EQUILIBRIUM EFFECTS OF SIZE-BASED POLICES ON MULTI-PRODUCT FIRMS

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Abstract. Small and medium enterprises (SME) account for a substantial proportion of manufacturing employment across countries. Governments commonly support SMEs with size-based industrial policies such as subsidies, financial and technical assistance and preferential procurement. In some cases, these policies are targeted towards specific products as well. In this paper, I model how such policies can affect firm entry, firm size and the product mix in a general equilibrium framework. In the theoretical model, multiproduct firms with correlated productivity across products, make extensive (entry) and intensive (size and scope) margin decisions in the presence of these policy distortions. Theoretically, I show how products that are not directly targeted by the policy can be indirectly affected through adjustments in the product mix. I then empirically test the theoretical predictions and estimate the model using the dismantling of a large, size-based industrial policy reform in India that reserved several products to be manufactured by small firms. I find that the policy reform increased consumer welfare by 1.62 percent. I further decompose the welfare gain and find that over half the gain came from the extensive margin (entry) adjustment, while over a third came from adjustment in firm size. The rest came from adjustment in the product mix, which highlights the importance of studying this channel of firm responses to industrial policies.

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Introduction

Small and medium enterprises (SME) account for more than half the manufacturing employment in many developing countries. Governments commonly support SMEs with size-based industrial policies (for example subsidies, financial and technical assistance, preferential procurement), with the idea that small firms are the primary drivers of economic growth and employment. In general, SME policies can be broadly classified in two types: one set of policies that are product-specific (for example, tax credits, technical assistance, preferential procurement) and a second set of policies that are only size-based and do not target manufacturing of specific products (for example, financial assistance).

There is a recent, but growing literature that examines the impact of such policies on a firm's production decision, the distortions that it can generate and its effect on consumer welfare (Bento and Restuccia (2017); Bernard et al. (2011); Brandt et al. (2013); Chaney (2008); Eckel and Neary (2010); Guner et al. (2008); Hsieh and Klenow (2009)). Typically in partial equilibrium (holding prices fixed), firms can respond on the extensive margin (entry) as well as on the intensive margin, by adjusting which products they manufacture (product mix) and how much they manufacture of each (firm size). A second channel, operating through changes in product and factor prices in general equilibrium can further affect both these margins. Moreover, product-specific size-based policies can also generate spillovers on products that are not targeted by the policy by incentivizing productive, large firms to move away from the targeted products.

In this paper, I propose examine how firms, manufacturing multiple products, respond to product-specific, size-based policies in a general equilibrium framework. I model firms as producing multiple products and can respond to these policies on both the extensive (entry) and intensive (size and scope) margins. I further examine how the removal of such policies can affect firms in general equilibrium. I examine the spillovers that it generates on products that are not directly targeted by the policy but are indirectly affected through firm responses.

To test the theoretical predictions of the model, I examine the dismantling of a large, size-based, product-specific, domestic policy in India that reserved hundreds of products to be manufactured by small firms. Having confirmed the theoretical predictions, I then estimate the model to quantify

the welfare gain from the policy reform. Lastly, I decompose the welfare gain along adjustments in the intensive and extensive margin. I find that the extensive margin accounts for around a half of the gain in welfare, while adjustments in firm size account for one third of the gain. The rest comes through adjustments in the product mix, suggesting the importance of studying this channel in the context of industrial policies.

Theory

I build on the theoretical framework by Bernard et al. (2011) and model the production decision of multiproduct firms with productivity draws that may be correlated across products within a firm. Correlations in productivity are important to the extent that size and product specific policies impact the product mix through spillovers in production decisions across products. Each firm chooses whether to produce at all (extensive margin) and conditional on entry, the mix of products and the quantity of each (intensive margin). A firm is classified as 'small' if the total value of its capital (across all the products it manufactures) is below a certain threshold[1]. I then model firm behavior in the context of a SME promoting policy that imposes a per-unit tax on revenue[2] of a large firm. Furthermore, I consider two types of SME policies: (a) size-based policies that are not product-specific i.e. large firms are taxed irrespective of the products they manufacture and (b) policies that are both size and product specific i.e. large firms are taxed only if they manufacture certain products targeted by the policy and not otherwise. I show that though both these policies distort firm production, they have very different implications on the nature of the distortion. Under the first set of policies that are size-based only, as firms get more productive and hence constrained by the policy, they initially adjust their size and product mix to bunch around the size threshold. However, very productive firms pay the tax and increase in size and scope instead. On the other hand, when policies are size-based and apply only to specific products, in addition to the above channels, they also induce a reallocation in the product mix as well. Specifically, firms now have

[1]While many countries define firm size based on employment or sales, this definition applies in the context of India, which I study in this paper.

[2]Many policies supporting SMEs also impose a size-based tax on capital or labor. It is straightforward to extend the model to incorporate this.

an additional option of dropping the products targeted by the policy– even though these products are viable for production– and manufacture the non-targeted products only. This is more stark in the case of firms that are relatively more productive in the non-targeted products as compared to the targeted products. Therefore, this implies that products that are not targeted directly by the policy are in fact, indirectly affected through the choice of a firm's product mix.

Lastly, I discuss how the removal of such policies can impact firm decisions and hence consumer welfare. In partial equilibrium (holding prices fixed), all firms expand in size and scope. However, the general equilibrium effect (operating through higher factor prices and lower product prices) induces firms to narrow their product mix or even exit on the extensive margin. The model therefore generates several predictions on how different types of firms (small and large, incumbents and entrants) respond to the policy removal– (a) incumbents (firms manufacturing the targeted products before the policy is removed) are more likely to shrink in size and scope, with small incumbents shrinking more than large incumbents; (b) entrants (firms manufacturing the targeted products after the policy removal) are more likely to expand in size and scope, with larger entrants expanding more than smaller ones; (c) small firms are more likely to reduce in size and focus on their core-competency products while large firms are more likely to expand their product scope by adding products that were targeted under the policy.

Empirical analysis

I test the theoretical predictions of the model using the dismantling of a large, size-based, product-specific domestic policy in India. In the late 1960s, the Government of India reserved hundreds of products to be manufactured only by small firms. Large firms were barred from manufacturing these products. However, starting 1997 and largely between 2000 and 2007, these barriers were lifted as products were gradually "dereserved". Using the plausibly exogenous variation in the timing of dereservation, one can test the theoretical predictions of the model by examining firm responses in size and scope to the policy removal. Using a panel of firms in the Annual Survey of Industries, Martin et al. (2017) show how the policy reform affected firm size

(measured by output, capital and labor). In line with the theoretical predictions above, they find that small incumbents decreased in size on average (employment and output declines by 6 percent on average) while large incumbents expanded. All entrants (small and large) expanded on average and large entrants were more likely to grow as compared to small entrants. I further extend the analysis to test the model predictions on the product mix as well, especially on the products that were never-reserved. Using the same panel of firms, I show that incumbents reduced their product mix on average while entrants expanded. Within incumbents, small incumbents were more likely to shrink than large ones. On the other hand, all entrants expanded their product mix and larger entrants were more likely to add the dereserved products. Lastly, I show that a substantial component of these changes in the product mix (and sales) stem from changes in the manufacturing of never-reserved products, thus establishing spillovers across products as implied by the model.

Welfare implications

Lastly, I turn to examining the consequences of the policy reform on consumer welfare. I begin by imposing parametric assumptions on the productivity distribution. I assume productivity to be log-normally distributed, with potential correlation in productivity across products within an industry. Since the policy is implemented imperfectly (empirically, I observe large firms manufacturing reserved products), I model the policy as a per-unit tax on revenue if a large firm manufactures atleast one reserved product. I then estimate the model using firm data from the Annual Survey of Industries before and after the policy. Parameter estimates indicate substantial correlation (both positive and negative) across products. This is especially important in affecting the extent of production distortions in the context of size-based policies that target specific products.

Having estimated the model, I then turn to examining the implications of the policy reform on consumer welfare. First, I find that dismantling the policy increased consumer welfare by 1.62 percent. In subsequent counterfactual exercises, I decompose the gain in welfare along the extensive and intensive margin to examine the relative importance of these margins in firm responses to the

policy reform. I find that over half the welfare gain came from the extensive margin adjustment, just over one third came from adjustment in the firm size, while the rest came through adjustment in the product mix.

Conclusion

This paper examines how firms respond to product-specific, size-based policies that support small firms and the consequences that it has on consumer welfare. In the theory, I model the decision of a multiproduct firm that has correlated productivity draws across products. The production decision of a firm on the extensive (entry) and intensive (size and product mix) margins reflects the presence of these policies. Moreover, I show how products that are not targeted directly by the policy are indirectly affected through firm decisions. Empirically, I use the dismantling of a large, product-specific, size-based, domestic policy in India that reserved products to be manufactured only by small firms to examine firm responses. Specifically, I test the theoretical predictions of the model by examining how different types of firms (incumbents, entrants, small and large) respond to the policy reform. Lastly, I use the model to quantify the welfare gain from the policy reform. I find a modest increase in welfare of 1.62 percent. I then decompose the welfare gain and find that while a substantial fraction of it comes from the extensive margin and firm size, a significant fraction of the welfare gain also comes from adjustment in the product mix.

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