Attracting Multinationals: Additional Hurdles under Firm Selection

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Abstract

We consider a country comprising monopolistic exporters, and a government seeking to boost their efficiency. With this goal, the government provides a multinational with incentives to relocate production in the country, which benefits exporters through productivity spillovers. Our setting highlights the additional difficulties to attract multinationals when the most efficient exporters benefit relatively more from spillovers. Specifically, this makes the policy more effective in enhancing aggregate productivity, by reallocating market share towards more productive firms. However, it simultaneously makes attracting multinationals harder, due to more pronounced increases in competition in the exporting market. Intuitively, the result underscores that multinationals could strategically avoid relocating production in a country if this potentially creates a pool of highly efficient competitors. Thus, those countries that have a subset of firms with outstanding capabilities and hence could potentially benefit more from this policy, are also the ones that could face additional hurdles to implement it.

Keywords: multinationals, foreign direct investment, FDI, productivity spillovers, firm heterogeneity.
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1 Introduction

In the most comprehensive study with firm-level export data to this date, Freund and Pierola (2015) conclude that "generating exports is not about promoting domestic entrepreneurship, but rather about attracting large multinationals." This has been a recurrent policy prescription for developing countries, due to the positive spillovers created when multinational enterprises (MNEs) locate production in a country (e.g., by knowledge transfer, input sharing, improved access to foreign markets).

In this paper, we consider a government attracting an MNE to boost the efficiency of its exporters through productivity spillovers. Using the approach by Melitz and Redding (2015), we isolate the consequences of accounting for heterogeneous responses by firms. The main conclusion is the existence of a trade-off. On the one hand, the most productive exporters benefit relatively more from spillover effects. Thus, the policy is more effective in increasing the exporters' efficiency, since it induces the exit of the least productive firms and reallocates market share towards more efficient firms.[1] On the other hand, this simultaneously implies that competition in the exporting market becomes even more pronounced. Thus, MNEs would eventually garner relatively lower profits, and attracting (or retaining) MNEs becomes more difficult.

The result is particularly relevant given that MNEs are oligopolistic firms influenced by strategic motives. This implies that they could strategically avoid relocating production in a country if this creates a subset of highly efficient competitors. As a corollary, those countries that have a subset of firms with outstanding capabilities and hence could potentially benefit more from this policy, are also the ones that may face additional hurdles to implement it.

Related Literature and Contribution. The standard framework to incorporate MNEs under firm heterogeneity is based on Helpman et al. (2004). This considers an augmented-version of Melitz (2003), where monopolistic firms decide whether to serve a market via exports or foreign direct investment (FDI). Using this approach and under absence of productivity spillovers, the closest paper to ours is Chor (2009). This article analyzes subsidies to fixed and variable costs to attract MNE, focusing on how these policies differentially impact the host country. Since all firms are monopolistic, this approach implies that no firm in isolation affects industry conditions (including MNEs), and also that even a small subsidy attracts a positive mass of MNEs.

On the contrary, our paper focuses on the MNE's decision to relocate production under productivity spillovers. Furthermore, we contribute to the literature on FDI by using an alternative approach. This is in line in particular with Kosova (2010), which studies the

[1] For an empirical analysis regarding the impact of multinationals on productivity through market reallocation, see Alfaro and Chen (2018).

effects of MNEs in a homogeneous-good industry assuming a dominant firm-competitive fringe framework. In this setting, the host country's firms are modeled as in a competitive industry à la Jovanovic (1982), with the MNE acting as a monopolist with respect to the residual demand. We instead study a differentiated-good industry, but follow a similar logic: the host country's firms are modeled as in the monopolistic-competition setting by Melitz (2003), and the MNE as an oligopolistic firm.

2 Setup

We consider a differentiated-good industry in isolation that does not affect wages or income, and two countries, H and F. To illustrate the mechanism as clearly as possible, we suppose that country H has zero demand for this good. Moreover, country F is served by H's exporting firms and one MNE installed in F. As we remark below, all our conclusions hold if we consider an alternative scenario where the MNE is already located in H, with the government providing the MNE with benefits to keep its operations in H.

Normalizing total expenditure, the demand for variety ω in F is $q_\omega := (\mathbb{P})^{\sigma-1} (p_\omega)^{-\sigma}$, where p_ω is ω's price and $\mathbb{P}$ is the CES demand's price index. We distinguish between variables of the MNE by using capital letters, so that Q and P are the MNE's price and quantity.

The MNE is supposed to be an oligopolistic firm with constant marginal costs C. Moreover, it incurs "iceberg" trade costs τ, where $\tau > 1$ if MNE serves F from H, and $\tau = 1$ if it operates in F. Without loss of generality, we also suppose that the MNE does not incur overhead costs.

Firms in H are modeled as in Melitz (2003). Thus, there is a continuum of potential firms that do not know their productivity. Each of these firms can pay a sunk entry cost F^e to get a unique variety assigned and a productivity draw φ, where productivity is a continuous random variable with cdf G and support $\left[\underline{\varphi}, \overline{\varphi}\right]$. Also, we suppose that these firms incur an overhead cost f if they serve F.

Spillover effects from the MNE are captured as productivity gains. More precisely, firms in H have constant marginal costs $c(\varphi, \tau) := \frac{w\tau}{\varphi x}$, where x represents positive spillovers if the MNE locates production in H. This variable is formally defined by $x = \alpha > 1$ if the MNE serves F from H, or $x = 1$ if the MNE serves F domestically.

We consider two scenarios. In the first one, which we refer to as the *status quo*, the MNE is located in F. We represent equilibrium values for this case through superscripts $*$. In the second scenario, H's government attracts the MNE through some fixed payment T to serve F from H. Each variable's equilibrium in this scenario is represented through superscripts

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Our goal is to identify the impact of firm heterogeneity on the amount T paid by H's government. To accomplish this, we follow Melitz and Redding (2015) to isolate the consequences of this aspect. Their approach requires comparing outcomes in Melitz, against a variant à la Krugman that satisfies two properties: it predicts the same status-quo equilibrium as in Melitz, and firms share the same average productivity as the active firms in Melitz. Basically, the approach compares setups where, starting from the same scenario, one incorporates heterogeneous responses by firms.

We distinguish between equilibrium variables in the heterogeneous and homogeneous model through subscripts h and o, respectively. As Melitz and Redding (2015) show, a setting à la Krugman can be defined as a special case of Melitz. Specifically, let φ_h^* be the survival productivity cutoff in the status quo under Melitz. Then, Krugman corresponds to a setting as in Melitz where firms receive either a zero productivity draw with exogenous probability $\overline{G} := G(\varphi_h^*)$ or a draw $\widetilde{\varphi} := \left[\int_{\varphi_h^*}^{\overline{\varphi}} \varphi^{\sigma-1} \frac{\mathrm{d}G(\varphi)}{1-\overline{G}}\right]$ with probability $1-\overline{G}$. Moreover, in order for both models to predict the same equilibrium in the status quo, we suppose that each model's parameters are calibrated to satisfy $\mathbb{P}_o^* = \mathbb{P}_h^*$.

3 Result

The main result of the paper is the following.

Proposition 1. *$\varphi_h^{**} > \varphi_h^*$ in the heterogeneous-firms setting, so that market share is reallocated towards more productive firms when the MNE sets operations in H. Moreover, $\mathbb{P}_h^{**} < \mathbb{P}_o^{**}$ and $T_h > T_o$, implying that competition increases more in the heterogeneous-firms setting and attracting the MNE is relatively more costly.*

Before proving the proposition, we analyze its implications. In both the homogeneous- and heterogeneous-firms settings, H's government has to pay a positive T to induce the MNE to stop serving F domestically and set operations in H. This payment compensates for both the exporting trade costs that the MNE starts incurring and reductions in profits due to changes in the competitive environment.

Comparing the heterogeneous- and homogeneous-firms settings allows us to isolate, and hence identify, the consequences of firm selection for outcomes. First, the productivity cutoff increases. Thus, market share is reallocated towards more efficient firms when the MNE locates production in H. Relative to the homogeneous-firms model, this implies further gains in productivity. Nonetheless, it also represents further decreases in the price index, and hence a relatively tougher competitive environment for the MNE in the exporting market.

This lowers the MNE's incentives to locate production in H, which is reflected in a more significant payment by the government.

All our results are valid if the MNE is already located in H in the status-quo scenario. In that case, the MNE analyzes whether to stay in H or move its operations to F, where we could even incorporate some additional fixed cost of doing this. In this context, T would represent the benefits provided by the government to induce the MNE to stay in H, and the results indicate that T is greater in the heterogeneous-firms setting.

Proof of Proposition 1. Denoting the MNE's market share by S, the MNE's optimal prices are $P = \mu C$, where $\mu := \frac{\varepsilon}{\varepsilon-1}$ is its markup and $\varepsilon := \sigma + S(1-\sigma)$ is its demand's price elasticity. This determines that its optimal profits are $\Pi := \left(\frac{\mathbb{P}}{\mu C}\right)^{\sigma-1}$, and so the minimum value T in each model that induces the MNE to set operations in H is respectively:

$$T_o := \left(\frac{\mathbb{P}_o^*}{\mu_o^* C}\right)^{\sigma-1} - \left(\frac{\mathbb{P}_o^{**}}{\mu_o^{**} C}\right)^{\sigma-1} \tau^{1-\sigma},$$
$$T_h := \left(\frac{\mathbb{P}_h^*}{\mu_h^* C}\right)^{\sigma-1} - \left(\frac{\mathbb{P}_h^{**}}{\mu_h^{**} C}\right)^{\sigma-1} \tau^{1-\sigma}.$$

By this, the difference in payments between settings, $\Delta T := T_h - T_o$, is

$$\Delta T = (C\tau)^{1-\sigma} \left[\left(\frac{\mathbb{P}_o^{**}}{\mu_o^{**}}\right)^{\sigma-1} - \left(\frac{\mathbb{P}_h^{**}}{\mu_h^{**}}\right)^{\sigma-1}\right]. \tag{1}$$

This implies that the payment is greater in the heterogeneous-firms setting when $\Delta T > 0$, which arises when $\frac{\mathbb{P}_o^{**}}{\mu_o^{**}} > \frac{\mathbb{P}_h^{**}}{\mu_h^{**}}$. In turn, using that $\frac{\partial \ln \mu}{\partial \ln \mathbb{P}} = \frac{(\mu-1)\left(\frac{\sigma-\varepsilon}{\varepsilon}\right)(\sigma-1)}{1+(\sigma-1)(\mu-1)\left(\frac{\sigma-\varepsilon}{\varepsilon}\right)} > 0$, this occurs when $\mathbb{P}_h^{**} < \mathbb{P}_o^{**}$. Next, we show this holds.

Let $\kappa := \left(\frac{\sigma}{\sigma-1} w\right)^{1-\sigma}$. In the homogeneous-firms setting, the free-entry condition in each scenario determines

$$\frac{\kappa \left(\widetilde{\varphi}\right)^{\sigma-1} \left(1-\overline{G}\right)}{\left(\mathbb{P}_o^*\right)^{1-\sigma}} - f\left(1-\overline{G}\right) = \frac{\kappa \left(\alpha\widetilde{\varphi}\right)^{\sigma-1} \left(1-\overline{G}\right)}{\left(\mathbb{P}_o^{**}\right)^{1-\sigma}} - f\left(1-\overline{G}\right) = F^e,$$

where $\mathbb{P}_o^* = \alpha \mathbb{P}_o^{**}$ after some algebra. Thus, $\mathbb{P}_o^* > \mathbb{P}_o^{**}$.

As for the heterogeneous-firms setting, the survival productivity cutoff in each scenario is $\varphi_h^* = \frac{1}{\mathbb{P}_h^*}\left(\frac{f}{\kappa}\right)^{\frac{1}{\sigma-1}}$ and $\varphi_h^{**} = \frac{1}{\alpha\mathbb{P}_h^{**}}\left(\frac{f}{\kappa}\right)^{\frac{1}{\sigma-1}}$, which implies $\frac{\varphi_h^{**}}{\varphi_h^*} = \frac{\mathbb{P}_h^*}{\alpha\mathbb{P}_h^{**}}$. Moreover, the free-entry condition in each scenario establishes that

$$\int_{\varphi_h^*}^{\overline{\varphi}} \left[\frac{\kappa\varphi^{\sigma-1}}{\left(\mathbb{P}_h^*\right)^{1-\sigma}} - f\right] \mathrm{d}G(\varphi) = \int_{\varphi_h^{**}}^{\overline{\varphi}} \left[\frac{\kappa\alpha^{\sigma-1}\varphi^{\sigma-1}}{\left(\mathbb{P}_h^{**}\right)^{1-\sigma}} - f\right] \mathrm{d}G(\varphi) = F^e,$$

which, after some algebra, can be expressed as

$$\left(\frac{\mathbb{P}_h^*}{\mathbb{P}_h^{**}}\right)^{\sigma-1} = \frac{\kappa \left(\mathbb{P}_h^{**}\right)^{\sigma-1} \alpha^{\sigma-1} \int_{\varphi_h^{**}}^{\overline{\varphi}} \varphi^{\sigma-1} \mathrm{d}G(\varphi) - f\left[G\left(\varphi_h^*\right) - G\left(\varphi_h^{**}\right)\right]}{\kappa \left(\mathbb{P}_h^{**}\right)^{\sigma-1} \int_{\varphi_h^*}^{\overline{\varphi}} \varphi^{\sigma-1} \mathrm{d}G(\varphi)}. \tag{2}$$

We begin by showing $\varphi_h^{**} > \varphi_h^*$. Using (2) to reexpress $\frac{\varphi_h^{**}}{\varphi_h^*} = \frac{\mathbb{P}_h^*}{\alpha \mathbb{P}_h^{**}}$, then

$$\left(\frac{\varphi_h^{**}}{\varphi_h^*}\right)^{\sigma-1} = \frac{\kappa \left(\mathbb{P}_h^{**}\right)^{\sigma-1} \alpha^{\sigma-1} \int_{\varphi_h^{**}}^{\overline{\varphi}} \varphi^{\sigma-1} \mathrm{d}G(\varphi) - f\left[G(\varphi_h^*) - G(\varphi_h^{**})\right]}{\alpha^{\sigma-1} \kappa \left(\mathbb{P}_h^{**}\right)^{\sigma-1} \int_{\varphi_h^*}^{\overline{\varphi}} \varphi^{\sigma-1} \mathrm{d}G(\varphi)},$$

and, substituting in by $f\left[G(\varphi_h^*) - G(\varphi_h^{**})\right] = \left(\varphi_h^{**}\right)^{\sigma-1} \alpha^{\sigma-1} \left(\mathbb{P}_h^{**}\right)^{\sigma-1} \kappa \left[G(\varphi_h^*) - G(\varphi_h^{**})\right]$, we determine that

$$\left(\frac{\varphi_h^{**}}{\varphi_h^*}\right)^{\sigma-1} = \frac{\int_{\varphi_h^{**}}^{\overline{\varphi}} \varphi^{\sigma-1} \mathrm{d}G(\varphi) - \left(\varphi_h^{**}\right)^{\sigma-1} \left[G(\varphi_h^*) - G(\varphi_h^{**})\right]}{\int_{\varphi_h^*}^{\overline{\varphi}} \varphi^{\sigma-1} \mathrm{d}G(\varphi)}. \tag{3}$$

Noticing that $\varphi_h^{**} \neq \varphi_h^*$ and towards a contradiction, suppose that $\varphi_h^{**} < \varphi_h^*$ Then, the right-hand side of (3) is lower than one, which implies that

$$\int_{\varphi_h^{**}}^{\overline{\varphi}} \varphi^{\sigma-1} \mathrm{d}G(\varphi) - \int_{\varphi_h^*}^{\overline{\varphi}} \varphi^{\sigma-1} \mathrm{d}G(\varphi) < \left(\varphi_h^{**}\right)^{\sigma-1} \left[G(\varphi_h^*) - G(\varphi_h^{**})\right].$$

But, since $\varphi_h^{**} < \varphi_h^*$, the left-hand side is negative and the right-hand side is positive, which is a contradiction. Thus, $\varphi_h^{**} > \varphi_h^*$. Moreover, by $\frac{\varphi_h^{**}}{\varphi_h^*} = \frac{\mathbb{P}_h^*}{\alpha \mathbb{P}_h^{**}}$ and $\alpha > 1$, then $\mathbb{P}_h^{**} > \mathbb{P}_h^*$. Finally, $\Delta T > 0$ follows if we show that $\mathbb{P}_o^{**} > \mathbb{P}_h^{**}$. But, this holds since $\alpha \mathbb{P}_o^{**} = \mathbb{P}_o^* = \mathbb{P}_h^* > \alpha \mathbb{P}_h^{**}$, where we used that both $\frac{\mathbb{P}_h^*}{\alpha \mathbb{P}_h^{**}} = \frac{\varphi_h^{**}}{\varphi_h^*} > 1$ and $\mathbb{P}_o^* = \mathbb{P}_h^*$. ■

4 Conclusion

We have studied a scenario where the location of an MNE creates productivity spillovers in the host country, with the government aiming to attract the MNE to boost its exporters' productivity. The results highlight a trade-off when the most productive firms benefit more from this policy: it becomes more effective in enhancing productivity, since resources are reallocated towards more efficient firms; nonetheless, it concurrently increases competition further in the exporting market, thereby lowering a multinational's incentives to relocate production.

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