of products, which in the end dumps the direct linkage effect.

9. Conclusion

The current paper investigates how changes in the local retail and supplying sectors, induced by the entry of a foreign multinational retailer (MR), affects the host country's exports. We adopt an approach that links recent empirical evidence of the effects of foreign direct investment in the retail sector, and recent developments in the literature on international trade with heterogeneous firms and with intermediaries. Our analysis is closely related to the empirical work of Head, Jing and Swenson (2010).

We develop a theoretical framework that explains the mechanisms through which multinational retailers establishing outlets abroad impact the export performance of local firms, and focus on the same two channels analyzed empirically by Head, Jing and Swenson (2010). First, incoming MRs may increase the overall export capacity of local firms (to any foreign market) via an increase in their productivity (capability effect). Second, local firms may use the global network connections of the incoming MRs to reduce their export costs and sell more, but only to other countries where these MRs operate (linkage or network effect). In the absence of MRs, all firms sell their products on the domestic market via a local retailer. When a MR enters the market, most productive firms switch to selling their products through the MR's outlets. Our theoretical model combines sector-level productivity gains, due to the competitive pressure on local firms brought by MRs, with intra-firm productivity gains. Only the latter affect the firm-level export decisions and the aggregate volume of exports. The dynamic firm-level productivity gains induced by the MR increase the host country's exports to any destination, the effect being larger for exports to remote countries with a high level of trade protection. MRs can let their local supplying firms to sell in outlets they operate in other countries, or help them find a foreign partner using their wide network of connections and contacts in these countries. In both cases, for these destinations, the MR's suppliers enjoy lower export costs than other host country firms. At the aggregate level, this leads to larger host country exports to other countries covered by the MR's network. This effect diminishes with the intermediation cost charged by the MR, and can even vanish. This can explain the absence of a linkage effect found by Head, Jing and Swenson (2010).

We also estimate empirically the link between retail investment and international trade. We use a dataset covering a large panel of countries and the foreign sales of the world's largest one hundred retailers in the food sector. Accordingly, we focus on bilateral exports in agri-food products sold in supermarkets. We find strong positive estimates for the capability

effect, suggesting that multinational retailers increase of the export competitiveness of their host countries. We decompose the linkage effect into a direct effect, capturing the increase in the host country's exports to the retailer's country of origin, and a third-country effect, referring to exports to other host countries of the retailer's network. Only the second component has a significant impact on exports. Countries hosting a MR exports export more to each other than to other similar markets. Retail FDI also leads to a higher overall product diversity of exported products (all destinations combined), but there is a product cannibalization effect for exports to the retailer's country of origin.

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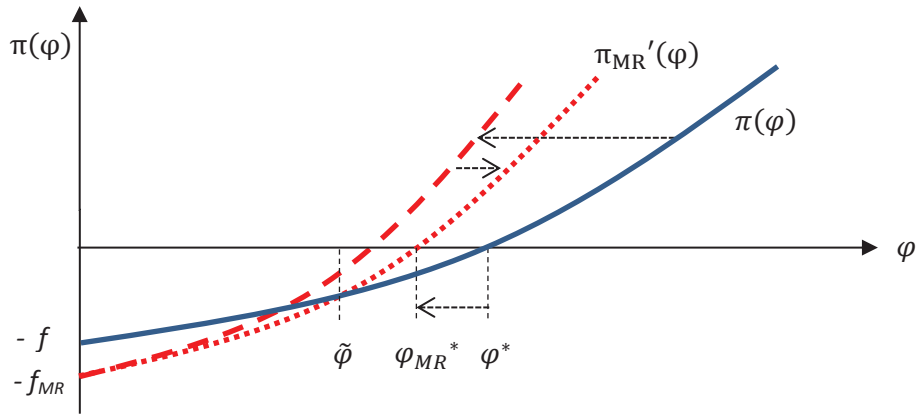
Appendix A

Intra-industry productivity gains when all firms switch to the multinational retailer

Figure 1 depicts the situation when only a fraction of firms sell to the MR. This corresponds to the case when the inequality $1-\gamma^{1-\sigma}(f_{MR}/f) < \beta < 1-\gamma^{1-\sigma}$ is verified and $\tilde{\varphi} > \varphi^*$. If $\beta < 1-\gamma^{1-\sigma}(f_{MR}/f) < 1-\gamma^{1-\sigma}$, all firms switch to the MR and a single diagram pictures all the mechanisms at work (Figure A1). In this case, the profit function for selling to the MR is steeper than the profit function for selling to traditional retailers for any firm productive enough to enter the market. This holds even after taking into account for the drop in the average price index that flattens the profit function. The threshold productivity for entering the market also decreases ($\varphi^*_{MR} < \varphi^*$) and some of the low productivity firms start making positive profits and enter the market. This situation occurs when traditional retailers charge high distribution costs γ and/or firms transfer a small fraction of their profits β to the MR. This result is at odds with recent empirical evidence on the effects of MR's entry on local firms provided by Javorcik, Keller and Tybout (2008), Iacovone, Javorcik, Keller and Tybout (2011), and Javorcik and Li (2013, 2014), according to which the entry of MRs drives least productive firms out of the market. Similarly, if all firms switch to the MR, traditional retailers are forced to exit the market. The implicitly assumed rationality of all economic agents suggests that the latter should prevent this from happening. They can achieve this either by lowering the distribution cost γ until $1-\gamma^{1-\sigma}(f_{MR}/f) < \beta$, or by lobbying the public authority to impose the restrictions that will determine other economic actors (in our case the MR) to adjust their strategy until the above condition is met. Therefore, we believe that the situation in which all firms switch to the MR is unlikely to arise in the real world.

FIGURE A1: All firms switching to the multinational retailer



Switching to the MR leads to a change in the profits function: from $\pi(\varphi)$ to $\pi_{MR}(\varphi)$.
The decrease in the price index P leads to a decrease in firms' profits: from $\pi_{MR}(\varphi)$ to $\pi_{MR}{}'(\varphi)$.

Notes: full-line curve = profits before the entry of the MR; dotted-line curve = profits after the entry of the MR.

Appendix B

Additional estimation results

Table B1. The impact of incoming foreign MRs on host country's exports, full sample

	Capability effect		Direct linkage effect		Same 3rd country linkage effect	
	(1)	(2)	(3)	(4)	(5)	(6)
ln distance	-0.88***	-0.88***	-0.88***	-0.88***	-0.87***	-0.87***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
common border	0.57***	0.57***	0.56***	0.56***	0.56***	0.56***
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
colony	0.62***	0.62***	0.61***	0.61***	0.62***	0.62***
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
language	0.52***	0.52***	0.52***	0.52***	0.51***	0.51***
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
any MR	0.22***					
	(0.07)					
ln Sales all MR		0.04***				
		(0.01)				
importer MR			0.01			
			(0.13)			
ln Sales importer MR				0.00		
				(0.01)		
same 3rd country MR					0.22***	
					(0.06)	
ln Sales same 3rd country MR						0.01***
						(0.00)
Fixed effects	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer
Nb observations	273,181	273,181	273,181	273,181	273,181	273,181
Log-likelihood	-1.37e+09	-1.36e+09	-1.37e+09	-1.37e+09	-1.37e+09	-1.37e+09

Notes: The explained variable is the volume of bilateral exports. Coefficients are estimated using PPML and allowing for an arbitrary correlation of errors within country pairs. Robust standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table B2. The impact of MRs on host country's exports, the endogoeneity bias

	Capability effect		Direct linkage effect		Same 3rd country linkage effect	
Dependent variable	Export dummy	Export volume	Export dummy	Export volume	Export dummy	Export volume
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	(1st stage)	(2nd stage)	(1st stage)	(2nd stage)	(1st stage)	(2nd stage)
ln distance	-0.01***	-1.33***	-1.05***	-0.68***	-0.45***	-0.64***
	(0.00)	(0.09)	(0.11)	(0.10)	(0.02)	(0.07)
common border	-0.01	0.73***	1.37***	1.07***	0.48***	0.40***
	(0.00)	(0.19)	(0.35)	(0.18)	(0.13)	(0.16)
colony	0.00	0.35	0.88***	0.56***	-0.47***	0.71***
	(0.00)	(0.23)	(0.21)	(0.15)	(0.11)	(0.13)
language	-0.01**	0.93***	0.71***	0.52***	0.36***	0.38***
	(0.00)	(0.16)	(0.20)	(0.19)	(0.04)	(0.13)
urbanization rate of the exporter	0.44***				0.08***	
	(0.01)				(0.01)	
any MR		1.85***				
		(0.15)				
dvpnt retail sector of the exporter			2.77***			
			(0.34)			
home mkt share of importer MR			0.59*			
			(0.31)			
importer MR				0.09		
				(0.08)		
urbanization rate of the importer					0.11***	
					(0.01)	
same 3rd country MR						2.32***
						(0.29)
Fixed effects	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer	exporter & importer
Nb observations	63,273	58,575	19,346	17,728	91,420	83,992
Log-likelihood	-30303.90	-1.69e+08	-2654.67	-3.60e+08	-37236.66	-9.55e+08

Notes: 1st stage columns report Probit estimations with the explained variable a dummy indicating the presence of exports; 2nd stage columns show PPML estimations with the explained variable the volume of exports. Predicted values of retailer dummies (any MR, importer MR, and same 3rd country MR) are used in 2nd stage estimations. All estimations allow for an arbitrary correlation of errors within country pairs. Robust standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01. Variations in the sample size are due to the limited availability of instrumental variables.

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