



Demand, costs and product scope in the export market[☆]



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ABSTRACT

In this paper, we distinguish between the contributions of two dimensions of firm heterogeneity, quality and productivity, to the export performance of Taiwanese multiproduct firms. We develop a theoretical model in which the relative importance of these two dimensions of firm heterogeneity depend on the degrees of product differentiation and cost elasticities of quality improvement. Our empirical results confirm the predictions of the theoretical model. Both quality and productivity play important roles in explaining firm export participation and export scope. Quality contributes more to export decisions for firms in more differentiated product markets and products with lower cost elasticities of quality improvements while productivity effects are stronger in markets with low degrees of product differentiation but high cost elasticities of quality improvements.

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1. Introduction

For many middle-income countries such as Taiwan, the heavy dependence on exports has meant that these economies are particularly susceptible to the swings in conditions in the global market. Over the last two decades, the foundation of Taiwan's export success, initially based on inexpensive domestic labor and low costs, was gradually transformed into one where product upgrading and market diversification played an increasingly important role in driving export success. In fact, since the mid-1990s, the production of low-skilled and labor-intensive goods has been outsourced to countries with low wages so that by the year 2000, almost half of Taiwan's total export orders were outsourced overseas, primarily to China. At the micro-level, this development meant that success in the export market no longer belongs only to firms that are able to compete on the basis of costs but also those that produce high value-added products demanded by consumers in multiple foreign markets. Indeed, there is increasing evidence that firm adjustments on the demand side of the market in the form of product and market diversifications constitute an important component of firm performance and therefore, a crucial survival strategy in response to increased competition from low cost countries.

However, empirical estimation of the role of the demand side in explaining the pattern of export participation and the overwhelming export success in middle-income countries like Taiwan is relatively recent. The bulk of the emphasis in the

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current literature has been on documenting the strong productivity performance and thus supply conditions of exporting firms. In this literature the use of revenue-based productivity measures implies that measured productivity may not only represent firm production efficiency but also idiosyncratic demand shifters such as consumer preferences for product quality or increased market size. Moreover, since higher quality products are more expensive to produce, the introduction of product quality straddles both the demand as well as cost side for firms. In this paper, we expand on the growing micro-level evidence indicating that both domestic and international activities tend to be dominated by a handful of very large multi-product firms.¹ We show that the success of these firms are driven not only by high productivity but also by their ability to exploit market demand factors.

We contribute to the current literature by focusing on the role of firm-product heterogeneity in the export decisions of firms in two specific ways. First, we are able to construct a demand index and a productivity index for each firm-product pair rather than rely on proxies that are commonly used in the literature. There are a few recent papers that examine the role of product quality in the success of domestic or export firm.² We extend this literature by constructing measures of demand and productivity indexes at the firm-product level that directly account for the heterogeneity of production technologies across products within a multi-product firm. Second, we explicitly model and empirically test the relative importance of firm productivity and product quality in product markets as functions of both degrees of product differentiation and costs of product improvements. While other multi-product analysis have taken the degree of product differentiation into account,³ our paper is the first to estimate the cost elasticity of demand side improvements. This approach and our access to the detailed data on the quantity and value of sales at the firm and product levels enables us to separately identify the roles of firm productivity, product quality and how the magnitudes of demand elasticities and cost elasticities impact on export participation and firm export scope.

Several papers in the recent literature have shown that the ability to distinguish between productivity and product quality provides insights into the determinants of how firms grow and survive in both the domestic and export markets.⁴ These papers show that understanding firm growth depends crucially on whether the shock that firms face arise from the demand or productivity side and on accounting for demand heterogeneity. To highlight the differences in demand and cost components across the product range of firms, recent work has begun to explore more disaggregated levels of firm heterogeneity based on theoretical models of multiproduct firms. Papers in this literature have developed general equilibrium models of trade that feature endogenous product scope and export decisions and use them to study the impact across country and over time on the firm's product scope.⁵ Among the interesting findings in this literature is evidence that exporters tend to skew their export sales toward their best performing products (Bernard et al., 2011; Mayer et al., 2014) and products with high degrees of product differentiation (Eckel et al., 2015) and that large firms export their lowest-selling products in smaller amounts than the lowest-selling products of small exporters (Arkolakis et al., 2015).⁶ More recently, Hottman et al. (2016) use bar-code data on product price and quantity in 42 U.S. cities and develop a structural model to estimate firm product appeal and the marginal costs based on the demand and price equations. They find that 50–70 percent of the variation in firm size can be explained by the difference in product appeal, 20–25 percent is attributed to product scope and less than 25 percent to marginal costs. Their findings suggest that variations in firm product appeal and product scope explain at least four fifths of the variation in firm sales and traditionally estimated revenue productivity reflects difference in product appeal rather than firm costs. Together, all these papers suggest that a fruitful way to proceed in our understanding of firm export decisions is to focus on demand and cost components at the firm-product level.

In this paper, by constructing the demand and productivity indexes for each firm-product pair, we can more accurately document how firms' demand index and productivity affect their export participation and product expansion decisions in export markets. We further extend the current literature by analyzing how the degree of substitutability across product varieties in demand and how costly it is to each firm to push its own demand shifter upwards simultaneously affect the relative importance of these firm-product specific measures of demand and productivity indexes. By linking the relative importance of these two sources of firm heterogeneity to both the degree of product differentiation and the costs of product

¹ Bernard et al. (2007) indicate that U.S. firms exporting more than five (10-digit HS) products comprise only 25% of exporters but 98% of export value. Bernard and Okubo (2013) show that multiproduct firms account for 63% of total output in Japan's manufacturing sector. According to Goldberg et al. (2010) multi-product firms account for 47% of manufacturing firms but 80% of manufacturing output in India.

² Like us, Martin and Mejean (2014) use the CES demand function to construct firm-product demand index for French exporters and find that the increase in mean quality of French exports is particular pronounced in the markets where French firms faced intensive competition from low-wage countries. However, they do not consider the channel of cost reduction to firm success in the international market. Hottman et al. (2016) develop a structural model to estimate firm product appeal and marginal costs based on the demand and price equation. They find that product appeal plays a relatively more important role than costs in explaining the variation of firm size. In their paper, firm productivity is not separated from input costs in their estimates of firm marginal costs. Eckel et al. (2015) analyze the contributions of firm product quality and productivity to the profile of output prices of multiproduct producers. Instead of directly estimating the quality and productivity indices, they examine the relationship between product prices and whether goods are classified as homogenous or differentiated.

³ See Broda and Weinstein (2006) and Hottman et al. (2016).

⁴ Foster et al. (2008) and Pozzi and Schivardi (2016) focus on the domestic market and Roberts et al. (2016), Gervais (2015), Crozet et al. (2012) and Piveteau and Smagghue (2015) concentrate on the export market.

⁵ See Bernard et al. (2011); Eckel et al. (2015); Mayer et al. (2014) and Arkolakis et al., (2015).

⁶ By allowing the market access costs to decrease with the number of exported varieties, Arkolakis et al., (2015) show that Brazilian exporters with high firm-wide productivity systematically export more varieties and export their lowest-selling products in smaller amounts than the lowest-selling products of small exporters.

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