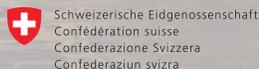


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## Policy Note 3

# The Role of Imported Intermediate Inputs in the Indonesian Economy

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Federal Department of Economic Affairs,  
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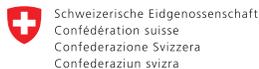
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# Policy Note 3

## The Role of Imported Intermediate Inputs in the Indonesian Economy

Authors: Sjamsu Rahardja, Gonzalo J. Varela



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# Abstract

The recent emergence of a persistent deficit in Indonesia's trade balance has triggered concerns over reliance on imports. Notably, imports of intermediate inputs and capital goods have been on the rise over the last decade. Apart from firms partaking in the emergence of global production networks, firms imported intermediates for various reasons, including value, variety, and quality. Concerns may arise about the impact that an increase in reliance on imported inputs may have on domestic jobs, and value added. A careful examination of sector and firm level data from the Indonesian manufacturing sector reveals that: (1) the growth of intermediates imports roughly matches the growth of Indonesian GDP, implying a relatively stable reliance on imported inputs. (2) Users of imported inputs in Indonesia are exceptional performers: they grow faster in terms of output, value added and employment, they are more productive, and they pay higher wages. (3) The increased availability of imported inputs has contributed to improved product quality in Indonesian manufacturing. Larger shares of imported inputs in total inputs, as well as lower tariffs on inputs, are associated with a higher probability of producing high quality goods. (4) Firms' product diversification processes have been boosted by lower tariffs on inputs, and by increased usage of imported versions. In light of these results, this note argues that facilitating the import of intermediate products can help the Indonesian economy to diversify, avoid being stuck in low-skilled processing or around natural resource based manufacturing, and to climb up the value chain. Such an approach, however, is not sufficient in isolation and active policies are needed to increase firms' absorptive capacities and workers' skills.

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# Table of Contents

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Abstract	ii
Table of Contents	iii
<b>Chapter 1</b> Background	1
<b>Chapter 2</b> Indonesia's Evolving Trade Balance	4
<b>Chapter 3</b> Imported Intermediate Represent Multiple Opportunities for Indonesia	8
<b>Chapter 4</b> The Challenge for Indonesia	22
References	25
Appendix	27

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## List of Figures

Figure 2.1. Emerging trade deficit driven by strong imports and weak exports	5
Figure 2.2. Imports of intermediates and capital goods have been on the rise in Indonesia	6
Figure 2.3. ...and more markedly in other rapidly industrializing countries	6
Figure 2.4. The increase in the share of imported inputs in production is a worldwide process...	7
Figure 2.5. ... which results in an increasing imported component in countries' exports	7
Figure 3.1. Sectors that import more of their inputs have expanded more	11
Figure 3.2. Sectors that import more of their inputs have generated more employment	12
Figure 3.3. Export Similarity Indices with the USA	13
Figure 3.4. Evolution of Unit Values of Indonesian Firms in Food and Chemicals	14
Figure 3.5. Evolution of unit value of Indonesian firms in textiles, rubber, and plastics	15
Figure 3.6. Evolution of unit values of Indonesian firms in electrical, machinery, and automotive sectors	15
Figure 3.7. Effects of selected variables on the probability of producing high quality products	16
Figure 3.8. Product varieties produced by medium & large manufacturing firms in Indonesia	19
Figure 3.9. Herfindahl Index of Export Diversification	19
Figure 3.10. Effects of selected variables on the firms' product scope	21
Appendix Figure 1.1. Sectors with a higher imported component in exports have expanded more	28
Appendix Figure 1.2. Sectors with a higher imported component in exports have generated more employment	28
Appendix Figure 1.3. Sectors with a higher imported component in exports are more productive	28

## List of Tables

Appendix Table 2.2. Results from Probit on the likelihood of producing high quality product	30
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## List of Boxes

Box 3.1. The benefits of quality and variety in inputs for manufacturing competitiveness	10
Box 3.2. Estimating the determinants of the likelihood of producing high quality goods in Indonesia	16
Box 3.3. Estimating the role of imported inputs in firms' product scope in Indonesia	20



Revitalizing manufacturing and accelerating the industrialization process have become major themes in Indonesia's new economic master plan to become a fully industrialized country by 2025. As laid out in the master plan (MP3EI) for 2011-2025, the government intends to achieve that objective by promoting development of an 'integrated pyramid' industrial structure, which calls for facilitating the development of processing industries, such as in Kalimantan, Sumatra, and Sulawesi, that can turn raw materials into semi-processed materials and from semi-processed materials into components to further boost downstream manufacturing activities, while labor intensive and machinery industries are expected to continue to be located in Java<sup>1</sup>. Such initiatives are also expected to increase value-addition at home instead relying too much on imports.

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<sup>1</sup> The Master Plan also identifies the physical infrastructure needed in each island-corridor to support the industrialization process.

## Chapter 1

# Background

**While the development aspiration is quite clear, the question is whether Indonesia should decide to promote substitution of imported intermediate products that are currently used by downstream activities with domestically produced alternatives.** Firms may import intermediate inputs because they are part of global production networks or because of other reasons such as variety or value for money. Although Indonesia imposes lower tariffs, on average, than comparator countries such as Brazil, China and Vietnam on imports of intermediate inputs, it imposes greater non-tariff measures on such imports. Raising barriers to such imports could have a detrimental impact on firms' performance and consumer choice. Therefore, the policy issue is not so much because of the risk of a protectionist environment taking hold, but because of its potential long-term impact on the development process in Indonesia.

**Evidence suggests that access to imported intermediates is important for quality improvement in manufacturing products.** An entrepreneur in South Jakarta producing high-quality hairstyle products for men including hair serum, hair conditioner and shampoos, for example, relies heavily on imported lanolin or hydrolyzed keratin because of better quality standards or cost differences, which allows his products to successfully compete in the domestic market with imported versions.<sup>2</sup> To support this findings, a statistical analysis is carried out using firm level data from Indonesian manufacturing over 1998-2009 and estimate the determinants of the probability of a firm producing goods with unit values that are above the median in the same industry, defined at the maximum possible level of disaggregation (5 digits in the ISIC 3<sup>rd</sup> Revision) (see Box 3.2 for a discussion of the methodology).

**Using various data, including census of medium and large manufacturers, this note presents evidence suggesting that facilitating imported intermediates has contributed to the promotion of industrialization in Indonesia.** A careful examination of sector and firm level data from the Indonesian manufacturing sector reveals that: (1) the growth of intermediates imports roughly matches the growth of Indonesian GDP, implying a relatively stable reliance on imported inputs. (2) firms using imported inputs in Indonesia are exceptional performers: they grow faster in terms of output, value added and employment, they are more productive, and they pay higher wages. (3) Availability of imported inputs has contributed to improved product quality in Indonesian manufacturing. Larger shares of imported inputs in total inputs, as well as lower tariffs on inputs, are associated with a higher probability of producing high quality goods. (4) Process for diversifying products have been boosted by lower tariffs on inputs, and by increased usage of imported versions.

While it may well be the case that, in certain instances, better performing firms that are those able to access and afford imported intermediate inputs – rather than those imported intermediates themselves being drivers of superior performance – **what is clear from this analysis is that imposing restrictions on the use of imported intermediates will hurt the best performing firms most.** This may have negative sector and economy-wide knock-on effects in terms of productivity, and ultimately job creation and wages.

Given that many of the changes to Indonesia's tariff regime came about in the context of the post-East Asian crisis can be considered in large measure to be exogenous to the productivity improvements

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<sup>2</sup> This information was obtained in an interview carried out by World Bank staff with the entrepreneur.

in its manufacturing firms. It can therefore be considered that it is trade liberalization on imported intermediate inputs that leads to the enhanced performance of Indonesian manufacturing firms, and not vice versa.

**These findings are particularly important because productivity increases and industrial upgrading are crucial elements that drive long-term economic growth.** Therefore, understanding how imported intermediates help shape the performance of manufacturers in Indonesia is an important part of the policy making process.

**But there could be a limit on how far reliance on imported intermediates can transform a developing economy into an advanced country.** Lessons from the success of South Korea and countries facing the “middle income trap” suggest that active policy interventions on infrastructure, human capital and reforming competition and the incentive regime were important elements in facilitating the transformation process. These policies are fundamental to the creation of an enabling environment and for the growth of strong, world-class, domestic manufacturing industries that would accelerate the economic transformation in Indonesia.

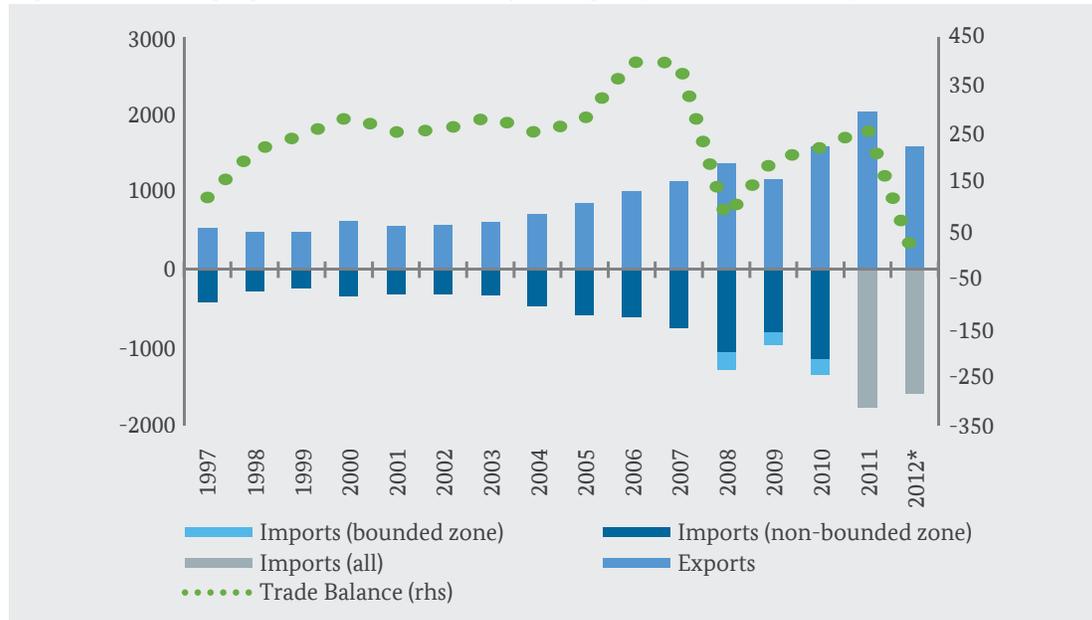


**Until 2012, Indonesia had never experienced an annual deficit on its trade balance.** Indonesia's economic performance between the East Asian crisis and the recent global financial crisis was characterized by a rapidly growing trade balance surplus, which peaked in 2006 and 2007 at just under USD 400 billion. The combination of strong domestic demand and relatively weak global demand gave rise during 2012 to a 6.6 percent decline in exports, an 8 percent increase in imports, and the emergence of a small but persistent monthly trade deficit, amounting to USD 8.5 billion for the first ten months of the year. In turn, these developments have triggered concerns over the economy's reliance on imports, and the impact on domestic employment.

## Chapter 2

# Indonesia's Evolving Trade Balance

Figure 2.1. Emerging trade deficit driven by strong imports and weak exports



Source: BPS and authors' calculations.

Notes: All USD billions at market prices, 2012 figures to end October.

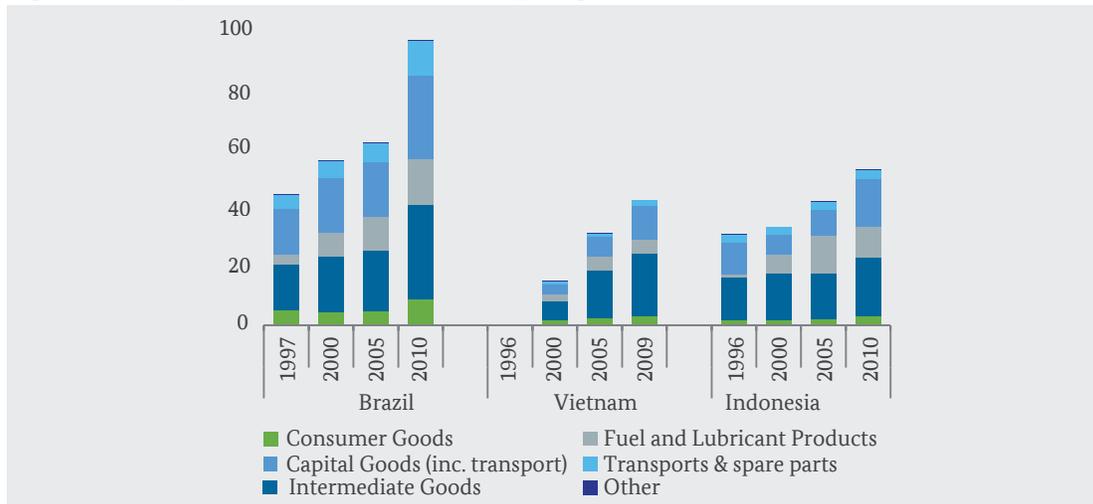
Prior to 2008, imports were underestimated as imports from the neighboring 'bounded zone' were excluded.

**Imports of intermediates and capital goods account for the largest share of Indonesian imports and an important source of inputs for the manufacturing industry.** In 2011, for example, these two components explained 66.5 percent of total imports, while consumer goods only explained about 10.3 percent.<sup>3</sup> In addition, Indonesia's imports of intermediates and capital goods have been increasing at a rate of 4 percent per annum since 1996 (Figure 2.1). Over the last decade about a quarter of medium and large manufacturing firms in Indonesia used imported intermediates. Within that medium and large category, those firms accounted for 51 percent of employment created, produced about 66 percent of total output, added two-thirds of total value created, and explained about two-thirds of total manufacturing exports.

**Compared with other emerging economies, the increase in Indonesia's imports of intermediates has been relatively modest.** Although Indonesia's reliance on foreign intermediates and capital goods seems to have remained stable, given the international experiences in countries that are rapidly industrializing (Figure 2.1 and Figure 2.2), it is to be expected that the importance of intermediates in Indonesian trade would also rise. The reason why the growth of imports of intermediates in Indonesia has not yet matched international norms is likely due to the relatively sluggish growth in Indonesia's manufacturing sector prior to 2010 and the commodity boom-induced increase in the importance of natural resource based production. These types of manufacturing activities typically rely less on imported intermediates.

3 To double check, we looked at trade flows from the other end, i.e. world exports of intermediates, final goods, et cetera, to Indonesia, and the percentages are in line with those reported here.

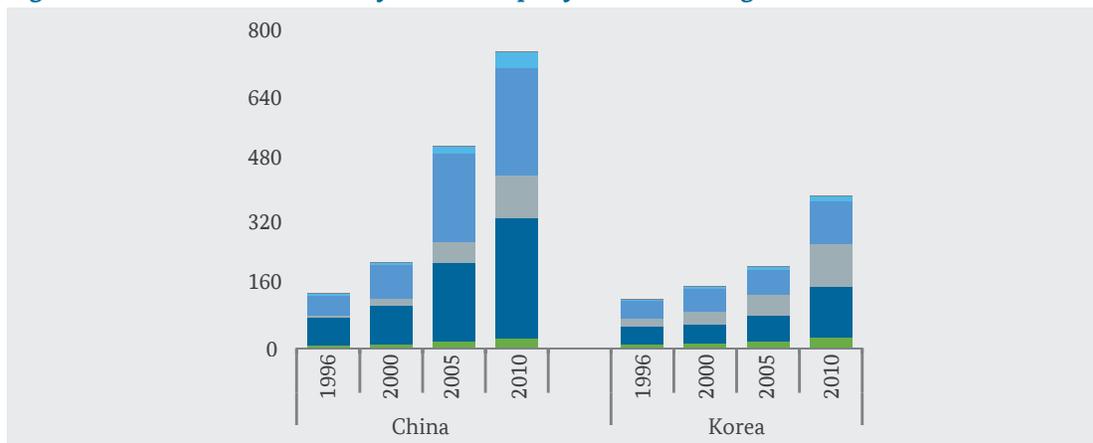
**Figure 2.2. Imports of intermediates and capital goods have been on the rise in Indonesia**



Source: World Integrated Trade Solution database.

Note: Imports in billions of 2000 USD.

**Figure 2.3. ...and more markedly in other rapidly industrializing countries**



Source: World Integrated Trade Solution database.

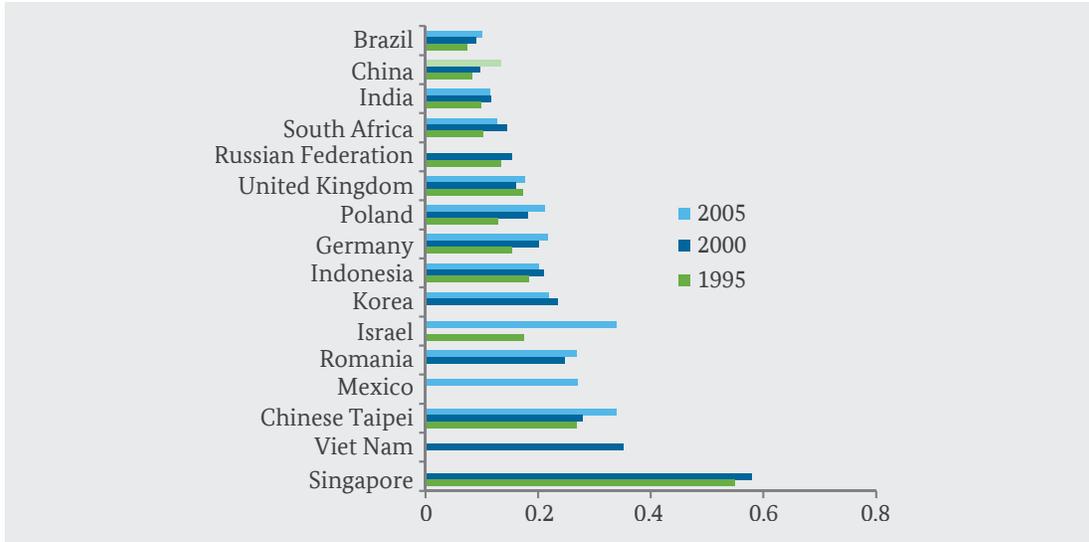
Note: Imports in billions of 2000 USD.

**The same set of products explains almost the entire increase in Indonesian imports of intermediate products.** Rather than importing many new varieties of intermediate inputs, the bulk of the increase in imported intermediates during the 2000s was accounted for by an increase in the volume of imports of varieties that had previously been imported. Only 130 new varieties of imports appeared between 2005 and 2011 (92 of which were intermediates), and 112 were introduced during the period 2000-2005 (of which 71 were intermediates). In fact, about 99 percent of the growth of imported intermediates from 2000 to 2005 can be explained by the so-called ‘*intensive margin*’: more demand for existing imported intermediates, rather than the ‘*extensive margin*’: demand for new varieties of imported intermediates<sup>4</sup>. This underlines the ongoing importance of imported intermediates as inputs for downstream manufacturing sectors.

4 Source: World Bank staff estimates based on BPS data.

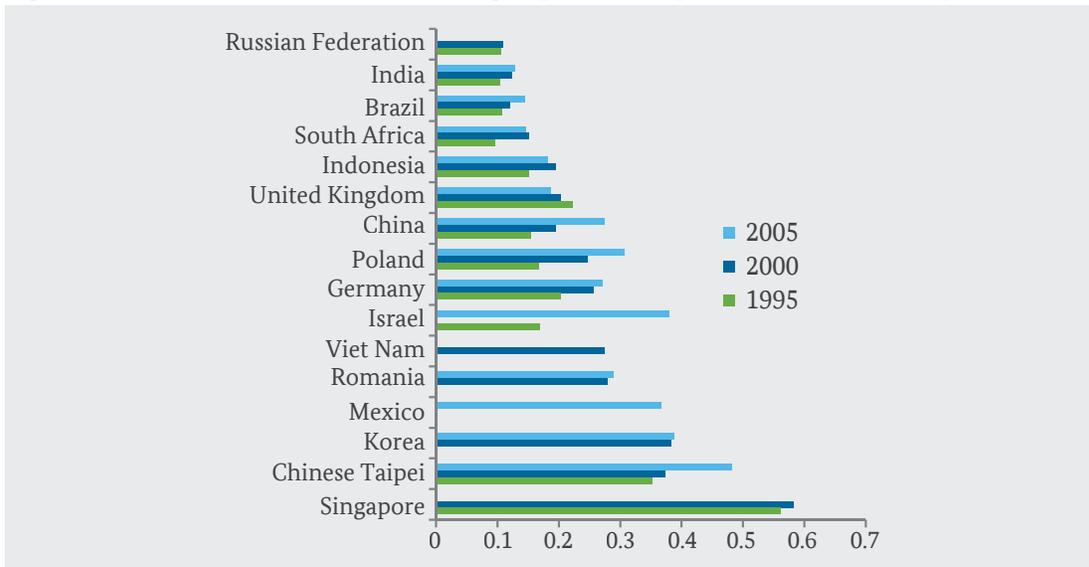
What is happening in Indonesia is not unusual as the use of imported inputs is also increasing in many developed and emerging economies. As shown below (Figure 2.4), imports of intermediates have increased in many developed and developing countries. As a result, the imports component in these country's exports has also risen (Figure 2.5).

**Figure 2.4. The increase in the share of imported inputs in production is a worldwide process...**



Source: OECD, Input-Output Tables.  
Note: Ratio of imported inputs to total inputs.

**Figure 2.5. ...which results in an increasing imported component in countries' exports**



Source: OECD, Input-Output Tables.  
Note: imports content of exports.



**Indonesian manufacturers have benefited from having access to varied, inexpensive and good quality intermediate inputs.** This emerges from anecdotal evidence collected during field interviews conducted for the purposes of this study, from examining international experiences, and from looking at what has happened in Indonesia (see Box 3.1 for a summary of the evidence). By carefully analyzing data from Indonesian manufacturing, both at the sector and at the firm level, the overall findings that will be discussed in detail are the following:

### Chapter 3

# Imported Intermediate Represent Multiple Opportunities for Indonesia

- Manufacturers with exceptional performance tend to use more imported intermediates.
- The use of imported intermediates has helped manufacturers in Indonesia move up the quality ladder.
- The use of imported intermediates has helped improve the capacity of firms to diversify their production.

**The flexibility to import intermediate inputs is vital for both Indonesian and foreign firms serving the domestic market.** For domestic firms, access to high quality and variety of intermediates can help them create products that allow them seize growing business opportunities in Indonesia. For foreign firms, access to imported intermediates helps them maintain the quality and specifications of their products, thereby strengthening Indonesia's ability to attract more FDI. This is particularly important given the recent tendency of global manufacturers to "on-shore" their production, i.e. producing close to their largest market. By ensuring access to intermediate inputs, Indonesia helps create a favorable business environment, which is important for attracting both market-seeking and efficiency-seeking FDI.

**Over the last two decades, the industrialization model has shifted towards the separation of production stages between several locations accompanied by an increased trade in intermediaries.** Processes of production, from inputs to final products, have increasingly been "sliced", meaning that each process can now be carried out wherever the necessary skills and materials are available at competitive costs. This change was facilitated by lower transport cost and by technological advances that allowed manufacturers to improve productivity by separating production stages into different locations.<sup>5</sup> This fragmentation of production process establishes international production networks in which firms located in different countries produce and trade different components of a single final good. In this context, intermediate goods travel to their destination by indirect routes.<sup>6</sup>

While Indonesia's participation in international production networks, or "Global Value Chains" is discussed in other Policy Note of this series, here the focus is placed on the role that imported intermediates may have for Indonesian firms' competitiveness.

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5 Baldwin (2011).

6 So say for example, that Korean intermediates are assembled in Indonesia into final goods to be exported to the EU. Then, Indonesian exports to the EU embody Korean content. This type of network results in increase in both trade in intermediates, and in the imported component in the export flows of the assembling country. What is more, the strength of the East Asian economies, leading global growth for the past three decades, is largely due to the development of these international production networks (Kimura & Obashi (2011)).

**Box 3.1. The benefits of quality and variety in inputs for manufacturing competitiveness**

**In Indonesia, imported inputs have played a key role in improving performance of the manufacturing sector. Evidence suggests that increased access to more varied and better quality imported inputs, facilitated by the trade liberalization process of the 1990s, was a significant productivity-enhancing force for Indonesian manufacturers.** A study conducted by Amity and Konings (2007), that looked at manufacturing census data from 1990-2001, found that a 10-percentage point fall in input tariffs led to a productivity gain of 12 percent via learning, quality and variety effects. This gain was found to be at least twice as high as the gains from reducing output tariffs that may arise via tougher competition effects.

**The importance of facilitating access to foreign inputs and capital goods is not unique to Indonesia.** More than half of China's exports are processed exports. This means that Chinese firms assemble final products from inputs that are often imported from other countries.

**Recent research focusing on India's development experience shows that the expansion in the number of products produced by Indian manufacturing firms during the 1990s was in part a direct consequence of cheaper, more varied, and better quality imported inputs** (Goldberg, Khandelwal, Pavcnik, Topalova (2008)). Tariff reductions lowered prices and increased volumes of existing imports, but they also meant access to new types of intermediate inputs from the rest of the world. These new inputs, in turn, resulted in an increase in the number of products manufactured by firms, or "firms' product scope", which explained nearly a quarter of manufacturing output growth. The lower price of intermediates due to trade liberalization represented a boon for domestic firms, as their costs fell. Firms could then use their cost savings to cover the fixed costs of entering new product lines. In addition, having access to higher quality intermediate inputs and capital goods implied that technological constraints were relaxed.

**The evidence and anecdotes reported here suggest that importing is crucial for stimulating production and exports, and that restrictive trade policies designed to protect domestic jobs, may actually produce plant closures and job losses.**

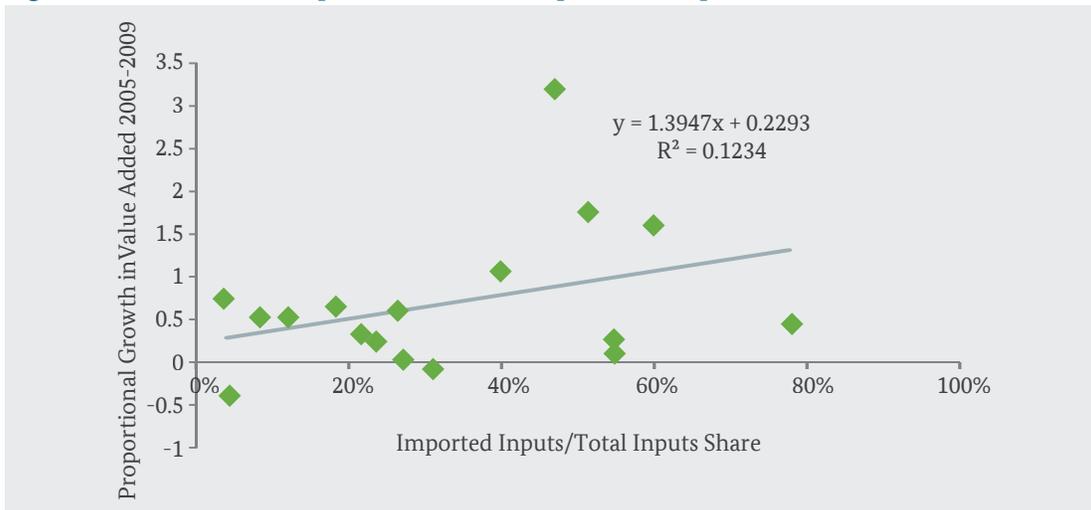
Source: World Bank staff based on Goldberg, Khandelwal, Pavcnik, Topalova (2008). Amity and Konings (2007).

## Fact 1: Imported intermediates help firms to increase performance

Concerns may arise over whether the increased use of imported intermediates implies less value added domestically, and a contraction in domestic input producing sectors.

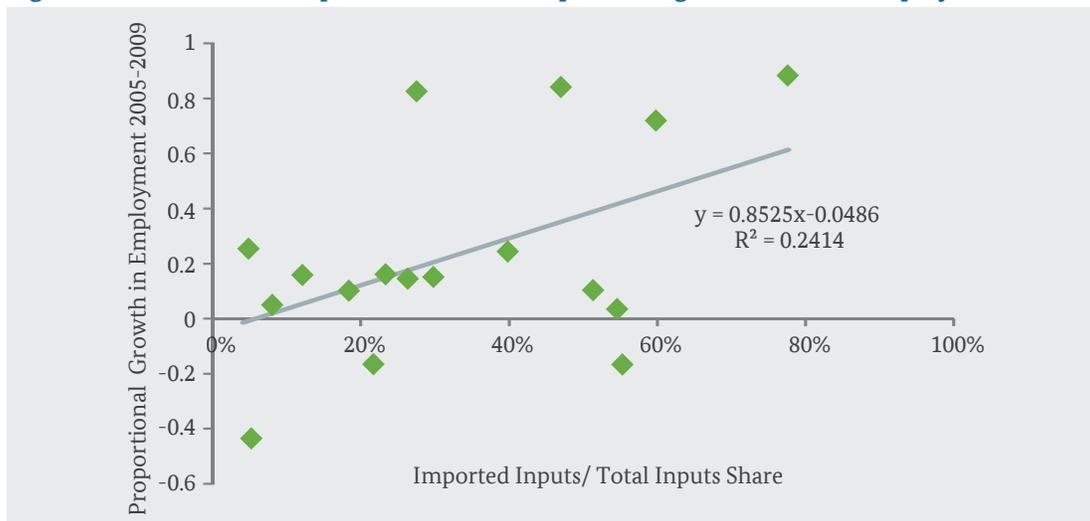
**Firms that use imported inputs have faster rates of growth for output, value added, and employment.** Comparing firms that use imported inputs with those that do not within narrowly defined sectors, those in the former group tend to display a better growth performance than those in the former group in terms of output, value added and employment creation (Figure 3.1, Figure 3.2, Appendix Figure 1.1, Appendix Figure 1.2, and Appendix Figure 1.3). Thus, the use of imported inputs does not imply that Indonesian jobs are being destroyed, but rather, that they are being created.

**Figure 3.1. Sectors that import more of their inputs have expanded more**



Source: World Bank staff based on BPS data.

Figure 3.2. Sectors that import more of their inputs have generated more employment



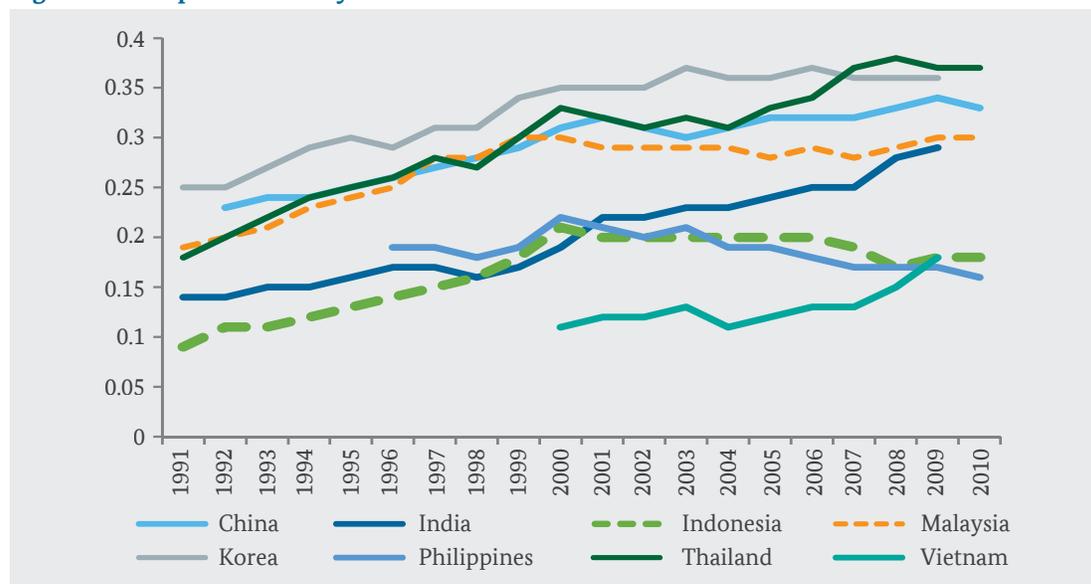
Source: World Bank staff based on BPS data.

**The jobs created by users of imported inputs pay higher wages.** The rapid employment growth exhibited by firms that use imported inputs is very good news for Indonesians searching for quality jobs. The real wage premium obtained by a worker in a firm that sources 10 percent of its inputs from abroad is about 3.7 percent. Why can firms that use foreign intermediates afford to pay higher wages, on average?

## Fact 2: Imported intermediates helped Indonesian manufacturers move up the quality ladder

**Is Indonesia moving up the quality ladder? What is the role of imported intermediates in this?** How and what a country produces matters for growth and development. Greater capacity among firms to increase the value addition of products in terms of skills and technology will induce productivity increases, allowing such firms to obtain higher prices in markets. It is thus, desirable, both from the point of view of firms' long run profitability, and from the point of view of the generation of high quality jobs, and ultimately for economic development, to increase the sophistication of production processes. Here, we explore how product sophistication has evolved in recent years in Indonesia, and what role increased access to imported intermediates has played in this process.

Figure 3.3. Export Similarity Indices with the USA



Source: Author's calculations based on data from Comtrade, World Bank.

Note: Finger-Kreinin indices<sup>7</sup> measuring overlapping of export structures at 6 digits of HS classification.

**Product sophistication and product quality in Indonesia has been falling overall, which can be partially explained by the commodity boom.** The decline in product sophistication is observed in the similarity of Indonesia's exports with those of an industrialized economy: the USA (Figure 8).<sup>8</sup> Export similarity has been growing uninterrupted since the early 1990s for most countries, with the exception of Indonesia and the Philippines. Although the downward trend precedes the commodity boom, it was likely exacerbated by it.<sup>9</sup>

**The evolution of product quality shows more heterogeneous patterns by sector, although the overall trend suggests a slight decline over the latter half of the 2000s.** To understand patterns in the evolution of product quality in Indonesian manufacturing, firm-product level data is used to define unit values at a 9 digit disaggregation of the 3<sup>rd</sup> revision of the ISIC classification.<sup>10</sup>

7 The Finger-Kreinin index measures the similarity of export bundles by comparing the extent to which they overlap in terms of products. It ranges from 0 (no overlapping) to 1 (complete overlapping), and it is formally defined as,  $FK_{a,b} = \frac{1 - |\sum_i [X_i(a,w) - X_i(b,w)]|}{2}$ , where  $X_i(a,w)$  is the share of exports that country 'a' sells to the world of product 'i', and  $X_i(b,w)$  is the share of exports that country 'b' sells to the world of product 'i'.

8 Export similarity is measured using Finger-Kreinin indices that assess the extent to which the export structures by product overlap between a pair of countries.

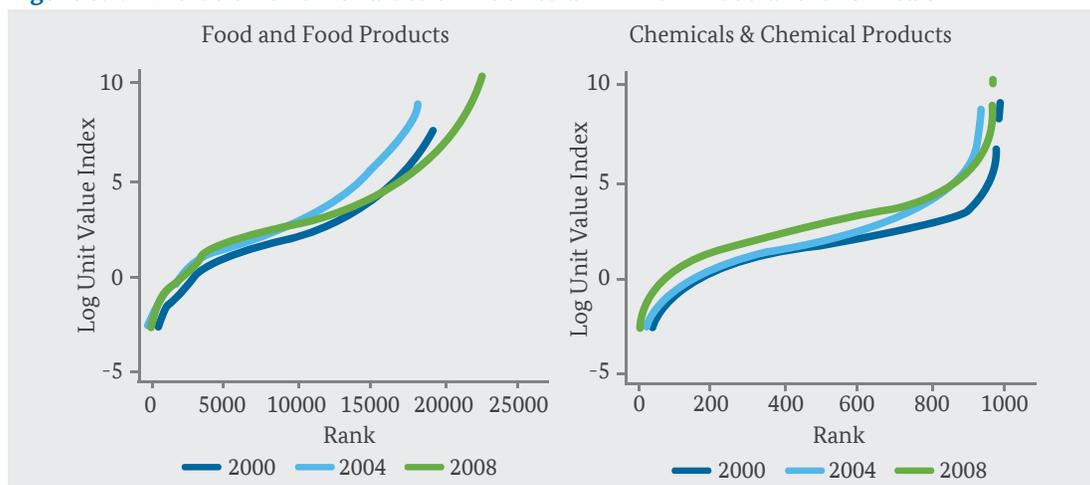
9 If the comparison is made with the Japanese production bundle, a similar picture emerges.

10 Unit values are typically used as proxies for product quality. When markets are competitive, higher prices are associated with higher quality and greater product differentiation. Of course, there are caveats, and the association between quality and unit values should not be considered to be automatic, particularly in the context of imperfectly competitive markets.

Figure 3.4, Figure 3.5, and Figure 3.6 plot the “quality ladders”, or distribution of firms’ unit value indices, ranked from the lowest (left) to the highest (right), for years 2000, 2004 and 2008, for the largest sectors in the economy (Food, Chemicals, Textiles, Rubber & Plastics) (Figure 3.4, and Figure 3.5), and those that actively participate in global production networks (Electrical Machinery, Automotive) (Figure 3.6). Two identifiable patterns emerge:

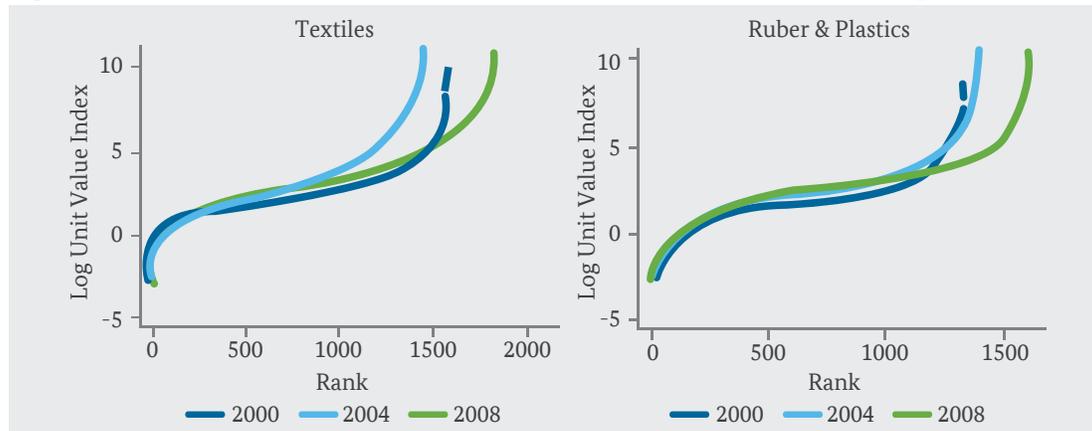
- a) Quality ladders are steeper in automotive, electrical machinery, and in food, while flatter for chemicals, rubber and plastics, and textiles. This reveals a wider heterogeneity (variation) of quality levels, as proxied by unit values, among firms in the former group than in the latter. For the automotive and electrical machinery sectors, the large variation in quality level of products also represents a wider range of output produced by firms for different stage of production chains
- b) Firms producing chemicals and those producing electrical machinery have improved the quality of their products steadily since 2000, resulting in higher unit values. Instead, for firms producing food related products, textiles, rubber and plastics and automotive, quality levels seem to have dropped since 2004, particularly for those products at the higher-end of the quality ladder.

**Figure 3.4. Evolution of Unit Values of Indonesian Firms in Food and Chemicals**



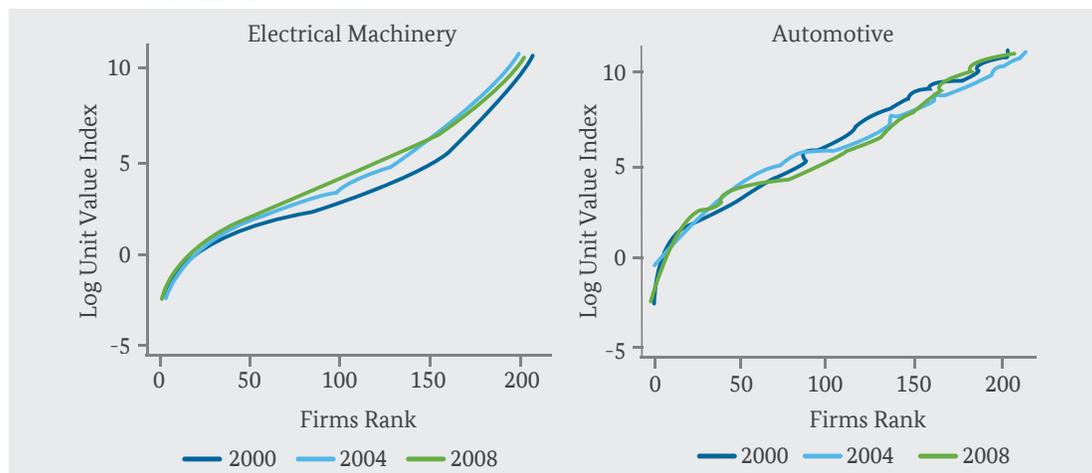
Source: World Bank staff based on Industrial Census data, BPS.

Note: Unit values defined as the ratio of values produced/volumes, disaggregated at 9 digits of the ISIC 3rd rev. classification.

**Figure 3.5. Evolution of unit value of Indonesian firms in textiles, rubber, and plastics**

Source: World Bank staff based on Industrial Census data, BPS.

Note: Unit values defined as the ratio of values produced/volumes, disaggregated at 9 digits of the ISIC 3rd rev. classification.

**Figure 3.6. Evolution of unit values of Indonesian firms in electrical, machinery, and automotive sectors**

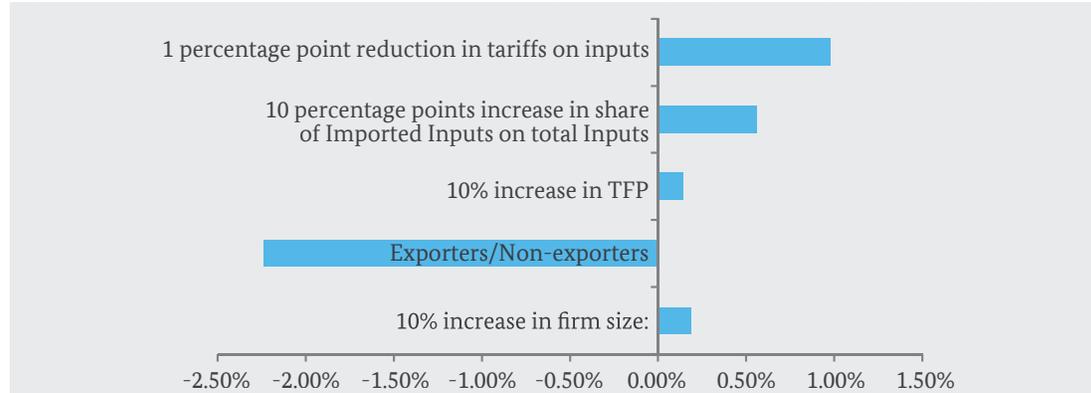
Source: World Bank staff based on Industrial Census data, BPS.

Note: Unit values defined as the ratio of values produced/volumes, disaggregated at 9 digits of the ISIC 3<sup>rd</sup> rev. classification.

Two approaches are used to examine the issue. First is the share of imported intermediaries on total inputs as a potential determinant of whether firms produce better quality products. A careful analysis reveals that increasing the usage of such inputs by 20 percentage points, makes it about one percent more likely to produce better quality goods.<sup>11</sup> Although the effect is statistically very well determined, its size is modest from an economic point of view. In addition, a 20 percentage point increase in the usage of imported intermediaries is a very extreme change, given that about 70 percent of firms do not use foreign inputs, and that for only 15 percent of them do foreign inputs account for more than 20 percent of total inputs.

<sup>11</sup> Other factors such as the size of the firm, and its productivity levels, positively affect the probability of producing high quality products. Results suggests that exporters seem to produce, on average, products with unit values about 2.24 percent below those produced by non-exporting firms with similar characteristics.

Figure 3.7. Effects of selected variables on the probability of producing high quality products



Source: World Bank staff based on Industrial Census data, BPS.  
Note: Estimated effects from a probability model as specified in Box 2.

### Box 3.2. Estimating the determinants of the likelihood of producing high quality goods in Indonesia

To understand the drivers of the probability of producing high quality goods in Indonesia we rely on detailed product-firm level data for more than 20,000 firms per year, over the period 1998-2009.

We assume that a firm produces a high quality product when the weighted average of the unit values corresponding to the firm’s products is above the median of the weighted average of the unit values of the same sector. Data on unit values are available at a highly disaggregated level (9-digit ISIC), which allows us to go to the actual product level. The benchmark for comparison – the sector – is defined at the 5-digit ISIC. Such a disaggregation means that the within group variation in unit values is more likely to be related to the degree of differentiation of the product or its quality content, than to substantial differences in product specifications, cost structures, etcetera. The 5-digit disaggregation allows us to reach specific activities such as ‘battery manufacturing’ (code 31400) or ‘biscuits manufacturing’ (code 15413).

We estimate a probit model with the following specification:

$$Pr ob(UVIndex_{it} > Median(UVIndex)_{st}) = \alpha_t + \alpha_s + \beta_1 \ln Empl_{it} + \beta_2 \ln TEP_{it} + \beta_3 Exporter_{it} + \beta_4 Foreignit + \beta_5 Sh Im Plnputs_{it} + \varepsilon_{it}$$

The probability of a firm ‘i’ at time ‘t’ producing goods with ‘quality’ above the median of the sector ‘s’ is explained by the size of the firm, proxied by the log of the number of employees, the log of the firm’s total factor productivity, its exporting status, the ownership structure (foreign/domestic), and the share of imported inputs on total inputs. The model also includes sector fixed effects (at the 5 digit level) to absorb any time-invariant sector determinant of unit values, and year dummies, to control for macro shocks that affect unit values across the board.

In a departure of the baseline specification, we substitute the share of imported inputs with the weighted average of input tariffs, disaggregated at the 2-digit level according to ISIC 3<sup>rd</sup> Rev.. For each industry, we create an input tariff as the weighted average of tariffs on inputs used in the production of the final output of that industry. The weights are constructed as the input industry's share of the total input bill of the industry. Tariffs are a better measure of availability of imported inputs, since they are less likely to be subject to endogeneity than the actual usage of foreign inputs (e.g.: if there is a third factor, uncontrolled for, that affects both the quality of the product, and the decision to import inputs, such as, for example, time-varying entrepreneurial characteristics of the firm). In addition, they also capture the disciplining effect that they may have on quality and price of domestic inputs via pro-competition effects.

To complement the analysis, we also estimate the probability of both producing a high quality good and expanding the ratio of value added/output, using an analogous specification:

$$\Pr ob(UVIndex_{it} > Median(UVIndex)_{st} \& gVA / Output > 0) = a_t + a_s + \beta_1 In Empl_{it} + \beta_2 In TFP_{it} + \beta_3 Exporter_{it} + \beta_4 Foreign_{it} + \beta_5 Sh Im plnputs_{it} + \varepsilon_{it}$$

Given the restrictions of the data, unfortunately we cannot know with certainty whether the results from estimating these models are indicative of causality. In fact, reverse causality and other sources of endogeneity are important concerns. For example, firms that have the capability of producing high quality goods may also find it easier to source inputs wherever these are produced, which would lead to a positive correlation between imported inputs usage and the likelihood of producing high quality goods, but may not inform us as to whether the former causes the latter. It is for these reasons that our results should be interpreted as conditional correlations.

**Maintaining low import restrictions on imported intermediates has a substantially greater impact on the likelihood of producing better quality products than the actual usage of imported inputs.** The second strategy for assessing the impact of availability of imported intermediates on quality consists of looking at the effect of input tariffs on the likelihood of producing high quality goods. Input tariff reductions not only make more varied, cheaper and better quality inputs available from foreign markets, but they also incentivize quality improvements and price reductions in domestic versions by adding competitive pressures. In fact, our analysis suggests that a reduction in input tariffs by one percentage point, from say, the median level of 3.5 percent to 2.5 percent, would increase the probability of producing high quality products by almost 1 percent. This relatively larger effect hints at some pro-competition effects that lower input tariffs may have on the price and quality levels of domestically produced inputs, which in turn, affects the quality of the final goods produced by Indonesian firms.

**These results provide more robust evidence that it is in fact the prevalence of imported inputs that causes firms to perform better rather than it being better firms that are best able to access and afford such inputs.** While firm productivity and growth may impact on the intensity with which firms use imported inputs, it is unlikely that the productivity or growth of firms affects changes in tariffs. Moreover, we know that many of the changes in the tariff regime in Indonesia came about on foot of the IMF program after the East Asian crisis. In this sense, they can therefore be considered to be exogenous, to a large degree.

**In general, production of high quality goods need not necessarily mean high levels of value addition, but evidence from Indonesia suggests that any trade-off between the production of higher quality goods and a reduction in the proportional value added is of modest magnitude.** Increased imports of intermediates have raised concerns over how much value is actually added in Indonesia. It is true that in some countries the process of manufacturing relatively sophisticated products relies mostly on imported intermediates, leaving labor as the only locally sourced input. Looking at the value chain of the popular ‘iPhone’ helps illustrate this point. The components of an iPhone come from a variety of suppliers and are assembled by a Taiwanese firm based in Shenzhen, China. However, only 1.25 percent of the iPhone value corresponds to value addition in China. This example shows that the production of a high quality good does not necessarily imply a high ratio of value added to output.

**In Indonesia, our evidence suggests that better access to imported intermediates is not only positively correlated with higher unit values, but also with an increasing ratio of value added to output.** As important as producing high quality goods is to incorporate Indonesian value added into goods produced. Higher value addition results in more and better-paid jobs in Indonesia. In the second part of our analysis we explored whether increased access to imported inputs contributed *simultaneously* to relatively high quality and to the expansion of Indonesian value added. Both the share of imported inputs in total inputs, and input tariff reductions positively increase the likelihood of producing goods with higher average quality than the median and expanding the ratio of value added to output at the same time. The magnitudes of the effects are in line with the previous results, with tariff reductions having economically more meaningful effects than increases in the share of foreign inputs used.<sup>12</sup>

### Fact 3: The use of imported inputs has helped Indonesian manufacturers to diversify its production bundle

As recent research shows, economic development is associated with process of diversifying production bundles.<sup>13</sup> Such process allows countries to reduce vulnerabilities to price or demand shocks, and build a wide set of capabilities. The acquisition of production capabilities in an increasing range of goods has been found to be an important source of knowledge spillovers and key to growth and development.<sup>14</sup>

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<sup>12</sup> The full set of results is reported in the Appendix to this note.

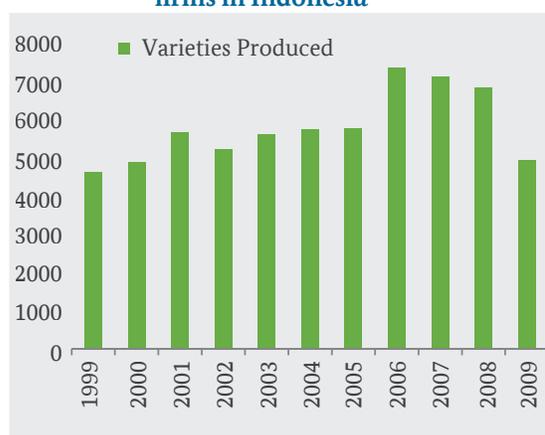
<sup>13</sup> See for example Imbs and Wacziarg (2003), Hesse (2009).

<sup>14</sup> Hausman, Hwang and Rodrik (2005)

**Production diversification in Indonesian manufacturing, as measured by the number of varieties produced, has been decreasing since 2006** (Figure 3.8), although the number of product varieties of the average firm increased mildly from 1.89 in 1999 to 2.13 in 2009. As with product sophistication and quality, the concentration of production is likely related to the commodity boom experienced during the second half of last decade. The picture for the export bundle is similar. Figure 3.9 shows the export diversification index plotted over 1990-2010, and reveals that there has been a mild reversal in the process of diversification since 2005.<sup>15</sup>

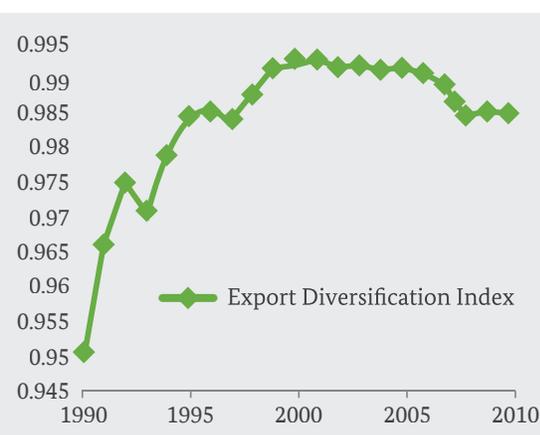
**However, there is a substantial variation across-sectors in product diversity.** Firms producing Machinery and Equipment, for example, dropped 73 product lines in the period 1999-2009, which represents a reduction in 24 percent of varieties produced. On the other hand, firms producing Electrical Machinery increased their product scope by 30 percent incorporating about 36 new varieties, while firms in the Textile sector incorporated 95 new varieties, thus increasing their product scope by 22 percent.

**Figure 3.8. Product varieties produced by medium & large manufacturing firms in Indonesia**



Source: World Bank staff based on BPS data.  
Note: Varieties are defined as unique ISIC-9 digit codes.

**Figure 3.9. Herfindahl Index of Export Diversification**



Source: World Bank staff based on Comtrade data.  
Note: Herfindahl is calculated using export data, disaggregated at 6 digits of the HS classification.

**The increased availability of imported intermediates played an important role in facilitating product diversification.** The relationship between the availability of imported inputs and the introduction of new products by Indonesian manufacturing firms is examined following the approach of Goldberg *et al* (2010) (see Box 3.3 for details on the methodology, the full set of results are reported in the Appendix).<sup>16</sup> Three different channels are explored:

- <sup>15</sup> The export diversification index is defined as  $(1 - \text{Herfindahl index})$ , where the Herfindahl index for period  $t$  is calculated as the sum of the squared trade shares at each product category (defined from the HS – 6 digit classification). Diversification is higher, the closer to 1 the diversification index is (that is, the closer to zero the Herfindahl index is).
- <sup>16</sup> The analysis follows quite closely Goldberg *et al* (2010). The authors analyzed the role that imported intermediate inputs had on domestic product growth in India over the period 1987-1997, and find that lower input tariffs account on average, for 31% of new products introduced by Indian firms.

- (a) Imported intermediates could facilitate product diversification since inputs with better quality or value for the money may render production profitable.
- (b) The varieties of imported intermediates could also facilitate product diversification and these are made available through increased trade.
- (c) The increased availability of imported inputs may trigger pro-competition effects, inducing cost reductions and quality improvements among domestic versions of intermediates, given a certain usage of imported intermediates.

### Box 3.3. Estimating the role of imported inputs in firms' product scope in Indonesia

To explore the extent to which the use and availability of imported inputs affects Indonesian firms' product scope, once again, we rely on the manufacturing census for Indonesia, with data at the firm-product level for over 20,000 firms over the period 1998-2009.

We examine three different channels through which availability of imported intermediates may affect product diversification. The first channel links the availability of imported inputs and diversification through the actual usage of imported inputs. We test this channel by looking at the effect of the share of inputs that are imported on firms' product scope. The second channel works through the number of varieties of inputs available. To test this channel we look at the effect of the number of imported varieties of intermediate inputs on firms' product scope. The third channel works through indirect effects that increase the availability of imported inputs may induce on the quality of domestic versions of inputs, and hence, on firms' product scope. To test this channel, we look at the effect that input tariffs has on firms' product scope **given** the actual use of foreign intermediates.

The estimated model is specified as follows:

$$\text{Varieties}_{it} = \alpha_t + \alpha_i + \beta_1 \ln \text{Empl}_{it} + \beta_2 \ln \text{TFP}_{it} + \beta_3 \text{Exporter}_{it} + \beta_4 \text{Foreign}_{it} + \beta_5 \text{Output Tariff}_{st} + \beta_6 \text{Share of Imported Inputs}_{st} + \beta_7 \ln \text{Input Varieties}_{st} + \beta_8 \text{Input Tariff}_{st} + \varepsilon_{it}$$

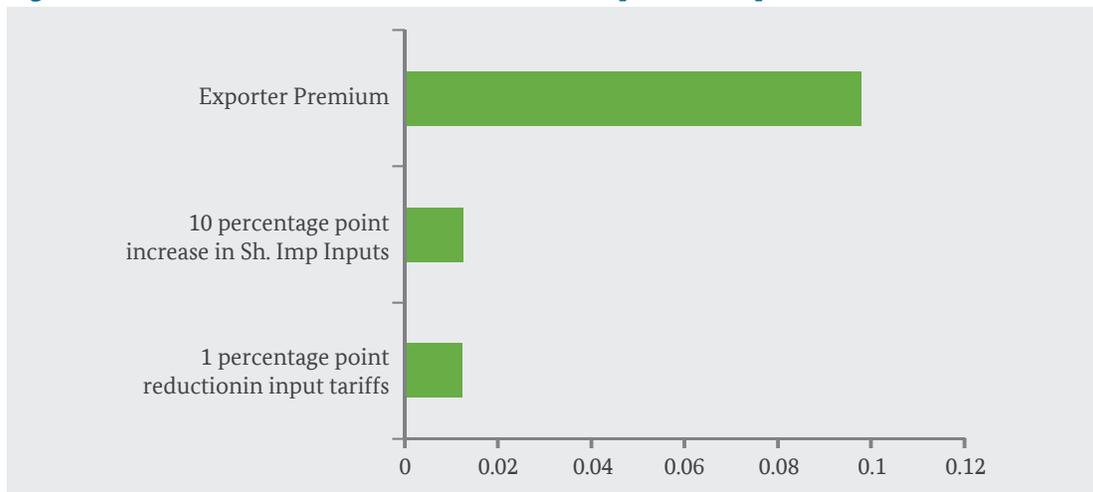
To isolate the imported input effect on product scope, we control for the effects that other firm characteristics may have on product scope, e.g.: the size of the firm, (proxied by the log of the number of employees), the log of the firm's total factor productivity, its exporting status, the ownership structure (foreign/domestic), the output tariff faced in the sector 's'. We then include the share of imported inputs used by the firm, the sector's input tariff levels and the imported input varieties available also at the sector level. The model also includes firm level fixed effects to control for time invariant firm heterogeneity, and year dummies, to control for macro shocks that affect unit values across the board.

In Table 3 of the Appendix, we report a full set of results for this specification, and alternative ones in which each explanatory variable is incorporated sequentially.

**Increases in firms' use of imported intermediates have been systematically associated with increases in product variety.** Results from a statistical analysis suggest that a 10-percentage point increase in the share of imported inputs on total inputs is associated with an increase in varieties produced by 1.22 percent (Figure 3.10).

**Given firms' use of imported intermediates, reduced input tariff help to further increase the number of varieties produced.** This provides some evidence that the channels outlined in (a) or (c) above that operate through lower prices of imported intermediates or pro-competitive effects that lower input tariffs may have on the costs and quality of domestic versions of intermediates. In fact, a one-percentage point reduction in input tariffs induces a 1.22 percent increase in the firm's product scope, above and beyond any effect induced by the actual usage of foreign inputs.

**Figure 3.10. Effects of selected variables on the firms' product scope**



Source: World Bank staff based on Industrial Census data, BPS.

Note: Estimated effects from fixed effects model described in Box 3.

**But increased variety in imported intermediates seems to have no clear effect on firms' product diversification.** This is found once input tariffs and usage levels of imported inputs are included in the regression analysis. One explanation for this may lie in the fact that, over the period considered, firms had already determined their set of input requirements, rather than accommodating new varieties.

**Interestingly, results also suggest that output tariffs may facilitate product diversification.** If developing new products is costly, tariff protection at the output level increases the effective protection rate of that particular output. This may act as an incentive, allowing existing firms to appropriate extra profits and finance the costs of discovering and developing new products.

The data also reveals that larger firms and exporters tend to produce more varieties than smaller and non-exporting firms, as it would be expected. Exporters, for example, produce 10 percent more varieties than non-exporters, on average, while a firm that is 10 percent larger than average, tends to produce 1.7 percent more varieties than average.



The availability and use of imported intermediates in Indonesia has been associated with greater output growth, greater growth in value added, higher productivity, and consequently, more and better paid jobs. They have also been associated with quality improvements, and with the widening of firms' product scope, thus contributing to the diversification of the Indonesian economy. First, imported intermediates can improve production processes if they add to the pool of available inputs from which domestic firms can choose. Firms then have access to intermediaries with better value for the money and more

## Chapter 4

# The Challenge for Indonesia

varieties of intermediates. While it may be the case that it is better performing firms that are able to access and afford imported intermediates in the first place, clearly any restriction on such imports would more damaging impact on superior performing firms, with negative sector and economy-wide effects on productivity etc. Second, the availability of imported inputs *per se*, even if these are not widely used by domestic firms, helps to improve the quality and reduce the price of domestic varieties of intermediates via competition and imitation effects. Third, imported inputs provide a conduit for technological transfers, from which domestic firms can benefit.

The use of imported intermediates has not been associated with a decline in manufacturing in Indonesia. On the contrary, it may be a sign that manufacturing is shifting away from resource based and low value added production, into more sophisticated production processes.

Given the international patterns of industrialization, the increasing importance of global production networks, and the reductions in trade costs, it is likely that the reliance of Indonesia's productive sectors on foreign intermediates will increase. Three factors place Indonesia in a privileged position in this respect: its geographic location, within what it has been called "Factory Asia", its comparative advantage in processing because of its abundant young labor force, and its growing market driven by strong consumption growth of emerging middle class.

The challenge for Indonesia is to make the most of this opportunity and to ensure that firms in Indonesia do not end up locked into the lower end of processing and assembling activities with limited knowledge content, but move up the quality ladder into design and branding.

Policy makers can contribute to making this possible and thus reap the maximum benefits by

1. Ensuring that imported intermediates and capital goods continue to be accessible for firms in Indonesia. Given the changes in the structure of production internationally, the costs of protectionism have increased. Trade barriers are likely to affect the competitiveness of domestic producers rather than protecting them. Measures that restrict firms to access imported intermediates, in fact, act as a tax on domestic value added.
2. In addition, if the barrier takes the form of delays in releasing import licenses or getting hold of the imported input, severe disruptions to the functioning of the production network are generated, with potential consequences for firms' location decisions.

But there could be a room for policy interventions to support import competing sectors where Indonesia possesses a latent comparative advantage in the production of heretofore imported intermediate inputs. The key focus of such interventions would be to facilitate an appropriate supply response among domestic firms rather than through trade barriers or behind-the-border restrictions which may otherwise prove detrimental to the wider economy if applied in isolation. Policy interventions to promote growth domestic manufacturers in intermediate inputs would involve addressing key challenges for private investment to grow and innovate in Indonesia, such as

- Investing in improving connectivity. Quantity and quality of infrastructure can be as or more important as restrictive trade policies in certain instances. The development of an efficient port in Jakarta, for example, will help break the dependence on Singapore and Malaysia for transshipment of cargo that is faced currently by Indonesian manufacturers.
- Promoting investment policies and contributing to a business environment that is friendly to foreign firms, as these are likely to be an important conduit for the flow of technology, information and ideas into domestic agents.
- Designing policies that stimulate skills training are necessary to build local absorptive capacities, which are at the heart of any process of industrial upgrading, and development strategy in general.

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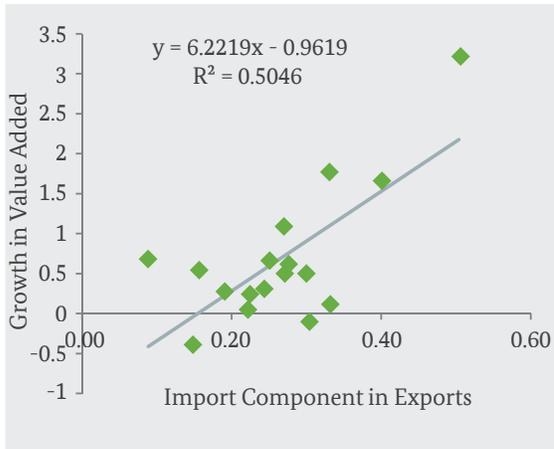
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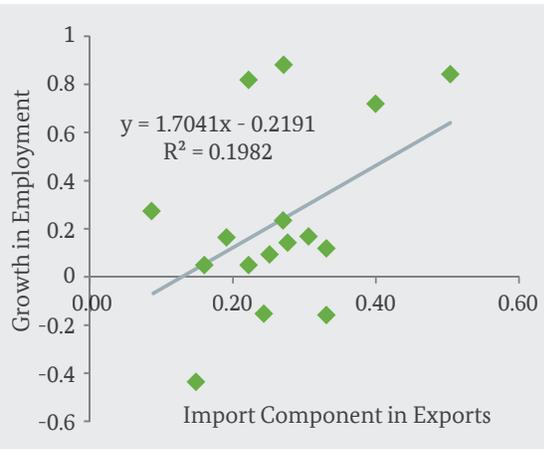
# Appendix

## Appendix I

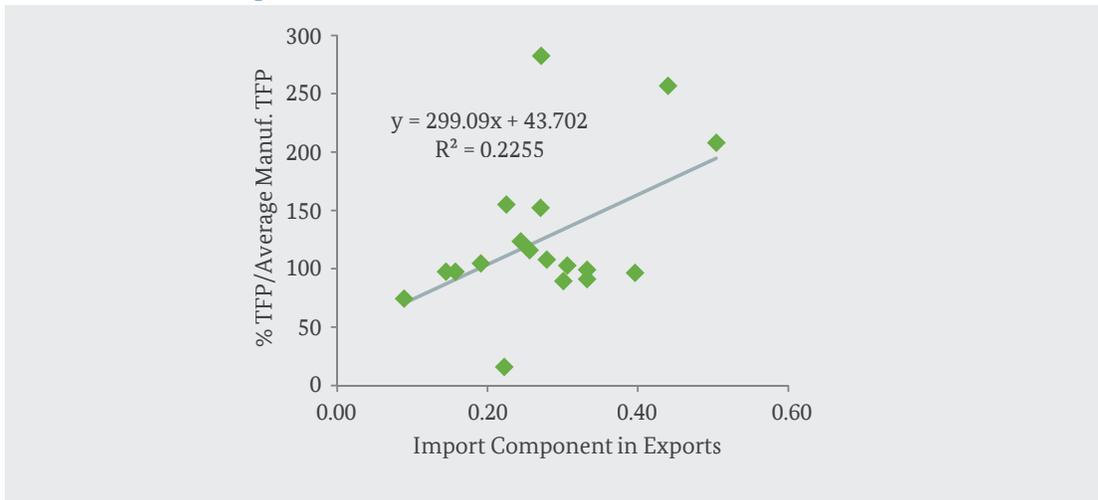
**Appendix Figure 1.1. Sectors with a higher imported component in exports have expanded more**



**Appendix Figure 1.2. Sectors with a higher imported component in exports have generated more employment**



**Appendix Figure 1.3. Sectors with a higher imported component in exports are more productive**



Source: Appendix Table 1.1. Data from Manufacturing Census, BPS, World Integrated Trade Solution, and OECD database.

## Appendix II

Appendix Table 2.1. Source of Calculation for Figure 3.1 and Figure 3.2

Description	Import Component in Exports				Imported Inputs/Inputs				Growth in Employment	TFP	Growth in TFP	VA/Output	Growth of VA	Growth in Demand for Domestic Imports
	1995	2000	2005	1995-2005	1995	2000	2005	1995-2005						
C2715Food products, beverages and tobacco	0.08	0.21	0.09	0.24	0.12	0.12	0.24	0.12	0.12	0.12	0.12	0.12	0.12	0.12
C2718Textiles, textiles products, leather and furs	0.06	0.29	0.24	0.25	0.18	0.22	0.22	0.04	-0.19	0.41	0.30	0.11	0.30	0.11
C2720Wood and products of wood and cork	0.00	0.15	0.15	0.01	0.05	0.05	0.05	0.00	-0.46	0.37	0.45	-0.08	0.37	0.01
C2721Paper, paper, paper products, printing and p	0.25	0.34	0.25	0.15	0.32	0.18	0.18	0.16	0.18	1.16	0.45	0.29	0.76	0.17
C2722Chemicals and chemical products	0.21	0.36	0.22	0.21	0.30	0.28	0.28	0.18	0.18	-0.11	0.42	0.30	0.42	0.18
C2723Rubber and plastic products	0.03	0.27	0.03	0.45	0.08	0.11	0.11	0.03	0.10	0.10	0.10	0.10	0.10	0.10
C2724Other non-metallic mineral products	0.15	0.15	0.15	0.14	0.09	0.08	0.08	0.04	0.04	0.10	0.10	0.10	0.10	0.10
C2725Iron and steel	0.22	0.14	0.22	0.38	0.44	0.11	0.11	0.14	0.14	1.94	0.40	0.40	0.40	0.40
C2726Fabricated metal products except machinery a	0.03	0.30	0.03	0.45	0.38	0.26	0.26	0.15	0.15	0.15	0.15	0.15	0.15	0.15
C2727Machinery and equipment n.e.c.	0.50	0.27	0.50	0.91	0.78	0.47	0.47	0.41	0.41	0.71	0.35	0.35	0.35	0.35
C2728Office, accounting and computing machinery	0.09	0.44	0.44	0.86	0.75	0.75	0.75	0.75	0.75	2.56	0.83	0.83	0.83	0.83
C2729Electrical machinery and apparatus n.e.c.	0.29	0.35	0.35	0.31	0.29	0.30	0.30	0.18	0.18	0.18	0.18	0.18	0.18	0.18
C2730Radio, television and communications equipme	0.41	0.32	0.32	0.37	0.41	0.35	0.35	-0.15	-0.15	-0.15	0.30	0.11	0.11	0.11
C2731Metal, plastic and optical instruments	0.08	0.27	0.27	0.06	0.48	0.78	0.78	0.71	0.71	0.71	0.71	0.71	0.71	0.71
C2732Motor vehicles, trailers and semi-trailers	0.49	0.13	0.40	0.98	0.27	0.40	0.40	0.19	0.19	0.19	0.19	0.19	0.19	0.19
C2733Other transport equipment	0.29	0.19	0.27	0.32	0.30	0.40	0.40	0.43	0.43	1.92	0.47	0.47	0.47	0.47
C2737Manufacturing n.e.c. excluding	0.01	0.22	0.19	0.18	0.30	0.24	0.24	0.19	0.19	0.19	0.19	0.19	0.19	0.19
<b>Total Manufacturing</b>	<b>0.25</b>	<b>0.25</b>	<b>0.24</b>	<b>0.96</b>	<b>0.47</b>	<b>0.38</b>	<b>0.38</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>	<b>0.13</b>
<b>Extractions</b>				<b>With Imported Inputs/Inputs</b>	<b>With Imported Inputs/Inputs</b>	<b>With Imported Inputs/Inputs</b>	<b>With Imported Inputs/Inputs</b>	<b>48.13%</b>	<b>48.13%</b>	<b>47.48%</b>	<b>47.48%</b>	<b>47.48%</b>	<b>47.48%</b>	<b>47.48%</b>
				<b>Without Imported Inputs/Inputs</b>	<b>Without Imported Inputs/Inputs</b>	<b>Without Imported Inputs/Inputs</b>	<b>Without Imported Inputs/Inputs</b>	<b>51.87%</b>	<b>51.87%</b>	<b>52.52%</b>	<b>52.52%</b>	<b>52.52%</b>	<b>52.52%</b>	<b>52.52%</b>

Source: Calculations from Manufacturing Census, BPS, World Integrated Trade Solution, and OECD database.

Appendix Table 2.2. Results from Probit on the likelihood of producing high quality product

Dep Var -->	(1)	(2)	(3)	(4)	(5)	(6)
	Pr(UV>Median)	Pr(UV>Median)	Pr(VA/Output>Median)	Pr(VA/Output>Median)	Pr(UV>Median & gVA/Output>0)	Pr(UV>Median & gVA/Output>0)
Log Employment	0.0190*** (0.00221)	0.0179*** (0.00509)	-0.0351*** (0.00221)	-0.0351*** (0.00387)	-0.00192 (0.00193)	-0.00394 (0.00329)
Exporter	-0.0224*** (0.00586)	-0.0224 (0.0194)	0.0510*** (0.00582)	0.0490*** (0.0125)	-0.00482 (0.00506)	-0.00620 (0.0110)
Log TFP	0.0142*** (0.00261)	0.0126*** (0.00479)	0.0388*** (0.00265)	0.0396*** (0.00491)	0.0307*** (0.00230)	0.0305*** (0.00345)
% Foreign Ownership	-5.38e-05 (0.000104)	0.000158 (0.000140)	4.87e-05 (0.000104)	0.000132 (0.000135)	-8.06e-05 (9.06e-05)	5.34e-05 (0.000101)
Share of Imported Inputs	0.0562*** (0.0107)		0.0236** (0.0106)		0.0251*** (0.00932)	
Input Tariffs		-0.00982** (0.00486)		-0.0199*** (0.00543)		-0.0125*** (0.00413)
year==2001					0.0317*** (0.00741)	
year==2002	-0.0120 (0.00821)	-0.00698 (0.00833)	0.00981 (0.00819)	0.0210 (0.0192)		-0.0239*** (0.00866)
year==2003	-0.0346*** (0.00794)	-0.0389*** (0.00845)	0.0208*** (0.00794)	0.0137 (0.0155)	-0.0266*** (0.00678)	-0.0609*** (0.00758)
year==2004	-0.0505*** (0.00796)	-0.0483*** (0.00882)	0.0328*** (0.00800)	0.0379** (0.0159)	-0.0321*** (0.00680)	-0.0591*** (0.00738)
year==2005	-0.0445*** (0.00800)	-0.0364*** (0.00841)	0.0341*** (0.00803)	0.0516** (0.0211)	-0.0278*** (0.00685)	-0.0478*** (0.00713)
year==2006	-0.0235*** (0.00738)	-0.0173** (0.00850)	-0.0232*** (0.00741)	-0.00761 (0.0175)	0.0822*** (0.00695)	0.0590*** (0.00887)
year==2007	-0.0601*** (0.00763)	-0.0551*** (0.0127)	-0.0322*** (0.00769)	-0.0228 (0.0179)	-0.0485*** (0.00636)	-0.0723*** (0.00835)
year==2008	-0.0301*** (0.00753)		-0.00455 (0.00758)		-0.0295*** (0.00644)	
Standard Errors	Robust	Clustered (ISIC 2, year)	Robust	Clustered (ISIC 2, year)	Robust	Clustered (ISIC 2, year)
Sector Fixed Effects (ISIC 5)	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	78,039	66,417	78,025	66,442	77,986	66,410
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						



