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FIRM ADJUSTMENT TO TRADE POLICY CHANGES IN EAST ASIA

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Abstract

Trade and investment liberalization has been one of the key features of economic policy in many developing countries since the 1990s. Research on this subject has consistently produced more evidence on the benefits of globalization; theoretical studies give more attention to what happens within an industry when trade and liberalization occur, while empirical studies confirm the positive impact of trade liberalization. This paper reviews some recent studies on the subject of firms in a globalized economy to enable us to understand more about how firms respond to globalization or changes in trade and investment liberalization. The paper focuses on presenting or explaining the underlying mechanisms through which the effects are realized. The studies summarized in this paper generally confirm the positive impact of trade liberalization on productivity or the spectrum of measures reflecting productivity, such as product quality, firm size, or skill intensity. The positive impact goes through various channels, including competition and industry dynamics, exporting and innovation decisions, and production or investment decisions.

Keywords: trade liberalization, investment liberalization, globalization, productivity

JEL Classification: F1, F6, O14, O53

Contents

1. BACKGROUND

Trade and investment liberalization has been one of the key features of economic policy in many developing countries since the 1990s. A new understanding of the benefits of international trade triggered unilateral tariff reductions from countries throughout the world. As a result, the global economy in the early 21st century has seen significantly reduced barriers, creating much larger trade volumes between countries. This has promoted globalization, as the increasingly borderless countries have nurtured the growth of production networks between countries. It has also made exports an engine of growth and a strategy to foster industrialization.

Economic literature on international trade closely follows globalization, and research has consistently produced more evidence on the benefits of globalization. Undertaking economic analysis of globalization has been facilitated by access to more sophisticated or detailed data (i.e., microdata at firm or plant level). In this context, the recent theoretical literature on heterogeneous firms and trade has emphasized a couple of new mechanisms through which changes in trade policy (trade liberalization) increase aggregate productivity and welfare. While this development has revolutionized our view of how an economy responds to trade and trade policy changes, our understanding is still only partial.

This paper reviews some recent studies on the subject of firms in globalized economy to enable us to understand more about how firms respond to globalization or changes in trade and investment liberalization. The paper focuses on presenting or explaining the underlying mechanisms through which the effects are realized. The studies summarized in this paper generally confirm the positive impact of trade liberalization on productivity or the spectrum of measures reflecting productivity, such as product quality, firm size, or skill intensity. The positive impact goes through various channels, including competition and industry dynamics, exporting and innovation decisions, and production or investment decisions.

This chapter is organized by broad topics commonly adopted by studies in the literature: productivity, competition, product dynamics, technology and innovation, and product fragmentation. Table 1 provides summary of key empirical findings organized by these topics. The chapter concludes with a section on policy implications.

Table 1: Summary of Key Findings

Productivity	Exporting	Competition
Competition, measured typically by dynamics of firms (i.e., firm entry, exit, and growth), increases productivity and improves resource reallocation (e.g., Liu (1993), Liu and Tybout (1996), Olley and Pakes (1996), Aw et al. (2001), and Narjoko (2012)). Aw et al. (2001) found that new manufacturing firms in Taipei,China have lower average productivity than incumbents, although productivity varies significantly across the firms. They also found that the more productive entrants survive, and their productivity converges to the level of incumbents. Narjoko (2012) found a positive relationship between firm entry and industry productivity growth in Vietnamese manufacturing. Rapid trade and investment liberalization occurring in Viet Nam since the early 1990s, which has substantially reduced the cost of establishing private enterprises and of exporting, and has triggered rapid growth in a number of firms entering the country's manufacturing and services sectors. There was a reallocation of resources across firms within Vietnamese manufacturing toward the more productive firms, which has resulted in higher industry-level productivity growth. Choi and Hahn (2013) examined the relationship between trade liberalization and productivity at firm and product level. They found that the increase in intermediate input variety via trade reduces the cost of R&D, and hence induces new product introduction and TFP improvement. At product level within firm, they found that the increase in imported intermediate input increases the extent of product switching within firms, defined as simultaneous product adding and dropping. The finding suggests the existence of a "creative destruction" process within firms, which implies a better reallocation of resources.	There is robust evidence on the self-selection hypothesis to exporting in the literature. One implication of the hypothesis is the significant difference between exporters and non-exporters. Bernard et al. (1995) and Bernard and Jensen (1999) documented that exporters in US manufacturing are larger, more productive, and more capital-intensive; pay higher wages; and employ more skilled workers than non-exporters. Sjoholm and Takii (2003) also observed that exporting plants in Indonesian manufacturing are larger and more productive; the labor productivity of these plants was about twice as high as non-exporting plants. Another implication is that firms prepare for exporting. Bernard and Jensen (1999) found that exporters in US manufacturing are more efficient, larger, and grow faster several years before they become exporters. For the manufacturing industry in Taipei,China and the Republic of Korea, Aw et al. (2000) found that the average productivity of continuing exporters and new entrants as exporters is significantly higher than exiting exporters and non-exporters. The alternative hypothesis, i.e., learning-by-exporting (LBE), is growing in terms of evidence collected by cases around the world. For countries in East Asia, for example, a Japanese case study (Ito, 2011) showed that first-time exporters increased their research and development (R&D) expenditure immediately after they exported, although the increase varies by export market destinations. A study in the Republic of Korea (Hahn and Park, 2011) showed that exporting promotes the creation of new products, while an Australian study (Palangkaraya, 2011) showed that exporters in the services sector increase their process innovation activities.	Trade liberalization has a positive impact on competition. One argument is due to imports-as-competitive-discipline mechanism, whereby greater trade inhibits domestic firms to conduct anticompetitive behaviors. Erdem and Tybout (2003) showed that trade liberalization negatively affects the price-cost margins of firms, which was also found by Harrison (1994) and Mitra and Krishna (1998) for the case of manufacturing in Côte d'Ivoire and India, respectively. Further impact is positive performance and stronger innovation outcome, as was found by Pavcnik (2002) for Chile and Amiti and Konings (2007) for Indonesia. Trade also positively affects innovation since trade liberalization stimulates competition, which forces firms to become more efficient and productive through innovation. Fernandes and Paunov (2009) showed that trade liberalization stimulates product quality upgrading in Chilean manufacturing, while Bloom et al. (2010) found a similar relationship between trade liberalization and innovation in the People's Republic of China using patent, information technology (IT), R&D, and TFP as the indicators. Aldaba (2012) found for manufacturing in the Philippines that trade liberalization increases competition in the domestic market and this forces firms to increase their R&D.

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Table 1 *continued*

Product Dynamics	Technological Change and Innovation	International Production Networks
The heterogenous firm theory has become more advanced by adopting models with multiproduct firms. It produces predictions on optimal solution concerning dynamics of product portfolio within a firm. Theories have been developed to predict the impact of trade liberalization on product scope of a firm (e.g., Feenstra and Ma (2008), Eckel and Neary (2010), and Bernard et al. (2011)). All these predict that trade liberalization reduces product scope, which was evident in Baldwin and Gu (2009), Bernard et al. (2011), and Mayer et al. (2014). These studies suggest that dropping products is the most immediate (and easy) response to fiercer competition resulting from trade liberalization. The evidence is, however, not yet robust. Qiu and Zhou (2013) found increased product scope as an impact of trade liberalization in PRC manufacturing. Hahn et al. (2016) in a comparative study of three countries, i.e., Japan, the Republic of Korea, and Indonesia, found that firm product scope increases, rather than decreases, with export participation. Trade liberalization improves product quality. Hayakawa et al. (2015), using a case study of Indonesian manufacturing, found that reduction in input tariffs generally boosts quality upgrading, whereas the decrease in output tariffs does not have a significant impact. This is consistent with the view that imported inputs are high in quality.	International trade or FDI play a role in promoting R&D to generate innovation. Engagement in exporting stimulates R&D activities of exporters and increases exporters' productivity, within the LBE hypothesis. Ito (2011) found that the decision to export by new Japanese exporters increases their R&D spending. Hahn and Park (2011) found evidence to support the role of innovation in the LBE hypothesis, that is, a statistically significant positive impact of exporting on product creation. Product creation here is defined to involve strong innovation activities. As for FDI, firm-specific advantages of MNEs—in the form of knowledge-based assets, managerial know-how, quality of the workforce, and marketing and branding—are expected to promote R&D activity in the host countries and hence, generate innovation. Jongwanich and Kohpaiboon (2013) found that foreign investment encourages firms to commit investment in R&D. They found that the investment tends to be imported—embodied in imported capital goods— rather than invested in R&D in host countries. Regardless, positive impact is still observed, including evidence that the presence of MNEs stimulates locally owned firms to conduct R&D activities. Kuncoro (2011), meanwhile, found that foreign ownership of firms in Indonesian manufacturing determines the R&D decisions of the firms, but not the scale of the R&D investment.	International production networks (IPNs) began to be developed as MNEs adopted a fragmentation strategy, under which they break up an entire production system into various processes or production blocks, which are then relocated to different countries where a particular process can be undertaken most efficiently. IPNs have been formed by connecting or linking the production blocks located in different countries. Critical to IPNs is liberalization of trade and FDI, and evidence of this is strong in cases of Southeast Asian countries. Jongwanich and Kohpaiboon (2013) found that firms participating in IPNs are more active in R&D activities than those not participating. Aldaba (2017) showed that the expansion of GVC index in the Philippines electronic industries is closely related to the opening of intermediate-input sectors of the industries, as well as privatization and fiscal incentives provided for MNEs invested in economic zones, a key element of FDI liberalization. IPNs change the production structure in the medium and longer term, especially because they increase the demand for skilled workers in participating developing countries, due to greater use of more technology-intensive imported input and of more advanced technology embodied in imported capital goods such as machineries. Kohpaiboon and Jongwanich (2013) showed that engagement in IPNs increases the demand for skilled workers, albeit only in firms that are already skill-intensive. Thangavelu (2013) found that Vietnamese firms participating in IPNs restructure their production methods by installing machines with more advanced technology, suggesting a higher demand for skilled workers for these firms.

2. PRODUCTIVITY

Voluminous amounts of research have addressed the impact of globalization on productivity. While the benefits of globalization on productivity gains across sectors is relatively clear and well documented, little is known about the impact at the plant or firm level. There is more variation on the impact when using more disaggregated/ micro-level data.

Recent theoretical developments in international trade allow us to understand more about what happens regarding productivity change within an industry when trade and investment liberalization occurs. Departing from the standard trade models, the new wave of trade models recognizes the impact of firm heterogeneity, particularly in terms of productivity, within an industry (Pavcnik, 2002). These models point to the importance of firm dynamics (i.e., entry, exit, and growth of the survivors) in shaping both aggregate- and plant-level productivity change. In an environment with heterogeneous firms, trade and investment liberalization induces the entry of more capable firms, forces less-productive firms to exit, and triggers a reallocation of market share toward more productive firms. The disappearance of less-productive firms is reflected by an increase in the level of industry productivity (or "between" firms' productivity growth).

Trade and investment liberalization encourage firms to adopt new technology to ensure their survival, either in domestic or foreign markets. Firms, however, perceive such encouragement differently, as some firms choose to adopt the new technology but others do not. In other words, there is variation between firms, even within the same industry, in responding to liberalization.

A new wave of theoretical developments underlines the importance of firm, or plant, heterogeneity in shaping firms' productivity within an industry, pioneered by Melitz (2003). This developed from growing evidence that the variation of exporting firms cannot be derived from a random sample, since not all firms within an industry export. Eaton et al. (2004), for example, highlight this for French manufacturing, while Helpman et al. (2004) did so for the data on manufacturing in the United States (US).

Melitz built a theoretical model that takes into account the importance of productivity differences across firms in an imperfect competition setting. As explained and summarized by Helpman (2006), Melitz's model predicts that firm dynamics created by trade liberalization reduce the productivity threshold for any firm to export, implying that any firm now has a higher probability of exporting compared with the situation before the liberalization. At the same time, however, trade liberalization increases the productivity threshold for the survival selection of any operating firm. This means that only more productive firms survive after the trade liberalization. Industry output is hence reallocated to these survivors. What we should ideally observe then is a situation where the overall industry productivity improves.

The Melitz model has been extended by including technology adoption and innovation to reflect technology upgrading by firms. Some of these models are Bustos (2011), Yeaple (2005), and Ekholm and Midelfart (2005). The Bustos model overall predicts that only a fraction of firms, i.e., firms with an intermediate level of productivity, respond to trade liberalization by upgrading their technology (Helpman, 2006). This comes as a result of both the coexistence of firms within the industry with different levels of productivity, and the existence of different types of technology adopted by firms in the industry. Less-productive firms, meanwhile, continue to use traditional technology.

It is important to mention the existence of a closely related strand of literature that examines the relationship between firm dynamics and economic performance. Certain theoretical works, in particular Jovanovic (1982) and Hopenhayn (1992), model the interrelationship between entry-exit and firm heterogeneity in terms of productivity. These models detail how competitive struggle, reflected by firm dynamics (i.e., entry, exit, and growth), affect productivity growth. Empirical studies on this issue include Olley and Pakes (1996), Liu (1993), Liu and Tybout (1996), and Aw et al. (2001). Aw et al., for example, found that new firms in Taipei,China manufacturing have lower average productivity than incumbents, although productivity varies significantly across the firms. They also found that the more productive entrants survive, and their productivity converges to the level of incumbents (Aw et al., 2001, p. 53).

More recent studies from research projects run by the Economic Research Institute for ASEAN and East Asia (ERIA) provide more evidence on the positive impact of globalization on productivity and, more importantly, provide more knowledge on the underlying mechanisms creating the impact.

Taking the heterogeneous firm theory as the basis, Narjoko (2012) examined whether trade and investment liberalization in Viet Nam improved industry productivity by improving resource allocation across firms within industries. This study is motivated by the observation that Viet Nam underwent rapid trade and investment liberalization during the 1990s and experienced a massive firm entry in the 2000s. The study asked whether trade and investment liberalization contribute to the entry of firms, whether more firm entry is associated with greater industry productivity growth, and whether the productivity level before trade reforms matters for the extent of the productivity growth.

The study establishes a positive relationship between firm entry and industry productivity growth in Vietnamese manufacturing. The rapid trade and investment liberalization occurring in Viet Nam since the early 1990s, which has substantially reduced the cost of establishing private enterprises, and of exporting, seems to have triggered rapid growth in the number of firms entering the country's manufacturing and services sectors. This finding suggests a reallocation of resources across firms within Vietnamese manufacturing toward the more productive firms, which has resulted in higher industry-level productivity growth.

Narjoko further examined the within-sector impact of firm entry. Plotting the change in the distribution of productivity growth over time, there is evidence that many firms have become more productive. The productivity improvements, however, vary across firms. The study shows that the entry of firms lowered the productivity of firms located at the bottom of the distribution, but increased the productivity of firms located at the center of the distribution. It suggests that the increase in productivity, as a result of the high entry rate, only applies to the firms that have already acquired some intermediate level of productivity before trade reform.

Choi and Hahn (2013) examined the effect of trade liberalization on plant total factor productivity growth (TFPG) and within-plant across-product reallocation behavior in manufacturing in the Republic of Korea during 1991–1998. They took the variety-based endogenous growth models, which suggest that the increase in intermediate input variety via trade reduces the cost of R&D, and hence induces new product introduction and TFP improvement. They examined whether the increase in imported intermediate input variety increased plant TFPG and the extent to which products are switched (simultaneously added or dropped).

Choi and Hahn showed some evidence that tariff liberalization in the Republic of Korea contributed to the growth of input variety during the period studied. They found that plants belonging to industries with higher variety growth in imported intermediate inputs experienced higher productivity growth.

Choi and Hahn further elaborated the variety–productivity relationships by testing the relationship between the imported intermediate variety and product switching. Product switching, defined as simultaneously adding and dropping products, can be understood as part of a continuous process of "creative destruction" within plants. Active product-switching behavior can enhance the resource allocation process within firms and thereby improve their production efficiency. The empirical results support the hypothesis, suggesting that the increase in imported intermediate variety has a positive impact on stimulating product switching by domestic plants.

3. EXPORTING

One of the most immediate implications of the Melitz (2003) approach, commonly known as heterogenous firm theory, is that it is easier for firms to engage in the international market after trade liberalization. Existing exporters can expand their export sales, and some firms start to export for the first time.

Consistent with this prediction is the "self-selection hypothesis," which existed before Melitz's heterogenous firm theory. This is based on the presumption that participating in export markets brings additional costs, which usually involve high fixed costs–including transport costs and expenses related to establishing distributional channels and production costs in adapting products for foreign tastes (Bernard and Jensen, 1999). Trade liberalization in export-destination countries reduces the total costs of firms exporting to these countries, in addition to providing more access markets. This is reflected in Melitz's framework by a reduced threshold for firms to export.

Both Melitz's framework and self-selection theory imply that exporters and non-exporters are different. Studies support this, and exporters are considered better performers. For developed countries, Bernard et al. (1995) and Bernard and Jensen (1999) documented that exporters in US manufacturing are larger, more productive, and more capital-intensive; pay higher wages; and employ more skilled workers than non-exporters. Aw and Hwang (1995) and Berry (1992) observed a similar finding for developing countries. Sjoholm and Takii (2003) also observed that exporting plants are larger and more productive; the labor productivity of these plants was about twice as high as non-exporting plants and this difference seems to increase during the 1990s.

The essence of self-selection means that firms prepare for exporting. Supporting evidence for this hypothesis exists (e.g., Bernard and Jensen, 1999; Clerides et al., 1998; Aw et al., 2000; Hallward-Driemeier et al., 2002). Bernard and Jensen found that exporters in US manufacturing are more efficient, larger, and grow faster several years before they become exporters. For the manufacturing industry in Taipei,China and the Republic of Korea, Aw et al. found that the average productivity of continuing exporters and new entrants as exporters is significantly higher than exiting exporters and non-exporters.

Melitz's heterogenous firm theory more recently introduced a self-selection mechanism and analyzed the effects of liberalized trade (e.g., Melitz, 2003; Bernard et al. 2007). In these models, trade liberalization raises aggregate productivity by inducing resource reallocation across firms, i.e., the contraction and exit of low-productivity firms and the

expansion and entry into export markets of high-productivity firms, even if there is no change in firm-level productivity.

The self-selection hypothesis focuses on action *before* exporting. The difference in performance between exporters and non-exporters can also be explained by actions *after* exporting. Participating in export markets creates a learning effect for firms, as exporters gain access to technical expertise, including product design and method, from their foreign buyers (Aw et al., 2000). The learning process accumulates knowledge acquired by firms and increases the productivity of exporters over time, widening the performance gap between exporters and non-exporters. This is often termed the "learning-by-exporting" hypothesis.

The more recent ERIA project provides evidence supporting the learning-by-exporting hypothesis in terms of a firm's innovation responses after engaging in exporting. A Japanese case study (Ito, 2011) showed that first-time exporters increased their research and development (R&D) expenditure immediately after they exported, although the increase varies by export market destinations. A Republic of Korea study (Hahn and Park, 2011) showed that exporting promotes the creation of new products, while an Australian study (Palangkaraya, 2011) showed that exporters in the services sector increase their process innovation activities. All these studies show that the innovation response improves performance of the exporters.

4. COMPETITION

Globalization increases competition in the domestic market and triggers dynamism in the survival and creation of new firms. Innovation links competition and firm dynamics.

Competition and innovation have a mixed relationship. The most recent theoretical framework suggests an inverted U-shaped relationship between competition and innovation (Aghion et al., 2002). The framework correlates firms' market power with their level of innovation. In this framework, firms facing intense competition will innovate more, as innovation serves as a method to escape from the fierce competition. In contrast, on the other end of the spectrum, firms facing weak competition do not have the incentive to innovate because firms with market power do not need to win in competing with other firms in the market. Evolution in competitive struggle that moves between these two extremes creates the inverted U-shaped relationship. Innovation goes up when the market is very competitive, but greater innovation generates market power for some firms; this reduces the incentive to innovate, resulting in less innovation.

This theoretical framework has been reinforced by empirical evidence from Aghion et al. (2002) and Burgess and Aghion (2003). However, several studies find that the inverted U-curve relation is not generally applied in several countries. Creusen et al. (2006) did not find an inverted U-curve relation, although the relation between competition and innovation was found to be positive. Hopman and Rojas-Romagosa (2010) found a negative relationship between competition and innovation, as well as insufficient evidence on the inverted U-curve relation.

Meanwhile, an extensive amount of studies found strong evidence regarding the positive effect of trade on competition. The most prevalent argument on this relationship is that trade fosters competition and constrains domestic firms in conducting anticompetitive activities (Cadot et al., 2000). This is known as the "imports-as-competitive-discipline hypothesis," which has found robust empirical evidence. For instance, Erdem and Tybout (2003) have shown that trade liberalization negatively affects the price-cost margins of firms. This was reinforced by Harrison (1994), who found the same evidence in the Côte

d'Ivoire, and Krishna and Mitra (1998) in India. Trade liberalization is also found to increase productivity, as exhibited by several empirical studies, such as Pavcnik (2002) for Chile and Amiti and Konings (2007) for Indonesia. Trade also positively affects innovation since trade liberalization stimulates competition, which forces firms to become more efficient and productive through innovation. Earlier work by Aghion and Burgess (2003) showed the positive effect of reduced trade barriers on the economic performance of firms close to the technological frontier. Fernandes and Paunov (2009) presented evidence that trade liberalization stimulates product quality upgrading using Chilean manufacturing data, while Bloom et al. (2010) found a similar relationship between trade liberalization and innovation in the People's Republic of China (PRC) using patent, information technology (IT), R&D, and TFP as the indicators.

Recently, more evidence was gathered for the Association of Southeast Asian Nations (ASEAN) and East Asian countries from ERIA's microdata research projects on the impact of globalization. Aldaba (2012), among others, examined the impact of competition on innovation for manufacturing firms in the Philippines, using firm-level panel data over 1996–2006. The paper examined the impact of trade barrier removal on innovation activities and questioned whether an increase in competition increased the innovation activities.

Aldaba found that trade reforms (i.e., reduction in tariff and/or non-tariff barriers) conducted several times in the Philippines from the 1990s to the 2000s have had a strong impact on the Philippine manufacturing sector, by increasing competition in domestic markets. The tariffs are found to be positively related to the price-cost margin. This is the finding from the first step of Aldaba's econometric estimation. From the second step of the estimation, Aldaba found that profitability is negatively related to R&D expenditure. In other words, higher competition stimulates R&D. Thus, overall, trade liberalization positively affects R&D through the product market competition channel. All these findings are generally the same even after she controls for firm entry and exit, which are proxies for the industry selection impact arising from competition. Further, from the results of her estimation in the "mixed" sector (i.e., a broad sector group that consists of mostly exporting and importing industries), she found that the net-entry variable is negatively related to profitability. Together with a negative relationship between profitability and R&D expenditure, this indicates that as more firms exit (presumably the inefficient ones), the surviving firms tend to engage in R&D to out-compete the new firms entering the market.

Another example is by Nguyen et al. (2011), which examined the determinants of innovation by Vietnamese small and medium-sized enterprises (SMEs) in the context of increased competition resulting from rapid trade expansion in the 2000s. Nguyen et al. used data for 2007 and 2009 from the Viet Nam SME Survey. The years of the data are chosen to capture the period when Viet Nam experienced rapid trade liberalization. Unlike the approach taken by other studies, Nguyen et al. used information on pricing strategies to capture the extent of competition among firms. The use of this information was driven by the availability of information in the data.

Nguyen et al. found moderately important effects of competition, both domestic and international. Specifically, matching the price of competitors has a positive impact on product innovation using the 2007 data and on product improvement using the 2009 data. As for the impact of international competition, they found that pressure from foreign firms—in terms of the price set by them—improves all kinds of innovation activities (i.e., product innovation, product modification, and process innovation) by the Vietnamese SMEs. The finding differs slightly when the study uses the 2009 data. Nguyen et al. not only addressed the globalization impact through the competition channel, but also tested whether linkages with foreign firms help SMEs to increase their innovation activities.

They found rather convincing evidence for this, using both years of the data and examining other innovation activities.

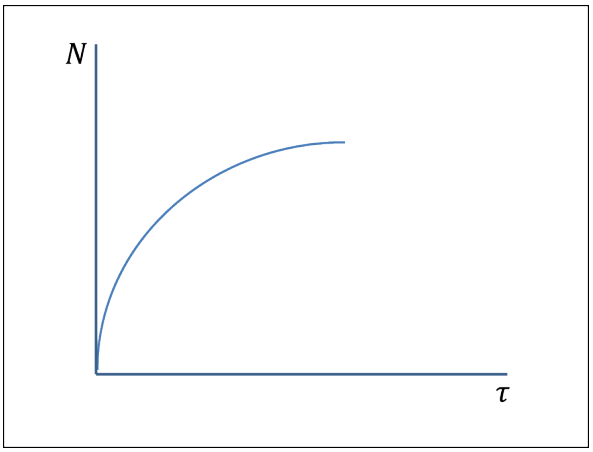
5. PRODUCT DYNAMICS

The literature on heterogenous firms has gone on to consider the models of multiproduct firms, motivated by an observation that trade is now dominated by firms producing (and trading) more than one product. Research for these models is also developing because of the greater availability of product-level data by firm or plant. Theory based on the multiproduct model suggests that trade liberalization changes firms' product portfolios and increases productivity.

Bernard et al. (2011) developed a model that interacts firm-level productivity with firm-product-specific expertise, which allows a firm to endogenously choose the range of products it exports. The general equilibrium setting of the model results in a prediction for adjustment at both industry and firm level. The adjustment at industry level is the general result of the heterogenous firm model, which predicts that inefficient firms will exit the exporting market. Adjustment at firm level—across a product range—enables firms with greater ability (or productivity) to produce more products, extending the scope of products that the firm can produce.

Trade liberalization pushes the firm to focus on its "core competencies" resulting from the change in focus of the firm on producing only higher expertise products because of the much higher export opportunities of these products. This is reflected in the dropping of the lower, or lowest, expertise products from the range of products for export. Unlike the prediction of the other models, these products are still produced but sold only in domestic markets. Thus, the scope of the product produced by the firm increases as the firm becomes more productive over time. The decision of the firm to drop its lowest-expertise products raises the productivity of the surviving products, and increases the overall firm-level productivity. The model hence predicts a monotonic relationship between productivity and product scope, as illustrated in Figure 1.

Figure 1: Theoretical Prediction of the Relationship between Productivity and Product Scope



Note: N is the number of products (product scope) and τ is the level of productivity.

Source: Bernard et al. (2011).

Eckel and Neary (2010) built a model that recognizes (i) the "cannibalization effect," which is defined as the impact coming from the internalization of demands within the firm

across products the firm produces; and (ii) "flexible manufacturing" (reflecting flexible technology in machineries), which allows firms to produce a range of products containing the firm's core competence. Eckel and Neary's model predicts that globalization makes a firm become "leaner and meaner" in its product scope, which means that its range of products is pruned to focus on its core competency.

Feenstra and Ma (2008) built a model with a similar prediction to the one built by Eckel and Neary, i.e., a firm produces (at the end) only within the range of its core competence. The Feenstra and Ma model can say more about what happens in the process, i.e., the lowered costs, caused by trade liberalization or a more open trade regime, expand the range of products produced by the firm. The cannibalization effect becomes unbearable for the firm when the market size grows larger, however, since globalization forces the firm to start dropping products. This results in a leaner product scope, as predicted by Eckel and Neary (2010).

All the theoretical mechanisms above point to a reduced product scope (i.e., product rationalization) because of trade liberalization. This is evident in the studies conducted by Baldwin and Gu (2009), Bernard et al. (2011), and Mayer et al. (2014), suggesting that dropping products is the most immediate (and easy) response to fiercer competition resulting from trade liberalization. However, robust evidence of this is not yet available. Qiu and Zhou (2013), for example, found increased product scope as an impact of trade liberalization in the PRC's manufacturing. Another study with similar results is Hahn et al. (2016).

Hahn et al. examined the impact of exporting on product portfolio upgrading, using plant-and-product level data from the Republic of Korea, Japan, and Indonesia. The upgrading is defined technically by the increase in the attributes of a product produced by a firm (or a plant). The analysis was conducted in two steps: (i) the relationship between exporting and product scope is examined, and (ii) after measuring the attributes for products, the relationship between product dynamics (product adding or dropping) and product attributes is examined. The second step addresses whether changes in the product extensive margin (product adding or dropping) reflect the resource reallocation from products with lower product attributes to those with higher product attributes.

The results provided evidence that changes in the product composition are associated with the exporting activity. Evidence also shows that plants' total product scope increases, rather than decreases, with export participation, though the results are not very statistically significant. These results are broadly in line with several recent empirical studies which find that trade liberalization causes firms to add products and expand product scope (Iacovone and Javorcik, 2010; Berthou and Fontagne, 2013; and Qiu and Yu, 2014). With respect to product portfolio upgrading, Hahn et al. (2016) found that added products have higher or better product attributes than dropped products.

More specific on the impact on quality of the product, more recent studies point to an improvement in product quality as a result of trade liberalization, which should be able to be traced back to improved productivity.

Hayakawa et al. (2015) examined the effect of tariff reductions on firms' quality upgrading in Indonesia's apparel industry. The empirical results suggest that the reduction in input tariffs generally boosts quality upgrading, whereas the decrease in output tariffs does not have a significant impact. The results also suggest that the positive impact of input tariff reduction on quality upgrading is greater, particularly for firms importing intermediate inputs. This is consistent with the view that imported inputs are high in quality. These results show that imported products, especially imported intermediate inputs, are an important factor for productivity growth. The reduction in imported input prices due to

tariff reduction encourages firms to increase imports of foreign materials, resulting in an upgrade of output quality.

The positive impact extends to non-importers, suggesting the presence of positive technology spillovers. Local suppliers learned from the increased foreign inputs and improved the quality of the inputs they use. The improvement thus may boost quality upgrading by the non-importers.

6. TECHNOLOGICAL CHANGE AND INNOVATION

Innovation has been widely recognized as a key factor in generating industrial development and promoting sustainable economic growth. As in many innovation-based endogenous growth models, firms' innovation activity drives productivity growth as does the introduction of new products or varieties (e.g., Romer, 1990; Grossman and Helpman, 1991). In an open economy setting, international trade or foreign direct investment (FDI) also play a role in promoting R&D to generate innovation.

Regarding the role of international trade, recent literature points to the engagement in exports, which would help stimulate the R&D activities of exporters and increase exporters' productivity, as a mechanism within the framework of the learning-by-exporting hypothesis. As for the role of FDI, firm-specific advantages of multinational enterprises (MNEs)—in the form of knowledge-based assets, managerial know-how, quality of the workforce, and marketing and branding—are expected to promote R&D activity in the host countries and hence generate innovation. Therefore, competition has been strong among developing countries to attract R&D-intensive FDI through fiscal incentives and high-quality infrastructure at subsidized prices (Athukorala and Kohpaiboon, 2010).

6.1 Exporting and Innovation

More evidence on the impact of exporting (as a response to trade liberalization elsewhere) is identified for East Asian countries, such as those highlighted in studies from the microdata project of ERIA. Ito (2011) addressed the role of innovation in the context of the learning-by-exporting hypothesis. She asks whether the effect of learning-by-exporting on innovation exists and, subsequently, whether and how the impact of exporting on innovation affects productivity. The paper attempts to find answers to these questions by examining the behavior and performance of first-time exporters in Japanese manufacturing. The study, therefore, not only seeks evidence for the positive impact of learning-by-exporting on innovation, but also moves deeper to find insights on the source of the learning-by-exporting.

Ito (2011) found that first-time exporters are able to increase their sales and employment growth more than firms serving domestic markets. More importantly, the decision to begin to export promotes innovation, as first-time exporters record an increase in R&D intensity and volume. Going deeper into the mechanism of learning-by-exporting, the study examined whether there are differences in the performance of innovation and other variables, which arise from engaging in exporting to different destinations. The evidence showed that starting to export to North America or Europe has larger positive effects on productivity than starting to export to Asia. This difference is also observed for other performance variables (i.e., sales and employment growth), innovation variables, and some characteristics of the firms. This finding is ascribed to differences in absorptive capacity, i.e., first-time exporters to North America or Europe have greater absorptive capacity than those exporting for the first time to Asia.

Hahn and Park (2011) used a rich combination of plant- and product-level manufacturing data from the Republic of Korea in their investigation. Unlike the previous studies, however, Hahn and Park adopt a different approach in defining product innovation. They use plant-and-product matched data to distinguish two types of product innovations: those that are new to the plant (termed "product addition") and those that are new to the Republic of Korea's economy (termed "product creation"). The former tends to capture imitation by domestic competitors or the process of domestic knowledge diffusion, while the latter reflects product cycle phenomenon or international knowledge spillover. Product creation could mean product addition, although this does not necessarily work the other way around.

Hahn and Park found evidence to support the learning-by-exporting hypothesis for the role of innovation in the export–productivity relationship. Using propensity score matching, they found a statistically significant positive impact of exporting on product creation. They cannot, however, infer the existence of this relationship when innovation is defined by product addition; the impact of exporting on product addition is not statistically significant, although it shows the same (i.e., positive) sign. The study was not able to find evidence to support the selection hypothesis. More specifically, it cannot find any significant effect of innovation—for both product creation and addition—on exporting. The investigation was extended by using the vector autoregressive (VAR) method. This route is taken to examine the dynamic interdependence between export and innovation, as well as productivity. The key results from it are consistent with the key finding that exporting significantly affects product creation. The finding from the VAR indicates that this impact is quite persistent; it takes more than 5 years for the impact on product creation to die out. The VAR results also show that productivity significantly and positively affects both exporting and product creation.

Palangkaraya (2011) investigated the direction of the causality between exporting and innovation using firm-level data from Australian SMEs. His investigation also looks at the direction of causality for the group of new exporters and new innovators, to ensure the robustness of the results. The sample of the study is not only manufacturing firms, but also enterprises in the services and other non-manufacturing sectors. This offers a distinct value added to the research, considering the lessons from the usual samples from the manufacturing sector may not be valid for the other sectors.

Palangkaraya found evidence that the relationship between exporting and innovation runs in both directions, i.e., both reflecting the self-selection and learning-by-exporting hypothesis. However, this only appears for process innovation in the services sector, not for product innovation and not in the manufacturing or other non-manufacturing sectors. The investigation also finds that the positive two-way relationship varies across industries. Palangkaraya attributes all these results to the uniqueness of the innovation characteristics of SMEs and the importance of services in the Australian economy. Process innovation matters more than product innovation because SMEs are usually financially constrained and product innovation is arguably substantially more expensive than process innovation.

6.2 FDI and Innovation

FDI plays a role in promoting R&D through the knowledge and technology brought by MNEs to host countries. FDI liberalization, therefore, is expected to be positively related to the extent of innovations. The following presents the findings of a few studies coming from the ERIA research project on the topic.

Jongwanich and Kohpaiboon (2013) examined the roles of MNEs and exporting in determining the decision to carry out R&D, as well as the intensity of R&D activities, in firms in the Thai manufacturing sector, using the most recent (i.e., 2006) industrial census data. Unlike the other studies, which measure different types of R&D in their total value terms, this study disaggregated R&D activities into three categories: (i) R&D leading to improved production technology, (ii) R&D leading to product development, and (iii) R&D leading to process innovation. The study examines not only the direct effect of MNEs on R&D activities, but also the indirect effect of MNEs on the presence and intensity of R&D in locally owned plants (termed "R&D spillovers").

The study found that globalization, through exporting and FDI, can play a role in encouraging firms to commit to R&D investment. The role played by FDI, however, seems to be different from the role of exporting. The study found that the R&D propensity of MNE affiliates is lower than that of locally owned firms. This suggests that MNE affiliates in Thailand prefer to import technology from their parent companies rather than investing in R&D in the host country (Thailand). Nonetheless, this does not mean that no effect arises from MNE presence on firm R&D propensity and intensity. In fact, the study found that the presence of MNEs stimulates locally owned firms to conduct R&D activities.

Kuncoro (2011) examined the globalization determinants of the decision to invest in R&D and the intensity of R&D expenditure, of medium-sized and large manufacturing firms in Indonesia. The study considers export participation, foreign investment, and trade protection as the variables that represent globalization. In addition, it looked at the impact of the spatial concentration of MNEs on the firm's R&D investment decisions and expenditure. Kuncoro uses data from the mid-1990s to the mid-2000s in his empirical investigation.

The study found that being an exporter significantly affects a firm's decision to invest in R&D, as well as the extent of the firm's R&D expenditure. Foreign ownership was found to be an important determinant only for the R&D investment decision, but not for the amount of R&D expenditure the firm commits. In terms of testing the potential R&D spillover effect arising from the concentration of MNEs in a location, the study found that R&D activities tend to be higher in big urban areas, not in a specialized or agglomerated location. In the interpretation of the findings related to foreign ownership and the presence of MNEs, Kuncoro asserts that a critical mass of MNEs may be needed in a location or agglomeration area for these MNEs to have a meaningful impact in terms of innovation or R&D performance.

7. INTERNATIONAL PRODUCTION NETWORKS

International production networks (IPNs) began to be developed as MNEs adopted a fragmentation strategy, under which they break up an entire production system into various processes or production blocks, which are then relocated to different countries where a particular process can be undertaken most efficiently. IPNs have been formed by connecting or linking the production blocks located in different countries.

The extent or degree of fragmentation depends mostly on the cost of establishing and managing production blocks and the cost of the service link that connects production blocks. The cost of establishing and managing production blocks depends largely on the labor cost, the quality of infrastructure (including the supply of electricity, transportation, and communication services), openness to foreign firms, and others, while the cost of the service link depends on the cost of international transportation and

communication services, which are affected by the international trade policies of the countries involved.

The expansion of IPNs has been aided by the liberalization of trade and FDI policies implemented by Southeast Asian countries, as the governments of these countries recognized the beneficial impacts of hosting MNEs with extensive IPNs.[1] IPNs bring not only export sales and import procurement networks, which enable host countries to import high-quality intermediate and capital goods, but also technology, which contributes to an improvement in productivity. Since rapid and extensive development of IPNs is partly due to MNEs' response to the liberalization of trade and FDI policies, we examine the impacts of IPNs on firm behavior and the development of industries in East Asia.

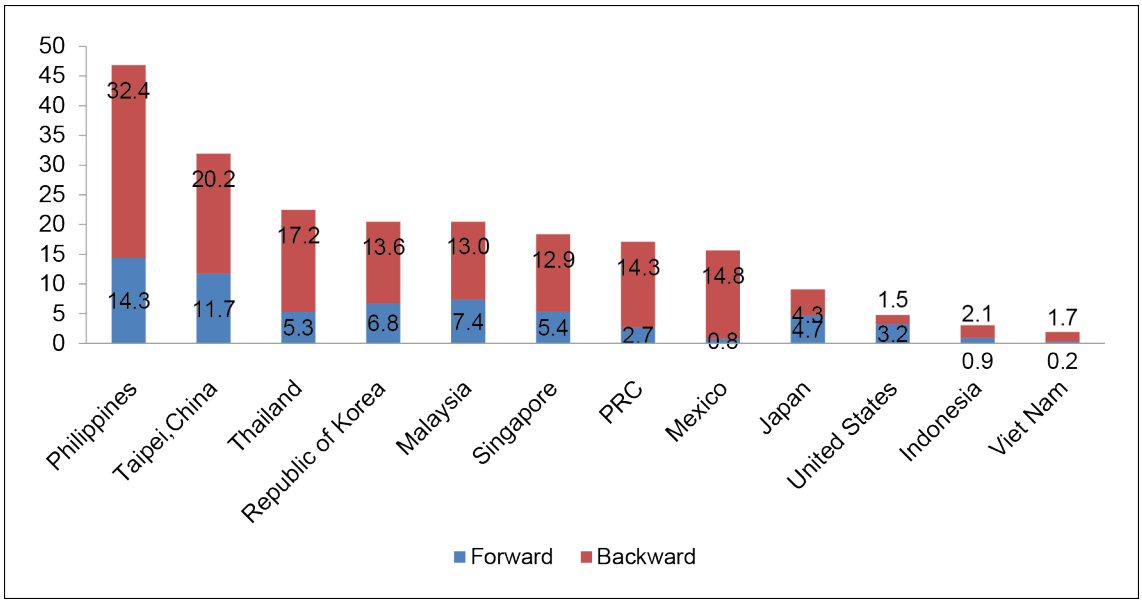
The importance of FDI and an open trade regime is confirmed by Jongwanich and Kohpaiboon (2013), who found that firms participating in IPNs are more active in R&D activities than those not participating. The dynamism of industries engaged in IPNs required firms populating the industries to keep the industries competitive in international markets.

Aldaba (2017) provided more evidence on the role of trade and investment liberalization for participation of firms in IPNs. The Philippine electronic industry has transformed to become deeply integrated within networks of industries in East Asia. Analyzed using the global value chain (GVC) participation index and length, Aldaba showed that the Philippines' participation in the backward linkage of GVC increased over time.[2] The share of foreign inputs in Philippine electronic exports (looking backward along the value chain) increased from 8.5% in 1995 to 32.5% in 2000 and 34.4% in 2008. The trend is the same for the forward GVC participation of the sector. The Philippines' share of domestically produced inputs used in third countries' exports (looking forward along the value chain) increased from 2.2% in 1995 to 8.4% in 2000 and 16.2% in 2008. Reflecting this, the GVC participation of the industry in the Philippines is among the highest in the region, as indicated in the cross-economy comparison of the GVC index in Figure 2.

[1] IPNs involving Southeast Asian countries were triggered by the currency appreciation of industrialized East Asian economies in the 1980s. Appreciation of the yen in the latter half of the 1980s prompted a massive outflow of Japanese FDI by Japanese MNEs, which adopted the fragmentation strategy and relocated production processes from Japan to Southeast Asian countries. MNEs in the Republic of Korea and Taipei,China followed, as the won and NT dollar began to appreciate sharply toward the end of the 1980s.

[2] The GVC participation index is defined as the share of foreign inputs (backward participation) and domestically produced inputs used in third countries' exports (forward participation), expressed as a percentage of gross exports (De Backer and Miradout, 2013).

Figure 2: Global Value Chain Participation Index of Electronics Industry in Selected Economies, 2009



PRC = People's Republic of China.

Source: Organisation for Economic Co-operation and Development (OECD) Global Value Chains indicators - May 2013, https://stats.oecd.org/Index.aspx?DataSetCode=GVC_INDICATORS (accessed 21 Aug 2018).

Aldaba (2017) further explained that the development of the Philippine electronics industry to the level seen in the 2000s can be attributed to reforms to liberalize the investment and trade regime that took place since the 1990s. Development of the industry is argued to have been the result of both privatization of economic zone management and fiscal incentives applied exclusively for investment in economic zones, both of which have been elements of FDI liberalization since the 1990s. The Philippine Economic Zone Authority granted significant incentives for investment in the electronics industry, such as tax- and duty-free importation of capital goods and intermediate inputs, and defining the electronics industry as a preferred area of investment from 1988 to 1994 and from 2006 to 2007.

The electronics industry has benefited from trade liberalization through tariff cuts or the removal of import restrictions for the import of material inputs and finished goods. Liberalization of the import regime for material inputs contributes directly to competitiveness by reducing the price of final products produced domestically, while the liberalization of finished goods affects indirectly by improving efficiency as a result of greater competition from imports.

IPNs change the production structure in the medium and longer term. The basic proposition is that the networks increase the demand for skilled workers in participating developing countries. Feenstra and Hanson (1996; 1997) predict this to come from greater usage of imported intermediate inputs, which are typically skill-intensive inputs performed by MNEs in IPNs. They argue that while IPNs shift production blocks that are unskilled or less technology-intensive from developed countries, they are still considered skill- or technology-intensive production blocks from developing countries' perspective.

In the context of Feenstra and Hanson's "outsourcing" or "production sharing" theory, skill-biased technological change is another explanation. Skill-biased technological change argues that the new technology embodied in imported capital goods—through a more open trade regime or an increase in FDI as a result of investment liberalization—

increases the demand for skilled workers (in host countries). In other words, the technical changes induced by trade and FDI liberalization have some effect (i.e., the "bias") to increase the demand for skilled workers.

Kohpaiboon and Jongwanich (2013) provided some support for the predicted higher demand for skilled workers for firms participating in IPNs. They found that engagement in IPNs increases the demand for skilled workers, but this only applies to firms that are already skill-intensive. Thangavelu (2013) found that Vietnamese firms participating in IPNs restructure their production methods by installing machines with more advanced technology, suggesting higher demand for skilled workers for these firms.

8. POLICY IMPLICATIONS

This chapter presents several key topics on the responses of firms to globalization, in responding to a more open trade or investment regime between countries. All these have policy implications, and the discussion below presents some of these.

First, most previous studies suggest that a country should continue with ongoing trade liberalization and maintain a relatively open trade regime. Strong domestic market competition drives firms to engage in innovation-enhancing activities, through the ability of the competition to create a contestable market situation. A liberalized trade regime could be even more beneficial in the framework of a deepened integration of a country in Southeast or East Asia. Some studies underline this in the context of linking firms to established IPNs in these regions. They found a positive relationship between participation in production networks and increased R&D activities by firms.

To complement trade liberalization, a reduction in trade costs (commonly done via trade facilitation reform) should be a high priority on the policy agenda for countries which have yet to join IPNs. Improving trade-related infrastructure is likely to be an important ingredient of policy. In many developing countries, transport cost remains a key bottleneck. Poor transport infrastructure raises transport costs and isolates markets. Such isolated markets may also feature minimal competition, and this will worsen within-country poverty and distribution issues.

Second, it is necessary to ensure that the forces of competition are at work in domestic markets. Some of the dynamic gains from trade are realized through reallocation across firms and industries, and even across products within firms. It is therefore necessary to focus on the elimination or reduction of existing regulations, such as entry regulations, strong employment protection, and business regulations based on firm size, which inhibit the reallocation of resources by market forces. In cases where proper institutions or markets are lacking, such as bankruptcy laws and procedures, building and improving these institutions or markets should be a top priority.

Third, policy to promote exports encourages firm innovation. Thus, policy to assist firms to export more, as well as to cause more firms to engage in exports, seems warranted. Several findings on the positive relationship between exporting and innovation activities and/or performance support this. Among others, and perhaps most importantly, is evidence of the positive effect of learning-by-exporting on exporters' innovation, e.g., exporting encourages the creation of new products as well as the expansion of export markets over time.

Fourth, policies for stronger foreign participation in industrialization should be encouraged. The justification for this comes mostly from evidence of the impact of R&D spillovers on domestically owned firms, i.e., the presence of MNEs encourages locally owned firms to gain technological knowledge and capability from various possible

channels, such as demonstration and the competition effect. From a macro and practical perspective, encouraging a higher presence of foreign ownership or MNE units requires a policy to sustain excellent infrastructure quality, both physical and institutional. The logic is clear; MNEs would consider investing in host countries if they are able to operate efficiently, and one of the key factors is supportive infrastructure. It is also important to achieve/maintain a stable macroeconomic environment to attract MNEs.

It is useful to comment here that a rather unique characteristic of countries in East and Southeast Asia is that they are very flexible and welcoming to the evolving production networks between countries orchestrated by MNEs. Very open trade and investment regimes, with the help of sizable fiscal incentives some time, plus the typically flexible labor market, seem to have strongly facilitated formation of IPNs within the East and Southeast Asia. This marks a significantly different model of industrialization to that adopted by other regions in the world, such as with the one typically adopted by countries in Latin America.

Fifth, findings from the research suggest that globalization seems to benefit not only large firms but also SMEs. While this is encouraging, if one considers affirmative action policies for SMEs in the context of increased globalization in a country's economy, the more important question perhaps is how to devise policies that could harness the benefits of globalization. Conceptually, the policy should be to equip SMEs to learn more about process innovation, rather than product innovation, from using globalization forces. This approach is sensible given the natural disadvantages of SMEs, vis-à-vis their larger counterparts, in terms of financial resources and economies of scale. Further, given the usual assistance-type policy for SMEs, export promotion policies for SMEs in general would be most effective if they were integrated with policies to promote SMEs' innovation activities, which in this case should focus more on process innovation activities.

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