



Multi-product firms, product scope, and the policy of export tax rebate



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ABSTRACT

This paper extends the model of Nocke and Yeaple (2014) to analyze the impact of the export tax rebate (ETR) changes on multi-product firms' product scope. In response to ETR changes, firms optimally reallocate their organizational capital, and adjust the intensive and extensive margins of production. We test the model's predictions using firm-level export and ETR data from China. We find that less profitable products, facing larger ETR reductions, and products in which China has a comparative disadvantage, are more likely to be dropped.

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1. Introduction

Multi-product firms account for a considerable share of international trade. In China, about 70% of exporting firms produce more than one product during 2000–2006, with their export revenues accounting for more than 90% of China's total exports. Bernard, Redding, and Schott (2010) document that multi-product firms frequently adjust their product mix over time and across markets. Besides, the cannibalization effect is a key determinant of firm-level product scope and this makes the intra-firm adjustments within multi-product firms significantly different from single product firms via entry and exit. As such, it is not only interests academic, but the economic impact of this research demonstrates the importance of investigating how multi-product firms react to policy changes, such as ETR.

In this paper, we extend the model of Nocke and Yeaple (2014) to analyze how multi-product firms adjust their product scope in response to an exogenous shock, such as a policy change. In contrast to Nocke and Yeaple (2014), we assume that firms are not only heterogeneous in their organizational capital and organizational efficiency, but also have different product specific expertise. Specifically, the organizational capital and efficiency determine the overall firm-level efficiency in production, while the product specific expertise affects a firm's core competence among different products. Firms optimally allocate their organizational capital toward different products. On one hand, given the product specific expertise, products being allocated more organizational capital exhibit lower marginal production cost; on the other hand, given organizational capital, products of higher expertise exhibit lower marginal cost. The allocation of organizational capital results in a cannibalization effect even in a monopolistic competition setting. Expanding product scope diminishes organizational capital in existent products, and hence increases their marginal production costs while lowering sales.

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China offers an ideal setting to empirically analyze how multi-product firms adjust their extensive margin in response to an exogenous shock and test the model's predictions. In China, there exists a series of policies which aim to adjust the structure of international trade by subsidizing or taxing export firms. One example is the establishment of the export tax rebate (ETR, thereafter) system, which refunds exporting firms the value-added and consumption tax they pay. The Chinese government changes product-level ETR rate frequently to adjust its export structure. In 2004, Chinese government reduced its ETR rate, on average, by 20%. This dramatic reduction of the ETR provides a natural experiment to estimate its impact on multi-product firms' product scope. Some recent papers analyze the impact of ETR on exporting firms' intensive margin (Chandra & Long, 2013; Chao, Chou, & Yu, 2001; Gourdon, Monjon, & Poncet, 2014; Liu & Weng, 2006). They all document the positive relationship between ETR and firm-level export quantities. However, to the best of our knowledge, there are few papers which investigate the impact of the ETR on the firm-level extensive margin. Our empirical results show that multi-product firms contracted their product scope in response to the ETR reduction. Furthermore, less profitable products, experiencing larger ETR reductions, and products in which China has a comparative disadvantage, are more likely to be dropped. These results are consistent with the model's predictions and indicate that 2004 reduction of the ETR had a substantial impact on export behavior.

Our paper is closely related to the multi-product firm literature. Eckel and Neary (2010) build a model to disentangle the impact of cannibalization and competition on multi-product firms' extensive margin. Nocke and Yeaple (2008) discuss the size distribution of multi-product firms. Nocke and Yeaple (2014) develop an economic model incorporating organizational capital but without product-level heterogeneity to explain multi-product firms' product scope decisions. Mayer, Melitz, and Ottaviano (2014) exclude the cannibalization effect by using the CES utility function, and they indicate that tougher competition enforces multi-product firms to skew more toward their core competence products and drop their least productive products. Song and Zhu (2011) and Manova and Zhang (2012) use Belgian and Chinese export data to document evidence that multi-product firms vary their product mix according to market toughness. Bernard, Redding, and Schott (2011), Fuss and Zhu (2012) and Ma, Tang, and Zhang (2014) show that trade liberalization leads multi-product firms to contract product scope and thereby increasing firm-level productivity.

This paper contributes to the literature in several aspects. First, it emphasizes the importance of product cannibalization on export firms' product scope. Differing from trade liberalization, the ETR reduction has a trivial competition effect as it only affects the cost of domestic exporting firms. This is contrary to Mayer et al. (2014), who investigate the importance of the competition effect on multi-product firms' extensive margin. Second, recent research only analyzes the impact of ETR changes on export firms' intensive margin, which leave its impact on firm-level product scope and the effectiveness of the ETR policy unclear. This work attempts to fill the gap in the literature. Third, in this model, we incorporate countries' comparative advantage and product specific expertise, and both of them have a nonnegligible influence on a firm's product scope. In line with Bernard, Redding, and Schott (2007), the reallocation of production (organizational capital) reinforces a country's comparative advantage.

The structure of this paper is as follows. In Section 2, we describe the model and the comparative statistics; Section 3 introduces the ETR system in China and empirically estimates the impact of ETR reduction on export firms' product scope. Section 4 concludes.

2. The model

Each firm decides its product scope, prices, and export status. Following Nocke and Yeaple (2014), we assume that firms are heterogeneous in organizational capital and organizational efficiency. Organizational capital is the intangible assets a firm owns, which can increase firm-level productivity. Corrado, Haltiwanger, Sichel, and Prennushi (2005) divide organizational capital into several categories. The work design¹ (including the number of levels of management within a firm and job sharing arrangements.) is an important component of organizational capital. Ichniowski and Prennushi (1999) find that flexible job assignments and training in multiple jobs can substantially increase firm productivity. The production of each product requires labor, physical capital and organizational capital. The more organizational capital is used in the production of a given good, the lower the marginal cost is of that good. Organizational efficiency determines the effectiveness of the organizational capital in reducing product-specific marginal costs. In line with H–O model, a country's comparative advantage is determined by its endowments. The production of each product needs a fixed cost, f , in each period. A representative firm's production function for product ω is of a Cobb–Douglas form:

$$Q = \theta_{\omega} l^{\alpha_{\omega}} k^{1-\alpha_{\omega}} \quad (1)$$

where $\theta_{\omega} = k_{\omega}^{\beta} e^{\eta}$ is the productivity of product ω , which is determined by the organizational capital k_{ω} allocated to product ω , the firm specific organizational efficiency θ , and product specific random shock e^{η} with $Ee^{\eta} = 1$.² The total organizational capital is fixed at K_{θ} ($\sum_{\omega} k_{\omega} = K_{\theta}$) for the firm. l and k are the labor and physical capital, respectively. The parameter α_{ω} is the labor share, $\alpha_{\omega} \in [0, 1]$. As

¹ The other components include workforce training, and employee voice.

² The random part of the product specific productivity can be interpreted as a firm's expertise in different products. This implies that even in a labor intensive country, such as China, it is not necessary that every firm's core competence is labor intensive products. Instead, the firm-product-level competence depends on both the country's factor endowments, and the product specific expertise draw.

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