



Multiproduct firms and scope adjustment in globalization

Larry D. Qiu ^{a,*}, Wen Zhou ^b

^a Faculty of Business and Economics, University of Hong Kong, Pokfulam Road, Hong Kong

^b Faculty of Business and Economics, University of Hong Kong, Hong Kong

ARTICLE INFO

Article history:

Received 6 July 2010

Received in revised form 7 March 2013

Accepted 24 April 2013

Available online 30 April 2013

JEL classification:

F12

F13

F15

Keywords:

Multiproduct firms

Globalization

Trade liberalization

Scope

Firm heterogeneity

ABSTRACT

A model of heterogeneous firms with variety-specific fixed costs is developed and analyzed to study how multiproduct firms respond to globalization. In contrast with most existing models, the analysis demonstrates that more-productive firms may expand their product scope, which in turn may push up their average costs. A necessary and sufficient condition for scope expansion is that the fixed cost of introducing more varieties increases rapidly with the product scope. With increasing globalization, the percentage of scope-expanding firms diminishes and eventually becomes zero.

© 2013 Elsevier B.V. All rights reserved.

1. Introduction

Multiproduct firms dominate production and export in modern economies. In the U.S., 41 percent of manufacturing firms produce more than a single product, but they account for 91 percent of U.S. manufacturing output and 94 percent of U.S. exports. Twelve percent of U.S. firms export more than five products to more than five destinations, and they account for more than 90 percent of export value (Bernard et al., 2010, 2012). Similar observations apply to other countries. Several recent studies have extended the Melitz (2003) firm heterogeneity model to multiproduct firms and pointed out that productivity may differ not only across firms, but also within each firm across various products. Despite diverging focuses and different modeling techniques, almost all those models concluded that multiproduct firms invariably reduce their product scope in response to trade liberalization (Bernard et al., 2011; Eckel and Neary, 2010; Mayer et al., 2011).¹ The logic is simple: Just like the least productive firms (in any single-product firm model) are forced to exit in the face of trade liberalization, the least productive products within each multiproduct firm should also be dropped.

Although there is a consensus among existing theoretical papers about the effects of trade liberalization on product scope, the empirical evidence is much more nuanced. In many cases, scope adjustment was found to depend on firm productivity. After the eurozone was established in 1999, the most productive French firms expanded their export scope while less-productive firms reduced it (Berthou and Fontagne, 2013). With the introduction of the North American Free Trade Agreement, many Mexican firms developed new products for export (Iacovone and Javorcik, 2010). Tariff reduction in Canada induced small or non-exporting Canadian firms to reduce their scope, but had no effect on large or exporting firms (Baldwin and Gu, 2009).

Looking back at existing theoretical models more closely, one realizes that the analogy between within-firm rationalization and cross-firm rationalization hinges on the premise that a multiproduct firm's least productive products are also the least productive in the whole industry. This premise, in turn, is derived from a seemingly innocuous assumption that the cost of introducing new products stays constant as a firm expands. Ample evidence, however, indicates within-firm diminishing returns to product development. Empirical studies have shown that the number of patents or innovations per dollar of R&D investment declines as a firm grows larger or a firm's R&D expenditure increases (Scherer, 1980; Bound et al., 1982; Acs and Audretsch, 1991), and that small firms account for a disproportionately large number of innovations relative to their size (Scherer, 1965; Pavitt et al., 1987; Acs and Audretsch, 1988). Cohen and Klepper (1992, 1996) summarized these findings into “the stylized fact that the average

* Corresponding author. Tel.: +852 28591043; fax: +852 25481152.

E-mail addresses: larryqiu@hku.hk (L.D. Qiu), wzhou@business.hku.hk (W. Zhou).

¹ There are two exceptions. Nocke and Yeaple (2008) found that smaller firms expand the number of product lines while larger firms reduce it. Feenstra and Ma (2008) showed numerically that, on average, firms expand product scope.

productivity of R&D, measured in terms of the number of patents or innovations per dollar of R&D spending, tends to be lower for larger firms even though R&D tends to increase proportionately with firm size.”²

As it turns out, the efficiency of product development plays an important role in multiproduct firms' scope choice. We will show in this paper that if new products are increasingly costly to introduce, more-productive firms may expand product scope in response to globalization. This is in sharp contrast with most existing papers which predict unanimous scope contraction. Consider the following scenario. A firm can produce its core product with the productivity that it draws, but incurs a fixed cost of introducing every additional variety, which we call *variety-introduction fee*.³ Inspired by the above-mentioned empirical findings about R&D efficiency, we assume that the variety-introduction fee rises within each firm as it adds more and more varieties. Furthermore, assume that a variety's marginal cost of production rises as it moves further away from a firm's core competence—the familiar core competence approach (for example, Eckel and Neary, 2010). Given declining production efficiency and rising variety-introduction fee, a firm's optimal scope is then reached when the (gross) profit of its least efficient variety, dubbed the *marginal variety*, is just enough to cover its introduction fee. It then becomes clear that a firm expands its scope in response to globalization if and only if globalization raises its marginal variety's profit.

A high-productivity firm can generate a higher profit for each variety than a low-productivity firm for the corresponding variety. This implies that the former will maintain a larger product scope, and therefore production of its marginal variety must be more efficient in order to cover the greater introduction fee it incurs due to its larger scope. In other words, the efficiency of a firm's marginal variety must increase with the firm's productivity. In the linear demand system considered in the main model, globalization raises a variety's profit if and only if the variety is sufficiently efficient (Melitz and Ottaviano, 2008). Although a firm's marginal variety is its least efficient one, it may nevertheless be quite efficient as compared to the industry's average variety if the firm itself is very productive. In that case, the profit of the marginal variety may increase after globalization, and as a result the firm will expand its product scope. Therefore, scope expansion is related to the speed at which the variety-introduction fee rises. If the variety-introduction fee stays constant or increases only slowly, a firm's marginal variety can never be very efficient and consequently the firm will never expand its scope after trade liberalization. The results and insights are obtained from a model with linear demand, but the analysis will show that they also hold for CES preferences.

Thus, a steeply rising variety-introduction fee is necessary and sufficient for scope expansion (by more-productive firms) in response to globalization. Such a condition is absent in all existing models of

multiproduct firms, and that is why scope expansion has never been predicted. If there is no variety-introduction fee, as Eckel and Neary (2010) and Mayer et al. (2011) have assumed, every firm will extend its product scope down to the point where the marginal variety generates zero profit. This means that all firms' marginal varieties are equally inefficient, and they together constitute the industry's least-efficient varieties. Because trade liberalization reduces the profits of the less-efficient varieties, all firms drop their marginal varieties, i.e., they all reduce their product scopes in response to liberalization. With CES preferences, Bernard et al. (2011) assumed constant entry cost for each variety, while Arkolakis and Muendler (2010) allowed the entry cost to vary with scope. However, the variety-level entry costs in those two studies are market specific, while the variety-introduction fee in our model is assumed to be specific to a variety for all markets. This will lead to different predictions.⁴

In addition to the slope of variety-introduction fee, we have identified a number of other factors which may affect the pattern of scope adjustment. Scope expansion is more likely when cross-firm heterogeneity is skewed towards low productivity, when within-firm heterogeneity is smaller, or when the market size is smaller. The analysis also predicts that globalization always induces scope expansion (by the more-productive firms) initially, but further globalization subsequently reduces the percentage of firms that expand their scope, and eventually all firms reduce scope. When a firm expands its scope in response to globalization, the newly added varieties are farther from its core competence and therefore less efficient than its existing varieties. This may raise the firm's average cost. Thus, by showing the possibility of scope expansion and identifying its necessary and sufficient conditions, this study provides a more complete picture of multiproduct firms' behavior in globalization. It also generates novel predictions that can be tested in future empirical investigations.

Several recent studies have addressed multiproduct firms' scope choices and within-firm rationalization in response to trade liberalization. Bernard et al. (2011) assumed heterogeneous production efficiency both among firms and among each firm's varieties. They found that trade liberalization raises the wage rate, which squeezes the least-productive firms in the industry as well as the least-efficient varieties in each firm, so all firms reduce their scope. Eckel and Neary (2010) also found scope reduction by all firms in response to globalization using a model allowing for cannibalization on the demand side and within-firm diminishing efficiency on the supply side.⁵ Mayer et al. (2011) explained how tougher competition induces firms to focus on more successful products, leading to a more skewed product mix as well as a smaller product scope. Their focus is mainly on how competition intensity affects the product mix rather than how trade liberalization affects scope adjustment.⁶ As has been explained earlier, all these researchers found scope contraction because they all assumed no variety-introduction fee, which is the distinguishing feature of this study.⁷

² Declining R&D efficiency is commonly explained by the inefficiency of large organizations. Such a rationale has also been recognized in other academic fields and comes under different names such as “core rigidity” (Leonard-Barton, 1992), “incumbent's curse” (Chandy and Tellis, 2000) and “organizational inertia” (Tripsas and Gavetti, 2000). Note that R&D efficiency is about the link between R&D input and output. If we look at R&D output, there is also a clear pattern that large firms underperform relative to their size. This can be explained by either lower R&D incentives or lower R&D productivity by large firms. Henderson (1993) disentangled these two effects using a unique field data of the photolithographic alignment equipment industry, and concluded that “while established firms invested substantially more in research than entrants did, they were significantly less effective in their efforts to bring products based on major innovation to commercial success.” Henderson (1993) also cited anecdotal evidence in which established industry leaders such as General Electric, IBM, and DEC failed to introduce the next generation products despite extensive experience and heavy investment in product development. See also Henderson and Clark (1990).

³ The most straightforward interpretation of the fixed cost is an R&D expenditure or customization cost, but it can also be understood as a management cost that rises due to limited internal resources for managing multiple products. Such internal resource is called the span of control by Lucas (1978), knowledge capital by Klette and Kortum (2004), organizational ability by Maksimovic and Phillips (2001), and organizational capital by Santalo (2001) in the industrial organization literature and by Nocke and Yeaple (2008) in the trade literature.

⁴ A variety-introduction fee is more like a firm's investment in product R&D, while market-specific entry cost is more like advertising expense for each variety in each market (Bernard et al., 2011). It is this difference which leads to scope expansion (by more-productive firms) in our model but scope reduction in all existing models. The reason will become clear in Section 5.

⁵ Their main model assumes no entries, homogenous firms and Cournot competition, but they show that the result continues to hold with free entry and heterogeneous firms.

⁶ Unlike Bernard et al. (2011) and Eckel and Neary (2010) who found scope reduction unconditional, Mayer et al. (2011) were more cautious: “We do not emphasize these results for the extensive margin, because they are quite sensitive to the specifications of fixed production and export costs.”

⁷ As in this study, Nocke and Yeaple (2008) also found that some firms may expand scope in response to trade liberalization. They assumed that a firm produces all its varieties at a common unit cost, which increases with the firm's scope, but the speed of the increase depends on the firm's organizational capabilities. Such an assumption generates a negative correlation between intensive and extensive margins, a result which contradicts empirical findings and all other theoretical models. The negative correlation led Nocke and Yeaple (2008) to find that smaller firms (i.e., those with lower output and fewer product lines) expand scope in response to trade liberalization. This study, by contrast, predicts a positive correlation between intensive and extensive margins, so the expanding firms are those with larger sales and greater scope.

Download English Version:

<https://daneshyari.com/en/article/962970>

Download Persian Version:

<https://daneshyari.com/article/962970>

[Daneshyari.com](https://daneshyari.com)