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IMPORTED INPUTS AND FIRM EXPORT PERFORMANCE IN INDONESIAN TEXTILE AND APPAREL INDUSTRIES

Fransiskus Xaverius David Ardiyanto[a] , Toshihiro Kudo[b]
[a]National Graduate Institute for Policy Studies, Japan, Email : fxd.ardiyanto@gmail.com
[b]National Graduate Institute for Policy Studies, Japan, Email : toshihiro.kudo.japan@gmail.com

ARTICLE INFORMATION	ABSTRACT
	IMPORTED INPUTS AND FIRM EXPORT PERFORMANCE IN INDONESIAN TEXTILE AND APPAREL INDUSTRIES. Limiting imported inputs for Indonesian textile and apparel industries may inadvertently decelerate the industries' export performance because each subsector in the industries has its own characteristics. This study analyzes the use of imported inputs and firms' exports in the Indonesian textile and apparel industries. It has employed unbalanced panel data from 2000–2015 with year gaps and estimated them using the regression model. The main findings show that foreign input has a positive and significant impact on the firms' exports, and the effect is larger on the apparels than the textiles when the industries are detangled. Although the result suggests a positive connection, the government may not fully liberalize all imported inputs for the industries. Instead, they may implement an effective protection scheme by relaxing tariffs on imported inputs for domestic production and imposing high tariffs imported inputs that have the potential to compete with domestic finished products. BAHAN BAKU IMPOR DAN PERFORMA EKSPOR PERUSAHAAN DI INDUSTRI TEKSTIL DAN PAKAIAN JADI INDONESIA. Pembatasan bahan baku impor untuk industri tekstil dan garmen Indonesia dapat dengan tidak sengaja menghambat performa ekspor dari suatu industri karena setiap subsektor di industri tersebut memiliki karakter yang berbeda. Penelitian ini menganalisis pemakaianbahan baku impor dan performa ekspor perusahaan di industri tekstil dan garmen Indonesia menggunakan data panel tidak seimbang dengan kesenjangan tahun selama periode 2000-2015 yang diestimasi menggunakan model regresi. Hasil regresi menunjukkan bahan baku impor mempunyai dampak positif dan signifikan terhadap kinerja ekspor perusahaan, dimana efek pada industri garmen lebih besar jika dibandingkan dengan industri tekstil ketika kedua industri dipisahkan. Pemerintah tidak dapat sepenuhnyamembebaskan impor semua bahan baku untuk industri tekstil dan garmen meskipun hasil penelitian menunjukkan hubungan positif. Sebaliknya, pemerintah dapat menerapkan skema perlindungan yang efektif dengan melonggarkan tarif pada bahan baku impor yang diperlukan untuk produksi dalam negeri dan mengenakan tarif tinggi pada produk impor yang memiliki potensi untuk bersaing dengan produk dalam negeri.

1. INTRODUCTION

The Indonesian government aims to develop its industries by making a Masterplan of Developing National Industry 2015–2035 (Ministry of Industry, 2015). The government has prioritized several industries in the planning, and one of the flagship industries is the textile and apparel industries. The textile and apparel industries are export-oriented industries that employ numerous workers, who are mainly low-skilled labor. Thee (2009) claimed that the Indonesian textile and apparel industries had made significant contributions to the national economy by generating export values and absorbing many laborers. However, the Indonesian textile and apparel industries' net export performances, which is the subtraction between total export values and total import values, have been decreasing in recent years. The net exports were always in surplus conditions from 2011–2017, though the linear trend has been gradually declining (Indonesian Central Bureau of Statistics, 2017). This condition may indicate that the industries' competitiveness in the global market is starting to diminish because the industries are using more foreign inputs but generating fewer export products.

Facing the above condition, the Indonesian government aims to strengthen its textile and apparel industries by limiting foreign inputs, which is one of the proposed solutions. The policymakers have

already taken several preventive measurements, for instance, safeguards, which raised tariffs of imported cotton yarn and cotton fabric. In addition, the government is planning to limit more imported raw materials, locally produce the import-substitution materialsto boost the industries' net export performance as well as develop the domestic industry. Conversely, restricting its access to imported raw materials may harm the textile and apparel industries because each subsector in the industries has its own characteristic. Additionally, well-identified subsectors may form an efficient policy intervention to improve the industries' net export without losing the other subsectors that heavily depend on imported inputs. However, little is known about the relationship between imported inputs and the Indonesian firm's export performance, specifically in the textile and apparel industries. The foreign input roles for the Indonesian textile and apparel industries' exports remain unexplored, and little attention has been paid to the characteristics of each subsector in the industries that may vary the effects of imported inputs on the exporter firms.

This paper aims to analyze the impacts of imported inputs on firms' export performance in the Indonesian textile and apparel industries by using an extended approach from earlier studies(Bbaale, Okumu, & Kavuma, 2019; Chevassus-Lozza, Gaigné, & Le Mener, 2013; Silva & Forte, 2018). Moreover, due to characteristic differentials between firms in the textile and apparel industries, the impacts may vary. Therefore, this paper also presents a detailed discussion of the impacts on each subsector. Furthermore, insights from this discussion can assist policymakers in determining the policy to promote the industries' export contributions. The rest of this paper is organized as follows. Section 2 provides the development of theoretical background on international trade and empirical evidence on trade policies. Section 3 describes the data and methodology. Section 4 presents an overview of the Indonesian textile and apparel industry, the estimated results, and discussion. Section 5 concludes the paper.

2. LITERATURE REVIEW

2.1. International Trade

David Ricardo, a British economist, formed the international trade theory back in 1819, and the development of the theory is still relevant to the economic condition now. The traditional theory states that a nation has its own comparative advantage in producing goods, in which it will export the goods that are efficiently produced by its labor and import the goods that are not efficiently produced by its labor. In their book, Krugman, Obstfeld, and Melitz (2018) explained that the comparative advantage theory had been developed into the interaction between the supplies of a country's resources, namely, capital, labor, and land, with the use of these resources in producing different goods. They further described the

expanded theory that engaging in international trade enables a nation to specialize in productions that are based on its resources or technologies because the nation has incentives in increasing the economies of scale. This condition leads to the integrated international market with intra-industry trade that offers a vast range of varieties and low-priced products. Moreover, they argued that integration trade tends to increase competition between firms, and the competition generates winners and losers in the industry based on a firm's performance. The losers, the less-productive firms, may exit the market because they cannot compete with the winners, the productive firms. However, they added that trade might increase industry performance in general because the winners' production expansion can compensate for the losers' loss. Furthermore, the growth of international trade theory defines the behavior of economic agents in the global level, and countries are more likely to gain values from trade activity because it is based on their mutual benefit.

Although it is beneficial for nations to engage in international trade, the level of values that a nation gains from trade may differ, and government attempts to control the level of gains rely on its trade policies. One of the government's instruments in trade policy is tariffs, which is a tax imposed on imported goods. On the one hand, as a tax, high tariffs may contribute to the government's revenue and guard specific sectors in the domestic market. On the other hand, lowered tariffs may lead to trade liberalization that removes trade barriers between countries and contributes to national revenue through export activities.

2.2. Import-Substituting Industrialization

Highly imposed tariff on imported inputs is an act of protectionism in international trade policy, which restricts foreign inputs to enter the domestic market. The protective policy is known as import-substituting industrialization (ISI), and the effectiveness of ISI remains unsettled across empirical studies. Many developing countries adopted ISI at the end of World War II to promote industrial development by replacing imports with locally produced goods. One of their arguments is that the infant industry required protections to prevent them from import competition. Hence, it can grow into a resilient industry (Krugman et al., 2018).

Some economists argue that the impacts of implementing ISI were far from promoting the infant industry. Instead, the policy can hinder the growth of the industry in the long term and reduce the industry's international competitiveness (Jayanthakumaran, 2000; Mazumdar, 1991). The evidence in Latin America and India shows that adopting ISI results in certain problems, namely low productivity, rent-seeking behavior, limited growth, and dependencies on imported goods and tariff revenues (Besam et al., 2012). However, Besam et al. (2012) argued that Brazil, Mexico, South Korea, and

Taiwan gained rapid growth in their early industrialization stage by implementing ISI. This evidence may contradict the authors' previously mentioned finding, but the protective policies were not continued after the successful stage because they were replaced by outward-looking policies. Zhu (2006) claimed that industrial development in China and Taiwan is closely related to ISI in developing a resilient base of manufacture before the nations shifted to export-oriented policy. He added that the policies' combination accompanied by the active role of the nations' strategies and institutions gained rapid economic growth. Zhu's argument in policies' combination was supported by a recent study on the BRICS (Brazil, Russia, India, China, and South Africa) countries using long panel data from 1960 to 2016 (Adewale, 2017). The advocates of ISI claimed that the protective measurement contributed to a nation's economic development, especially during its initial industrialization stages. However, when the nation reached a particular industrial development level, it changed its protective policies into liberalization policies to enter the global market.

2.3. Export-Oriented Industrialization and Trade Liberalization

After the era of implementing import-substitution industrialization, developing countries moved into an outward-looking trade policy by promoting export-oriented policies and liberalizing trade (Krugman et al., 2018). Export-oriented industrialization (EOI) became preferred by developing countries because the development of information and technology enable them to merge in the global production network. The countries focused on producing and importing goods based on their comparative advantages; thus, the urges to remove trade barriers between countries arose by lowering the tariff on the traded goods. A large and growing literature on trade liberalization shows that tariff reduction has a positive impact on the productivity of the domestic industry.

Amiti and Konings (2007) stated that Indonesian firms had gained higher productivity with the reduction of the tariff on imported inputs. Using data from 1991 to 2001, they argued that the importing firms had more significant productivity than the non-importing firms. Other studies found that tariff reduction enabled a firm to get more access to imported inputs, which positively affected its performance in India (Goldberg et al., 2010; Topalova & Khandelwal, 2011) and China (Fan et al., 2018; Yu, 2015; Yu & Li, 2014). The studies on India focused on the impacts of trade liberalization on the domestic firms after the government abolished an import-substituting policy by using data from the late 1980s until the early 2000s. When dealing with import competition, the Indian firms tended to become more efficient in their production process, which made them more productive. Moreover, the studies on China

focused on the effects of China joining the World Trade Organization (WTO) in 2001 on its manufacturing sectors. After China becoming a member of WTO, Chinese firms seized the opportunity to get easier access to imported inputs and increased their productivity through technology spillover and quality upgrading. These Asian studies imply that trade shock by lowering the tariff for imported inputs may encourage domestic firms to utilize more foreign inputs and create a more efficient production process, thereby generating higher productivity.

Furthermore, studies on Chile and Hungary corroborated with these Asian findings. Kasahara and Rodrigue (2008), using data from 1979 to 1996, stated that imported inputs had a positive impact on Chilean firms' performance, and the local firms gained higher productivity when converting from non-importers to importers. In Hungary, the domestic firms gained higher productivity when using foreign inputs because these inputs had a better quality than the local inputs (Halpern et al., 2015). Halpern et al. (2015) added that the Hungarian industries obtained higher productivity levels in the period when many foreign firms and importers were operating in the country.

The previous evidence on trade liberalization builds on the argument that reducing tariffs on imported inputs exposes the domestic market with import competition, but the exposure becomes advantages when the domestic firms can fully exploit it. For instance, a local firm has an urge to make its products efficiently in order to maintain its competitiveness with foreign products in the local inputs market, or a domestic firm may upgrade its machinery to process newly imported inputs, which explains the technology spillover condition. The efficient production process and technology spillover increase the firm's performance; thus, it correlates with high productivity.

2.4. The Relationship with Firms' Export Performance

Previous studies on trade liberalization present a positive connection between tariff reductions and productivity levels. Productive firms may decide to enter the global market and export their products (Wagner, 2007). Trade liberalization may not directly encourage the domestic industry to export, but the ability to access imported inputs has an effect on exporters in the domestic industry. Furthermore, the recent trends in trade liberalization studies address the connection between access to imported inputs to a firm's export performance.

A firm's ability to access foreign raw materials may affect its export performances in several ways. Lowered tariffs enable firms to acquire low-priced imported inputs, and then, it may raise the profit in the exporting activities (Edwards et al., 2018; Feng et al., 2016; Pierola et al., 2018) or increase the likelihood of its export status (Bbaale et al., 2019).

More evidence shows that the use imported inputs may induce the firm's production process that allows the firm to generate new exported products (Castellani & Fassio, 2019), expand its range of exported products (Bas & Strauss-Kahn, 2014), and improve its exported product quality (Xu & Mao, 2018). Furthermore, looking at the evidence above, the firm's export performance could be proxied into different variables, but the positive relationship remains dominant in the field of study.

Studies on Indonesian firms suggest that import behavior may affect the likelihood of the firm to export its products. Sjöholm (2003) argued that the Indonesian enterprise with importing activities is more likely to become an exporter, and he also included a detailed result on the 2-digit level of industrial classifications. He studied the exporting factors on the micro-level by using firm data from 1994–1997; however, the arguments on Indonesian firm's behavior are based on a brief period of data, and the description behind the chosen timespan remains unclear. Moreover, using more extended period of data than the previous study, Sjöholm and Takii (2008) found that imports may increase the probability of a firm to export; however, they claimed that firms' import activities are less likely to affect their exports because the significances differ between all estimations and the coefficients are small. Although they used data from a 10-year observation period, they analyzed the effects of foreign networks on all Indonesian industries and excluded the evaluation on more specific industries. As each Indonesian industry has its characteristics, a detailed result on each sector may assist them on enhancing their findings on the effects of foreign inputs on the Indonesian industries.

Furthermore, little is known about the relationship between imported inputs and export performances in the Indonesian industry. The evidence has shown the probabilities of export and import activities in the Indonesian firms without presenting the impacts of using foreign raw materials on firms' export value. This paper focuses on this connection by using a firm's export revenues as the proxy for export performance based on earlier studies (Edwards et al., 2018; Feng et al., 2016; Pierola et al., 2018). This variable may illustrate the real connection between the export and import activities compared to the likelihood presented in previous studies in Indonesia. Additionally, this paper concentrates on specific Indonesian industries, i.e., textile and apparel industries, to obtain a detailed result on the relationship of using imported inputs on the industries' export performance, which we expect will be a positive correlation.

3. RESEARCH METHODOLOGY

3.1. Data

This research employs the Indonesian Large and Medium-sized Manufacturing Survey by the Indonesian Central Bureau of Statistics as its primary source of data. The annual census categorized firms based on their number of employees, in which medium-sized firms employ 20–99 workers, and large-sized firms have more than 99 workers. The yearly survey captured a wide range of firm-level data that includes value-added, total production, the value of domestic and imported raw materials, percentage of export, wages, and detailed firms' capital. The observation period is between 2000 and 2015, with some exclusions, as the firms' export percentage variable is missing in 2002, 2003, 2005, and 2007. Moreover, the Indonesian government classified the domestic industries based on the International Standard Industrial Classification for All Economic Activities (ISIC) and ASEAN Common Industrial Classification (CIC). Furthermore, there were different industrial classifications during the time observation because the ISIC series had changed from the 3rd revision in 1990 to the 4th revision in 2007. Firm-level data from 2000–2009 used the Indonesian Standard Industrial Classification (Klasifikasi Baku Lapangan Usaha Indonesia or KBLI) 2000 series, which is based on the ISIC Rev. 3 in 1990. On the other hand, the data from 2010–2015 used the KBLI 2009 series, which is based on the ISIC Rev. 4 in 2007 and ASEAN-CIC in 2006. This research employs a 5-digit level of KBLI 2009 as a base; hence, the 5-digit level of KBLI 2005 data has been converted by using the officially published concordance table from the Bureau.

Table 1. Numbers of the Indonesian textile and apparel industries 2000-2015.

	Total firms	Imp	Imp & Exp	Dataset
Textile industry				
Medium-sized	17,591	2,654	285	**190**
Large-sized	7,700	2,807	1,422	**1,010**
Apparel industry				
Medium-sized	21,729	2,107	212	**76**
Large-sized	7,601	2,665	1,646	**1,103**
Total observation	54,621	10,233	3,565	**2,379**

Note:*Imp* is a firm that uses both imported and domestic inputs. *Imp & Exp* is an importing firm that has an export percentage or claim doing export activities. *Dataset* is an importing firm that has real export value after the data cleaning process.
Source: Authors' elaboration on Indonesian Large and Medium-sized Manufacturing Survey, 2000-2015.

The observation of Indonesian textile and apparel industries shows that the total number of firms is 54,621, in which 25,291 firms are in textile industries and 29,330 firms are in the apparel industries, as shown in Table 1. The firms that utilize imported inputs are nearly nineteen percent of the total firms. The importers can fully utilize foreign inputs or combine them with domestic inputs, and the large-sized importing firms slightly exceed the

number of the medium-sized importing firms. Between the importers, there are exporter firms that report their percentage of exported products or claim to be doing export activities. Table 1 displays that the firms with import-export activities in the industries are highly concentrated in large-sized firms rather than medium-sized firms. However, as this paper aims to analyze the relationship between imported inputs and export performance, we have isolated the firms in the industries into importing firms that have real export value in the observation period. It means that several observations were omitted, namely importers without export value, exporters without imported inputs value, and claimed exporters using imported inputs without export value. Then, after the data cleaning process, this paper uses the unbalanced panel dataset from 2000 to 2015, with gaps, containing 2,379 observations.

3.2. Methodology

The purpose of this research is to analyze the relationship between imported inputs and firms' export performances in the Indonesian textile and apparel industries. This paper follows Edwards, Sanfilippo, and Sundaram (2018), who estimated the relationship between imported inputs and firms' export performances in South Africa. The regression model from Edwards et al. (2018) has been modified as

$$\ln X_{it} = \alpha + \beta_1 \ln M_{it} + \beta_2 \ln LP_{it} + \beta_3 \ln Size_{it} + \beta_4 \ln KL_{it} + \beta_5 \ln Wage_{it} + \lambda_i + \lambda_t + \varepsilon_{it}$$

(1)

where, i and t indicate the firm level in the industry and year, respectively. X denotes the firm's export value and the variable generated by multiplying the percentage of exports with the firm's total production value. M is the proxy for the foreign raw material value used by the firm in its production process. The correlation with the firm's export performance is expected to be positive, as stated in earlier studies that proxied the export performance from the firm's export value (Edwards et al., 2018; Feng et al., 2016; Pierola et al., 2018). LP denotes the labor productivity variable generated from the firm's gross value-added per labor. Additionally, productive firms are expected to operate more efficiently; hence, they can generate higher export value than to the less-productive firms (Aristei et al., 2013; Castellani & Fassio, 2019; Chevassus-Lozza et al., 2013; Silva & Forte, 2018; Sjöholm & Takii, 2008; Tomiura, 2007).

The model employs several control variables to indicate the firm's characteristics. The control variables are *Size, KL,* and *Wage,* which denote the firm's size, capital intensity, and average wage, respectively. The size of the firm is proxied with the number of employees in the firm, which follows The Indonesian Central Bureau of Statistics classifications. The correlation between size and export

performances is expected to be positive (Edwards et al., 2018; Fan et al., 2015; Parra & Martínez-Zarzoso, 2015; Silva & Forte, 2018; Tomiura, 2007). Capital intensity is proxied as the firm's decomposed capital assets in machinery per labor. As this paper focuses only on the Indonesian textile and apparel industries, the assumption follows Thee (2009), who stated the industries are heavily invested in machinery capital rather than other capital assets. The decomposed capital intensity is expected to have a positive correlation with a firm's export performance (Edwards et al., 2018; Fan et al., 2015; Silva & Forte, 2018). The wage variable is proxied by the firm's total expenditure on wage per labor. It follows previous studies and is expected to have a positive relationship with the firm's export performance (Fan et al., 2015; Silva & Forte, 2018). In all previous studies, the fixed effects act as treatments to control unobserved heterogeneity in a firm that is constant over time, and this occurrence is commonly found in the model that used panel data. Therefore, the model in Equation 1 employs firm fixed effect and year fixed effect, which are shown as λ_i and λ_t, respectively. ε denotes error term in the model.

Furthermore, all the variables in Equation 1 will be estimated using a logarithm form because the gap between minimum and maximum values is vast in the variables. The distributions of variables are shown in Appendix A and B. Most of the unit values in the Indonesian Large and Medium-sized Manufacturing Survey are in thousand rupiahs, and the values are deflated to the base year, which is 2000, by using wholesale price indices, except for wage that is deflated by using real wage index. All the indices are issued by the Indonesia Central Bureau of Statistics. The wholesale price indices are categorized by the end-use of commodities and sectors. Thus, the index for each variable may differ. This paper follows Amiti and Konings (2007), who used the wholesale price index as a deflator to obtain the real value of Indonesian manufacturing input materials and output products.

Additionally, there are several assumptions in this paper regarding the values of each variable. Export values, imported inputs, and wages are assumed to have values greater or equal to one million Indonesian rupiahs. Having values of less than one million in one year for medium or large-sized firms are caused by underperformance or irregular pattern in production throughout the year. Hence, the firm with this condition is assumed to be an outlier and excluded from the dataset. Capital intensity and labor productivity are assumed to have values greater than zero. The zero-value that is caused by neither the machinery capital nor the value-added variables have real value or their values equal to zero.

4. RESULTS AND FINDINGS
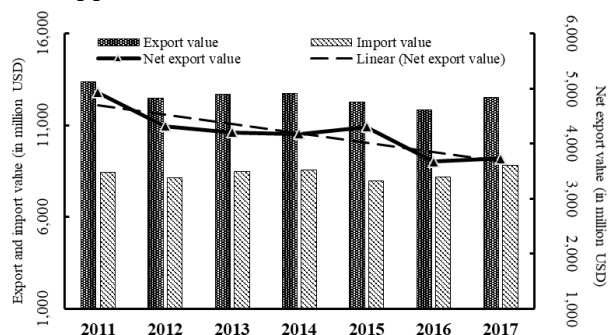## 4.1. Overview of the Indonesian Textile and Apparel Industries

Figure 1. Indonesian textile and wearing apparel industries' trade balance.
Source: Authors' elaboration on the Indonesian Central Bureau of Statistics data.

The Indonesian government plans to impose more tariffs on imported inputs, which may hinder the textile and apparel industries' export performances. In recent years, the net export performances of the industries have been gradually declining, as shown in Figure 1. This condition reflects that the industries utilize more imported inputs, but their export performances move sluggishly. The government intends to restrict imported raw materials and manufacture import-substitution products locally. This government's aims may settle some problems related to decreasing net export performances and developing domestic industries. However, restriction on imported inputs may inadvertently decelerate the industries' export performances because the exporter firms are highly dependent on imported inputs.

Moreover, the structure of the Indonesian textile and apparel industries has three sub-sectors, and each sub-sector has its own characteristics (Salim & Ernawati, 2015; Thee, 2009). The upstream (i.e., textile fiber, yarn-spinning, and yarn-processing firms) is a highly capital-intensive industry that uses cutting-edge technology and automated machinery. Yarn-spinning firms dominate this sub-sector with 15% of total observed firms. The midstream (i.e., weaving, knitting, and finished-fabric firms) is a mixed industry, which is both capital and labor intensives because it employs more workers than the upstream industry. Weaving firms dominate the midstream sector, with 12% of the total observed firms, and the rest are finished-fabric firms and knitting with 8 and 2 percent , respectively. The downstream (i.e., apparel, knitted garment, and others textile firms) is a highly labor-intensive industry with the most substantial rate of employment. Apparel firms dominate the downstream with 38% of the total observed firms. The rest of the downstream firms are others textile firms, which produce accessories or non-garment textile products and knitted apparel firms with 15% and 6%, respectively. Appendix E presents more detailed statistics on the sub-sectors of Indonesian textile and apparel industries.

The textile and apparel industries in Indonesia started in the 1970s and quickly grew in the 1980s. In the early 1980s, the Indonesian industry manufactured textile products under the government's protectionism framework, which limited the competition of raw materials from the foreign market. The policy discouraged firms' export behavior, as it was more beneficial to fulfill the domestic market than the global market. Later, the government reformed the trade policies to promote the industry's export activities, by, namely, attracting more foreign investments (Hassler, 2004) and giving export subsidies (Pangestu, 1997, as cited in Hassler, 2004). In 1986, the government proposed a drawback scheme and duty exemption to boost export-oriented firms in the textile industry. This regulation had a significant impact on the exporters because they could purchase imported raw materials at the international price (Thee, 2009). It enabled the firms to operate more efficiently and fulfill international demands by substituting domestic raw materials with imported ones, and, thus, the industries experienced rapid growth in productivity during the 1980s.

Furthermore, the government's decision to raise the minimum wages was not correlated to a significant increase in the labor productivity in the textile and apparel industries (Pangestu, 1997, as cited in Thee, 2009). It caused the export-oriented industries to lose its competitiveness in the international market; hence, the export growth of the Indonesian textile and apparel industries slowed down during the 1990s, and it worsened after the Asian crisis in 1997–1998 before starting to rise again (Thee, 2009). High dependency on imported inputs and faulty-managed new investment in the industries were other aspects that contributed to the declining performance of the industries.

Moreover, decentralization and labor regulation caused difficulties in the development of Indonesian textile and apparel industries in the 2000s. Since 2001, local governments have had an authority to levy taxes or charges to create their own revenues. These charges increased industry's transaction costs and burdened the industries, including textiles and apparels (Thee, 2009). Likewise, the government enacted a new Labor Law in 2003 that defended the labor rights in discharge procedures, social securities, and working conditions. The positive impacts of labor became the adverse effects on the industries because the law led to labor costs rising in Indonesia (Aswicahyono & Hill, 2004, as cited in Thee, 2009). Increasing local taxes and labor costs discouraged the incentives of manufacturing industries, especially labor-intensive industry such as textile and apparel.

As the Chinese textile industry grew even more prominently after the expiration of the Multi-Fiber Agreement in 2005, Indonesia faced competition not

only in the international market but also in the domestic market. To protect the domestic industry against cheaper imported products from China, the Indonesian government enacted safeguard policies on cotton yarn and the fabric of cotton. The Indonesian Textile Industries Association claimed that a significant increase in the imported goods might harm local producers; thus, the import activities had to be slowed down by imposing safeguards or increasing tariffs on the imported inputs (Indonesian Safeguards Committee, 2014). The safeguard policies started from 2011 to 2014, but the policy for cotton yarn was extended to 2017 because the association argued that the local yarn-spinning firms were not yet ready to compete with the Chinese products.

4.2. Descriptive Statistics

This paper investigates the firms with export-import activities in Indonesian textile and apparel industries, and the main variables illustrate the characteristics of the industries, as shown in Appendix F. The textile industry generates a higher total export value compared to the apparel industry, and the firm in the textile industry has the highest export performance among the observed firms. The firms in both industries are highly dependent on foreign raw materials. It seems that the textile industry has higher imported input values than the apparel industry. Furthermore, on an average, the workers in textile firms are two times more productive than the workers in apparel firms (see Appendix F).

Nonetheless, the labor productivity values of the apparel firms are closer to the average than the values of textile firms, and it may indicate that the apparel industry produces more value-added products than the textile industry. In capital intensity, the textile firms appear to be more capital-intensive industry than the apparel firms. Moreover, this condition supports the argument that the textiles, as upstream and midstream industries, utilize more machinery capitals than apparels, as a downstream industry (Thee, 2009). Moreover, the firms in the textile industry have a larger industrial scale and pay higher salaries to their workers compared to the firms in the apparel industry.

4.3. Empirical Result and Discussion

The estimation results illustrate the connection between firms' export performances, foreign raw materials, and other control variables in the Indonesian textile and apparel industries, as shown in Table 2 and Appendix A. Table 2 displays the results for the total observed industries (see column 1) andthe isolated results for the textile and apparel industries, respectively (see column 2 and 3). Appendix A adds more detailed results for isolated textile and apparel industries based on their sizes (see column 4 and 5 for the large-sized and medium-sized industries, respectively), isolated textile industries based on their sizes(see column 6 and 7 for large-

sized and medium-sized textile industries, respectively), and isolated apparel industries based on their sizes (see column 8 and 9 for large-sized and medium-sized apparel industries, respectively).

Table 2. Firms export performances: Regression estimations on textile and apparel industries, isolated textile industries, and isolated apparel industries.

Dependent variable:	ln export value		
Industry	Textile and Apparel	Textile	Apparel
	(1)	(2)	(3)
ln imported input	0.247*** (5.51)	0.180** (3.15)	0.320*** (4.66)
ln labor productivity	0.481*** (8.56)	0.518*** (7.13)	0.429*** (4.70)
ln size	0.682*** (8.04)	0.727*** (6.26)	0.539*** (4.82)
ln capital intensity	0.0126 (0.41)	-0.0286 (-0.74)	0.0849 (1.65)
ln wage	0.0385 (1.22)	0.00504 (0.13)	0.0355 (0.72)
Constant	3.486*** (3.93)	4.246*** (3.60)	3.555* (2.31)
Firm fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes
Observation	2,379	1,200	1,179
R-squared	0.8784	0.8907	0.8501

Note: t statistics in parentheses * p<0.05, ** p<0.01, *** p<0.001.

In general, all variables in the model have positive signs toward firms' export performances in the industries, even though the significances differ (see Table 2Column 1). The result confirms the hypothesis that there is a strong and positive connection in the industries between export performances and imported inputs. Additionally, the result proves that productive firms tend to earn higher export values, and the size of the firm has a significant impact on the firm's export activities. Furthermore, capital intensity and wage show positive signs with firms' export value in the textile and apparel industries; however, the effects are small and statistically insignificant.

Imported input boosts firms' export value in the Indonesian textile and apparel industries, and it is statistically significant in the estimation results in Table 2. For example, a 10% increase in foreign inputs contributes to a 2.47% increase in export value of the industries. This evidence seems in-line with recent studies on China (Feng et al., 2016), Peru (Pierola et al., 2018), and South Africa (Edwards et al., 2018). Furthermore, the magnitudes and significances for isolated estimations vary. When the observed

industries are separated, the results show that an increase in foreign raw materials is associated with increasing export value for 1.8% in the textiles and 3.2% in the apparels (see Table 2 column 2 and 3, respectively).

Based on sized of the observed industries, the result on large-sized textile and apparel industries shows a significant increasing by 2.58% (see Appendix A column 4), while the result on medium-sized textile and apparel industries is statistically insignificant. Moreover, the textiles utilize imported inputs to boost their export values regardless on their sizes of industries and the magnitude on the large-sized textile industries is lower than the medium-sized textile industries (see Appendix A column 6 and 7, respectively). While in the apparels, foreign inputs contribute to an increase in the export performance of large-sized industries by 3.37%. On the other hand, the estimation result on medium-sized apparel industries is statistically insignificant. Furthermore, the positive signs and significant results support previous research on Indonesia that the textile firm's import activities increased the firm's probability to export (Sjöholm, 2003), even though there are distinctions in proxied export and import variables and less-detailed on isolating the industries. The findings on this paper may indicate that utilizing foreign inputs in the production processes, either to compliment or as a substitution to domestic raw materials, affects the exporter firms' outcomes, especially the large-sized industries.

A firm tends to use foreign than domestic raw materials because the local materials are either unavailable or low in quality (Halpern et al., 2015). In the case of Indonesian textile and apparel industries, there are three primary imported raw materials, namely, other knitted fabrics (6002 HS4), woven fabrics of synthetic filament yarn (5407 HS4), and raw cotton (5201 HS4) based on The Atlas of Economic Complexity (Center for International Development, 2019). The downstream sector imports the knitted and woven fabrics from China, South Korea, and Taiwan. The knitted garment and others textile firms use other knitted fabrics as inputs to produce sweaters, accessories, socks, and hats, while the apparel firms use woven synthetic fabrics in their production processes. Seeing these inputs originating from developed countries, it seems plausible to think that the Indonesian firms choose to import these materials because the domestic market cannot deliver the same quality of materials at as low a price as the foreign materials. The local manufacturers have the constraint to produce these advanced materials because of a lack in high technology machinery. Thee (2009) argued that Indonesian textile and apparel industries were more likely to invest in other sectors that are unrelated to the core business rather than upgrading their machinery. Likewise, the upstream sector imports raw cotton from the US, Brazil, India, and Australia. The spinning firms use raw cotton to produce cotton yarn. The possible explanation is that the domestic plantations cannot support the demand of local industries in terms of quantity and quality; therefore, the textile industries have to acquire raw cotton from overseas.

The effect of imported inputs to a firm's export performance is higher on the apparel firms than the textile firms. The possible explanation is that the Indonesian apparel firms are more export-oriented and more dependent on imported inputs than the textile firms (see Appendix D). The apparel industry exports two main products, which are knitted apparel (61 HS2) and not knitted apparel (62 HS2), based on The Atlas of Economic Complexity (Center for International Development, 2019). Around half of the end-products are shipped to the US, and the other half is shipped to the rest of the world. This condition may illustrate how the value chain of apparel industry works in the global trade. Most of the original brand name companies, which are located in the US, manufacture their garment products in developing countries for cost reduction, and they import the products back to the US before dispatching them as branded goods (Salim & Ernawati, 2015). Being part of the global value chain requires Indonesian apparel firms to deliver high quality of exported products; thus, they utilize advanced inputs mainly from China. Moreover, the outlook in the future to enter global market as the extension of trade agreement may attract foreign direct investment (FDI) to the domestic apparel industry as the following case of Vietnam, after joining the Trans-Pacific Partnership Agreement with the prospect to enter the US apparel market (Herr et al., 2016; Kikuchi et al., 2018).

Furthermore, labor productivity significantly raises firms' exports in the Indonesian textile and apparel industries (see Table 2 column 1). The firms with a 10% productivity increase are more likely to have higher export values by 4.81%. The result implies that the productive firms in the Indonesian textile and apparel industries can produce efficiently, thereby rising their export performances. Similar results can also be found in earlier studies that have used value-added per labor in proxied labor productivity variable (Chevassus-Lozza et al., 2013; Silva & Forte, 2018; Sjöholm & Takii, 2008; Tomiura, 2007). In separate estimations, productivity in the textile industry has a better impact on the export values than in the apparel industry. An increase in the firms' productivity promotes the export values by 5.18% in the textiles and 4.29% in the apparels(see Table 2 column 2 and 3, respectively). Moreover, Appendix A reports that the medium-sized firms are more productive than the large-sized firms (see column 4-5). Within the medium-sized industries, the textile firms' productivity contributes to an increase in the firms' exports by 7.38%, while the result on the apparel firms' productivity remains statistically insignificant (see Appendix A column 7 and 9). Furthermore, Appendix A presents statistically

significant results of the large-sized textile and apparel firms' labor productivity with 4.69% and 4.4% increases, respectively (see column 6 and 8). The larger magnitude in the textile industry suggests that its workers have higher productivity than the apparel's workers, which could potentially explain the differences in the industry characteristics. The upstream and midstream sectors are capital-intensive firms that use more machines and less-labor than the downstream sector.

Moreover, the size of the firms has a significant and positive impact on the firms' export value in the Indonesian textile and apparel industries (see Table 2). As the firm size is proxied by the number of employees, hiring more workers may increase the firm's scale on the industry. For example, raising the number of labors by ten percent correlates to a 6.82% increase in the firms' export values. These findings can be interpreted as the firm size positively contributing to the firms' export activities, as in South Africa (Edwards et al., 2018), Portugal (Silva & Forte, 2018), and Japan (Tomiura, 2007). The effects are higher in the textile industry and lower in the apparel industry, i.e., 7.27% and 5.39% increases, respectively. Columns 4-9 on Appendix A show more detailed results based on the size and type of industry. The large-sized industries show a higher contribution than the medium-sized industries in firms' export performance. In the observed textile industry, the large-sized firms contribute nearly a doubled increase of export value than the medium-sized firms. The results present that textile industry as the upstream and midstream sectors are capital-intensive, increasing the number of workers may correlate with increasing the number of machinery or expanding the production process that required more workers. Meanwhile, in the observed apparel industries, the large-sized firms have a significant result in raising export value, while the medium-sized firms show an insignificant result. On the contrary with textile industry, the significant result in the large-sized apparel firms may correlate with the addition of workers. It may corroborate with previous study that present the characteristic of the apparel firms as a labor-intensive industry (Thee, 2009).

Although capital intensity has a positive sign to the Indonesian textile and apparel firms' export performances, the effect is small and insignificant (see Table 2, column 1). The estimations show different results when splitting up the industries into textile and apparel (see Table 2, column 2 and 3). The capital intensity sign become negative in the textile industry, and it remains positive in the apparel industry; however, the results remain statistically insignificant. Furthermore, the results also present various signs in the elaborate estimations based on the size and type of industry, even though they remain statistically insignificant (see Appendix A, columns 4-9). The insignificant effects of capital intensity corroborate with the finding in China (Fan et al., 2015) and

contradict with the finding in Indonesia (Dijk, 2002) and South Africa (Edwards et al., 2018). However, the results cannot be directly compared with that of other studies due to the difference in a proxied capital-intensity variable.

Wages variable remains small and insignificant in all estimations. The results on Table 2 show positive signs when all industries and separated textile and apparel industries are estimated. In further estimation results, the signs vary on detailed industries; however, the results remain statistically insignificant (see Appendix A, columns 4-9). The results corroborate with the findings on China (Fan et al., 2015; Xu & Mao, 2018). Moreover, wages in the industries may relate to the skills of the workers. The upstream and midstream sectors are paying higher salaries because they employ skilled workers to operate more complicated machinery than sewing machines in the downstream sector. Nonetheless, the average of wages remains insignificant affecting the firms' exports in Indonesian textile and apparel industries.

5. CONCLUSIONS

Trade liberalization may indirectly encourage domestic industry to export, but the ability to access imported inputs may promote exporter firms in the domestic industry. This paper demonstrates that foreign input has a positive and significant impact on firms' export performances in the Indonesian textile and apparel industries. The results also suggest that the effect of using imported inputs is greater on the large-sized apparel industry than the large-sized textile industry when the industries are detangled. Additionally, it may relate to the characteristics of the apparel industry, which is more export-oriented and part of the global value chain.

Although the result shows a positive correlation between imported inputs and firms' export performances in Indonesian textile and apparel industries, liberalizing all the imported inputs may not be an option for the Indonesian government because it may expose the domestic market to import competition. On the other hand, limiting several advanced input materials, which are unobtainable in the domestic market, may inadvertently cause a negative impact on the Indonesian textile and apparel industries because the restrictions may decelerate the firms' exports, particularly, the large-sized apparel firms as downstream sectors. To address this issue, the government may implement a tariff structure called effective protection. This tariff scheme is not about imposing high tariffs on the foreign inputs that are needed for the domestic production process. Instead, it refers to increasing tariffs on imported products that compete with domestic finished products; thus, the local producers may have higher margin in value-added producing the finished products (Gillis et al., 1987). Furthermore, the government can maximize the role of traders in the domestic market to assist the medium-sized textile

firms to expand their access to imported inputs. Easier access to foreign materials may encourage the Indonesian medium-sized textile firms to produce larger export values.

In addition to the trade-related policy implications above, the government can gradually develop the domestic industries, particularly the large-sized textile firms, by upgrading their old machineries. Several incentives may encourage the firms to upgrade their production equipment, namely tax reductions and loan-schemes with low-interest rates to acquire imported machines. Moreover, the Indonesian government may attract more foreign direct investments (FDI) to the industries by entering multilateral free trade agreements. Likewise, as the imported inputs came from developed countries, the local industries may develop advanced materials through joint R&D programs with developed countries. Government-affiliated R&D institutions may assist the local firms in the joint program.

6. LIMITATION

This paper addresses the relationship between importers and exporters in the Indonesian textile and apparel industries. However, it has excluded some exporter firms from its dataset due to proxying variables that need to have real values in the survey. The exporters that are indirectly using imported inputs and claim to be doing export activities but do not have real export values have not been included in this paper. It may become a task for future research to address all exporter firms in the industries; thus, it can illustrate an inclusive connection between imported inputs and firms' exports in the industries. Moreover, the approach can also be applied for all Indonesian industries to measure the impacts of foreign inputs on the domestic export-oriented industries.

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APPENDICES

Appendix A. Estimation results

Dependent variable:	ln export value								
Industry	Textile and Apparel	Textile	Apparel	Large-sized Textile and Apparel	Medium-sized Textile and Apparel	Large-sized Textile	Medium-sized Textile	Large-sized Apparel	Medium-sized Apparel
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln imported input	0.247*** (5.51)	0.180** (3.15)	0.320*** (4.66)	0.258*** (5.38)	0.155 (1.48)	0.185** (2.90)	0.234** (2.71)	0.337*** (4.61)	-0.612 (-1.02)
ln labor productivity	0.481*** (8.56)	0.518*** (7.13)	0.429*** (4.70)	0.456*** (7.73)	0.644*** (4.42)	0.469*** (6.10)	0.738*** (6.75)	0.440*** (4.82)	0.610 (0.98)
ln size	0.682*** (8.04)	0.727*** (6.26)	0.539*** (4.82)	0.724*** (5.96)	0.630** (2.74)	0.830*** (4.66)	0.463* (2.31)	0.559*** (3.09)	1.392 (0.59)
ln capital intensity	0.0126 (0.41)	-0.0286 (-0.74)	0.0849 (1.65)	0.0153 (0.49)	-0.0609 (-0.43)	-0.0299 (-0.79)	-0.0140 (-0.12)	0.0839 (1.59)	-0.111 (-0.26)
ln wage	0.0385 (1.22)	0.00504 (0.13)	0.0355 (0.72)	0.0335 (1.22)	-0.0193 (-0.37)	-0.0185 (-0.33)	0.0401 (0.62)	0.0390 (0.74)	-0.0581 (-0.26)
Constant	3.486*** (3.93)	4.246*** (3.60)	3.555* (2.31)	3.367** (3.04)	2.837 (0.96)	4.286* (2.38)	1.963 (1.56)	3.089* (1.98)	8.037 (0.43)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	2,379	1,200	1,179	2,113	266	1,010	190	1,103	76
R-squared	0.8784	0.8907	0.8501	0.8159	0.9026	0.8309	0.9567	0.7953	0.8308

Appendix B. Scatterplots of the Main Variables
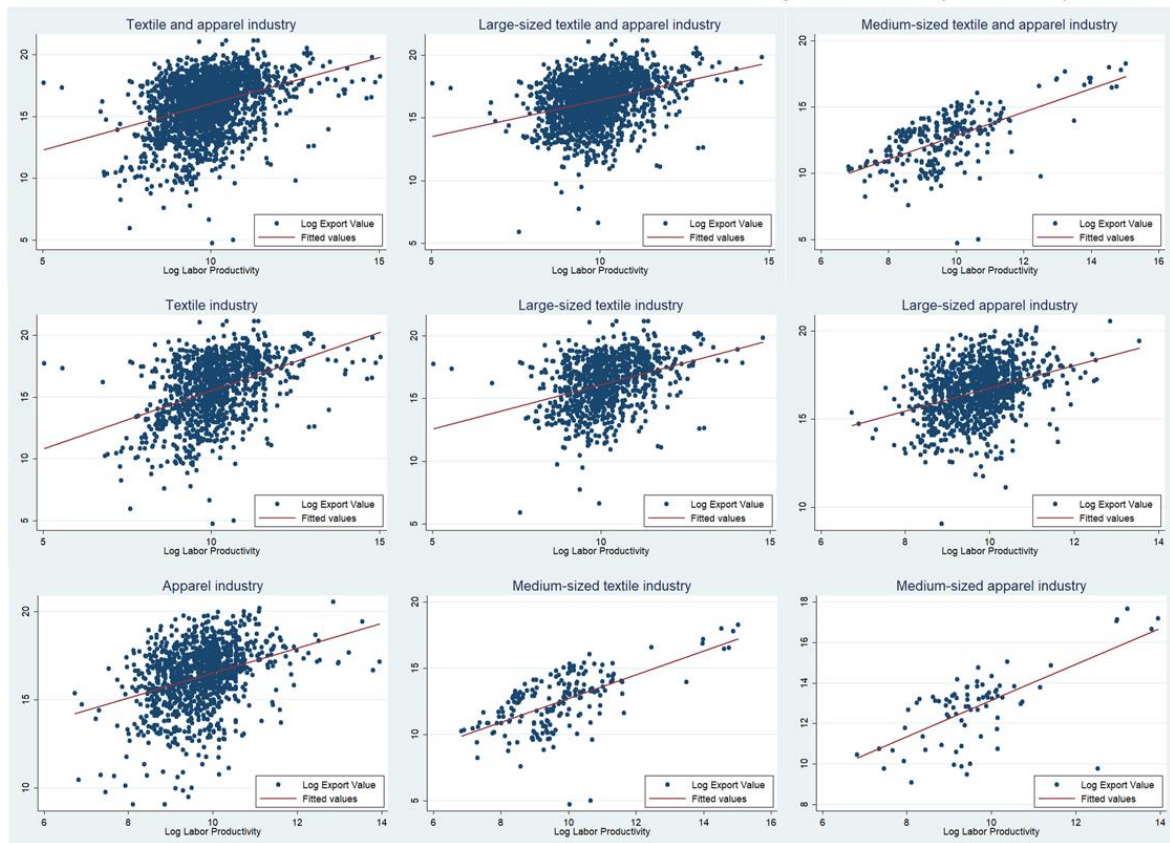

Scatterplots for import variables
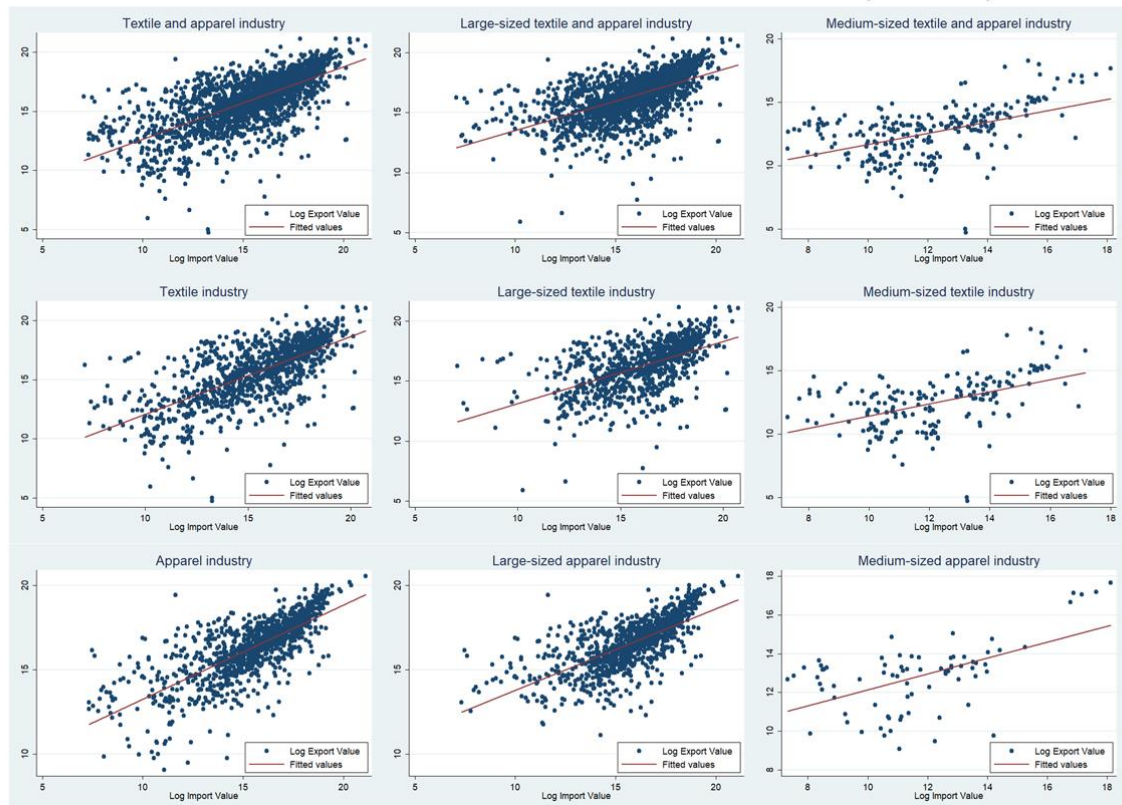
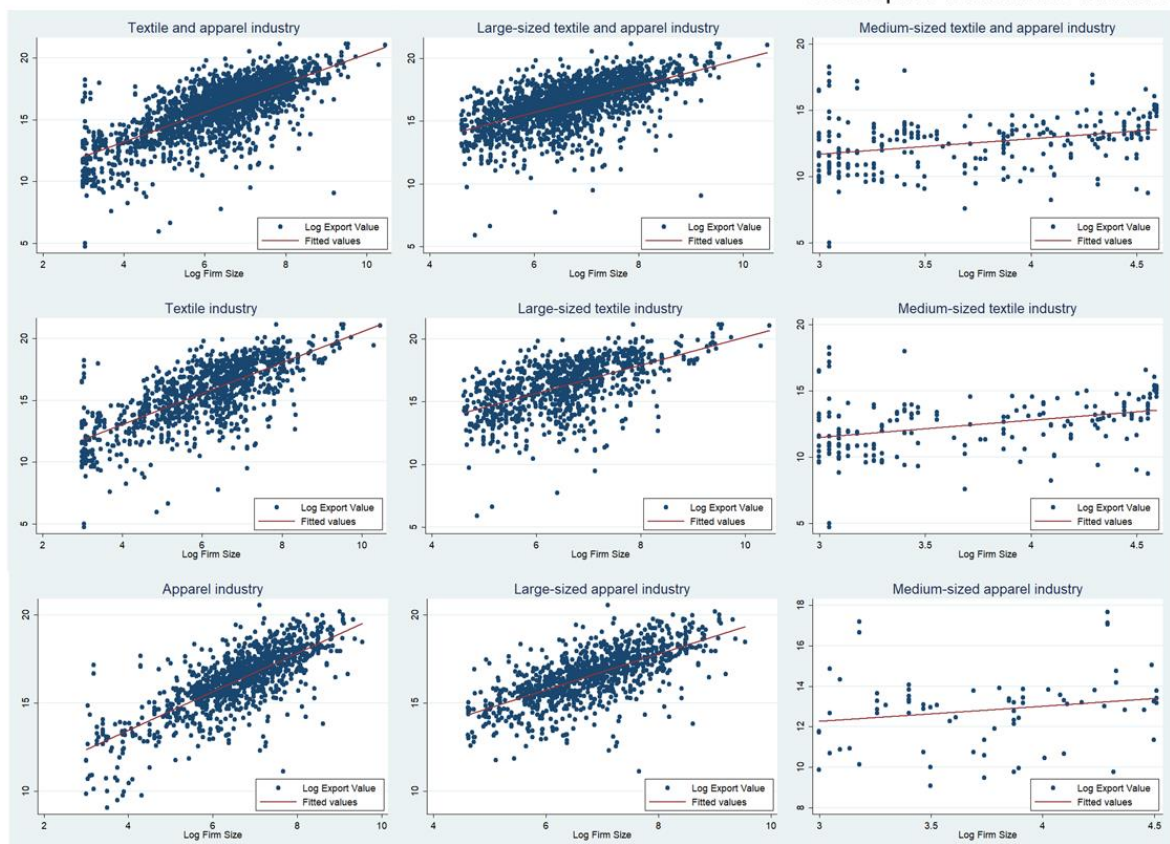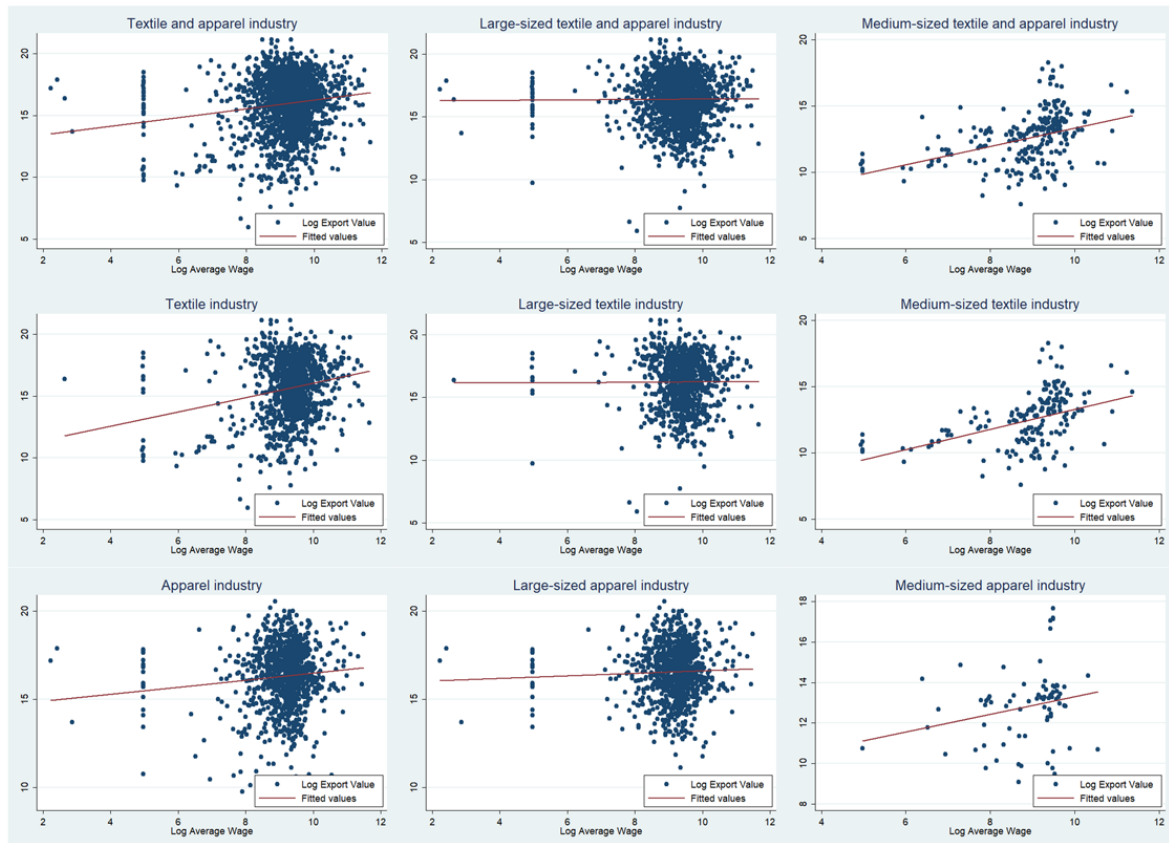Scatterplots for capital intensity variables
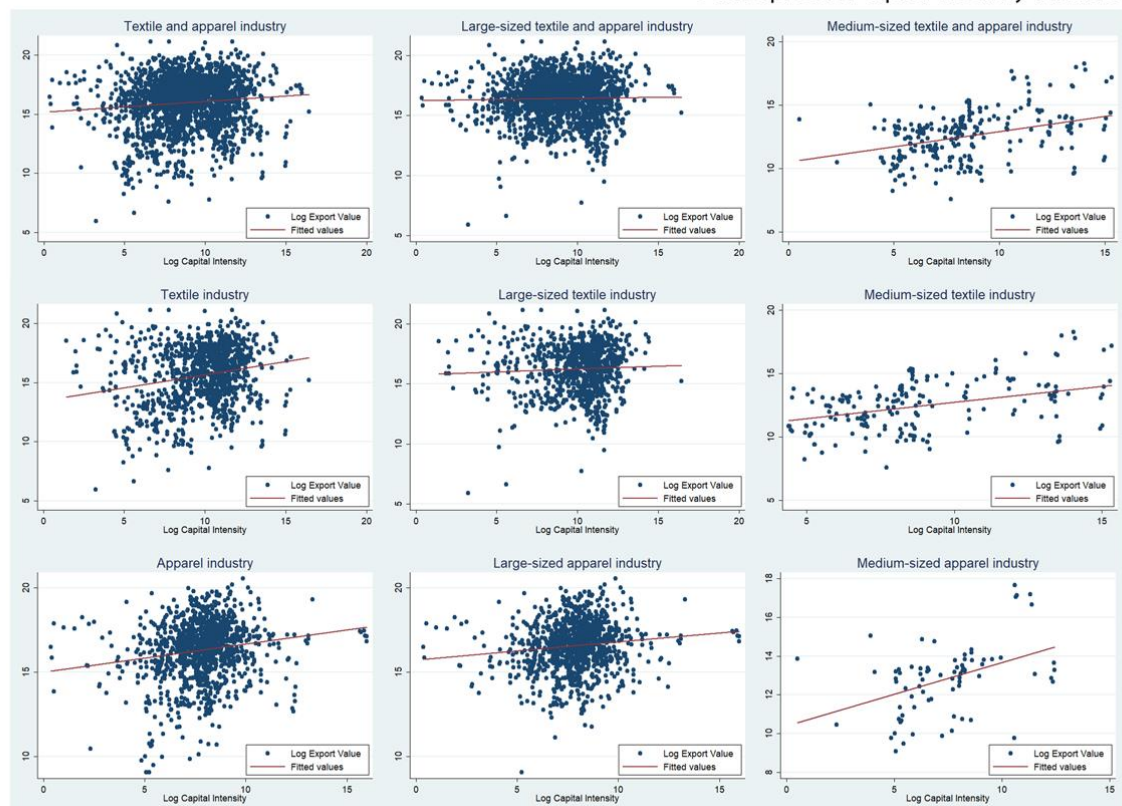
Scatterplots for labor productivity variables

Scatterplots for firm size variables
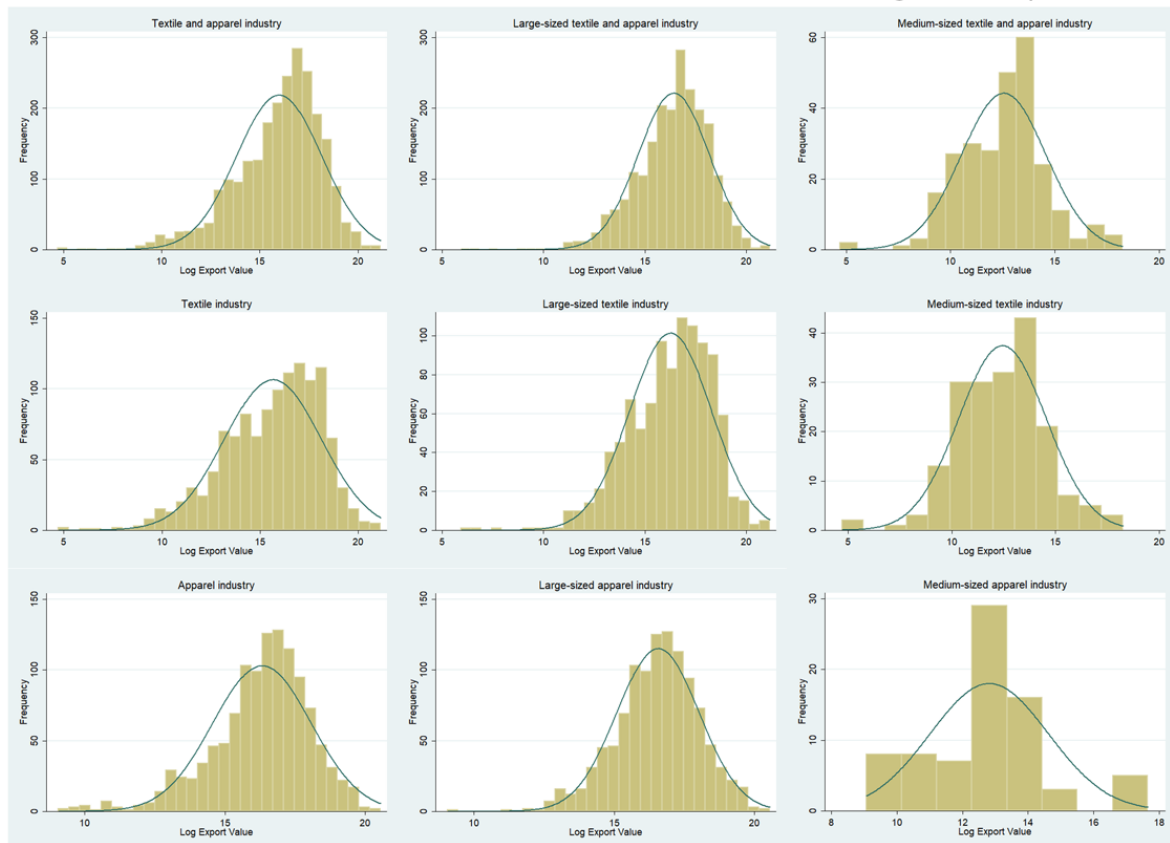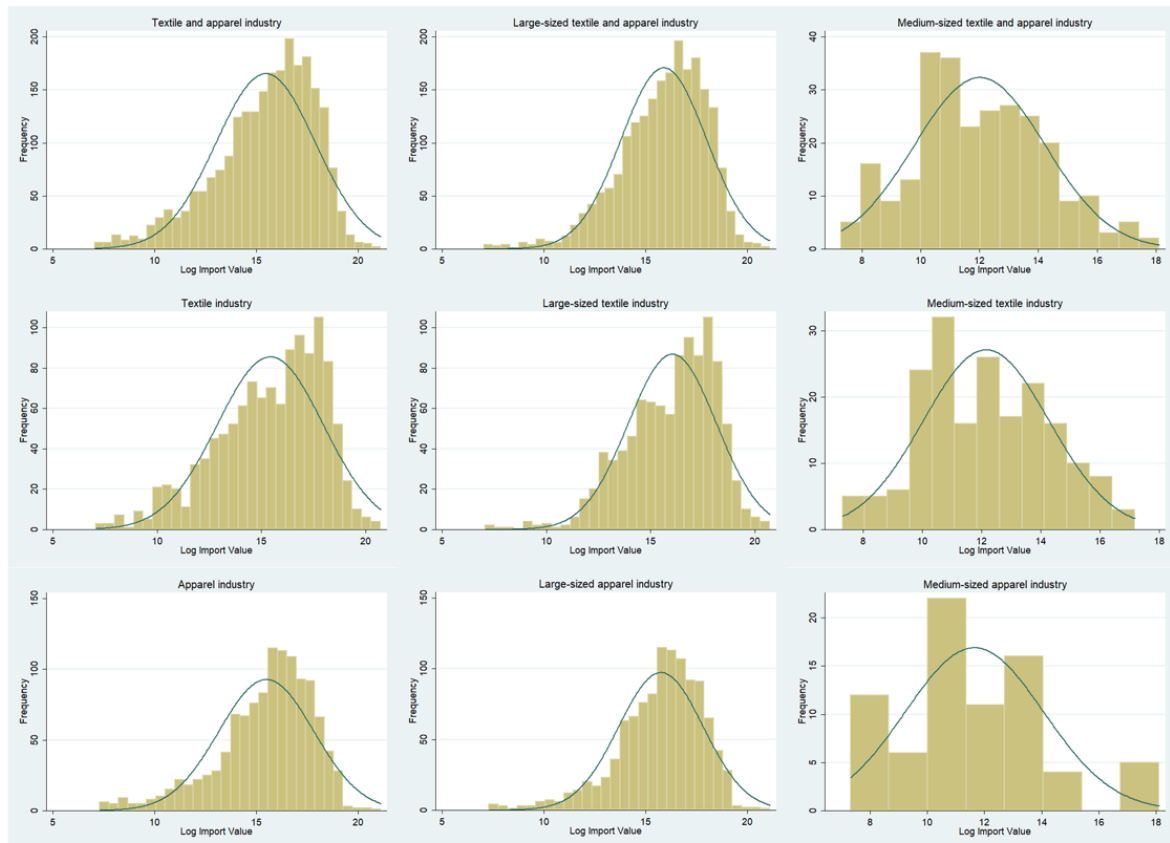
Scatterplots for average wage variables

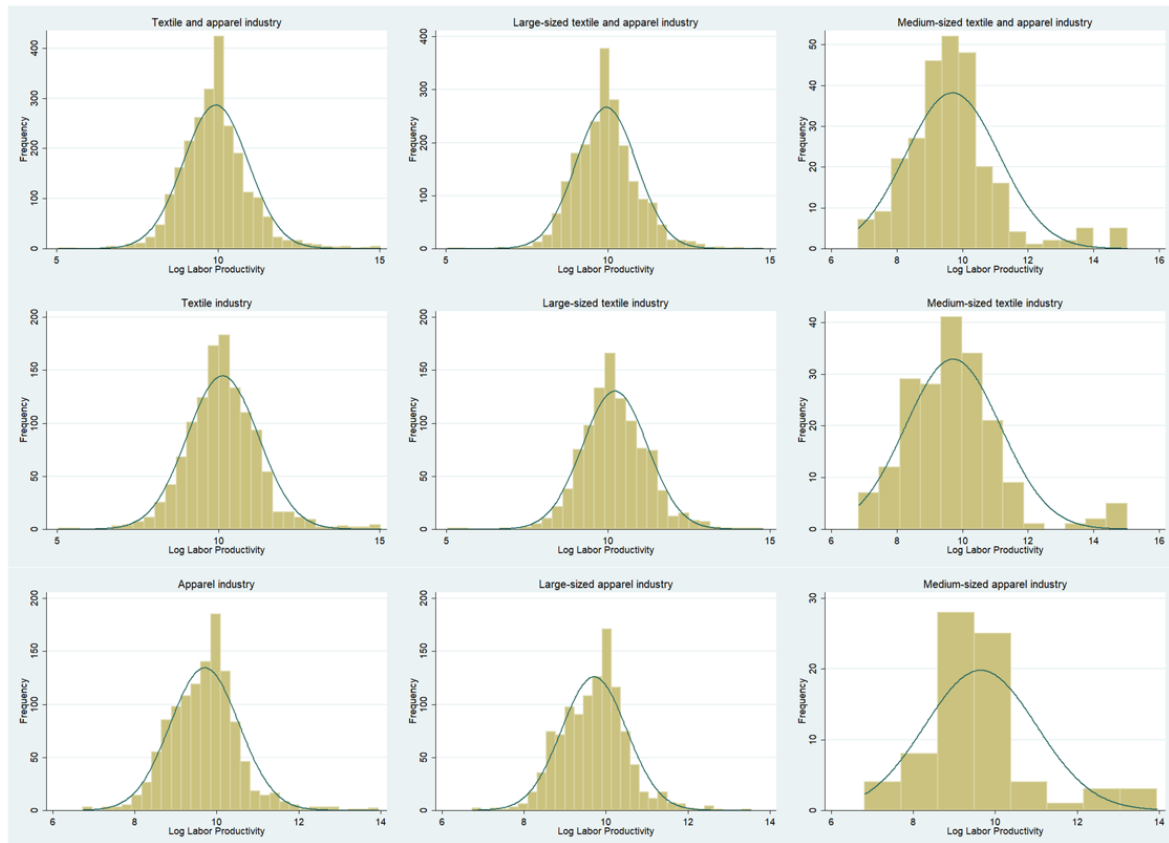Appendix C. Histograms of the Main Variables.
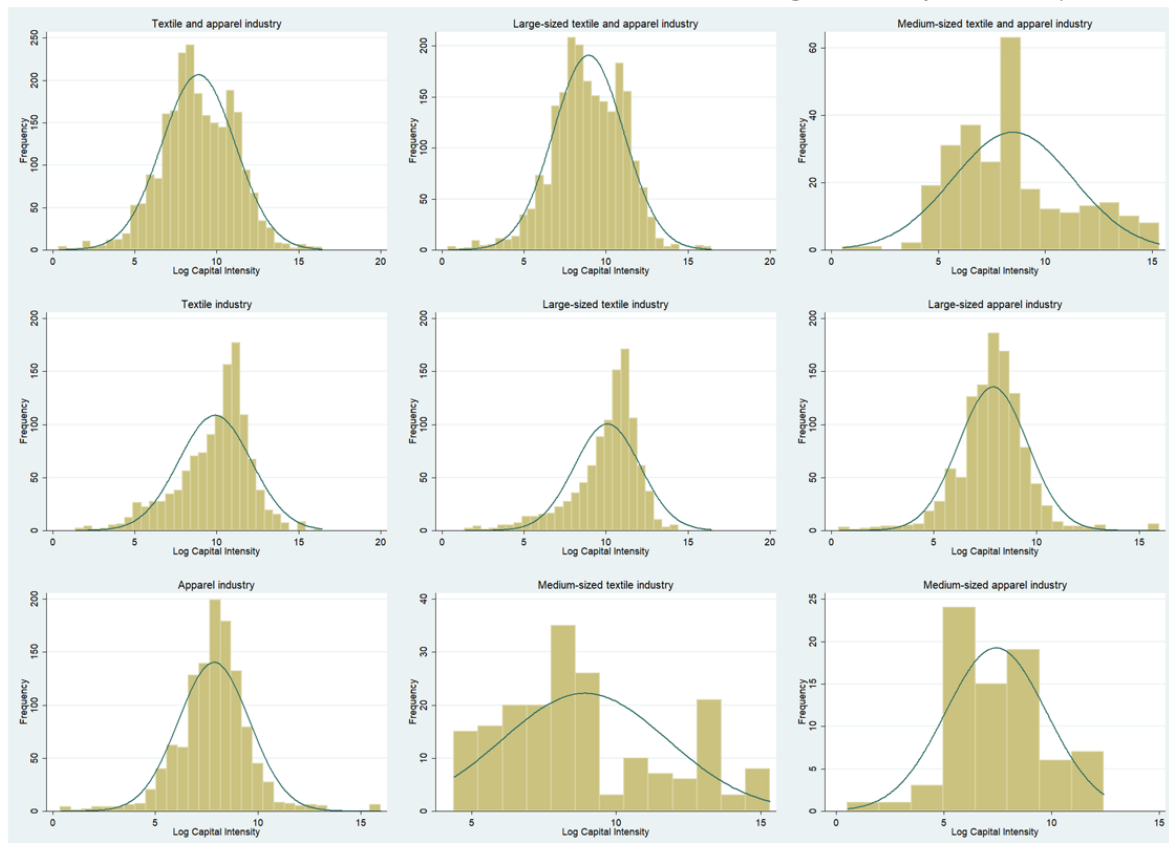

Histograms for export variables
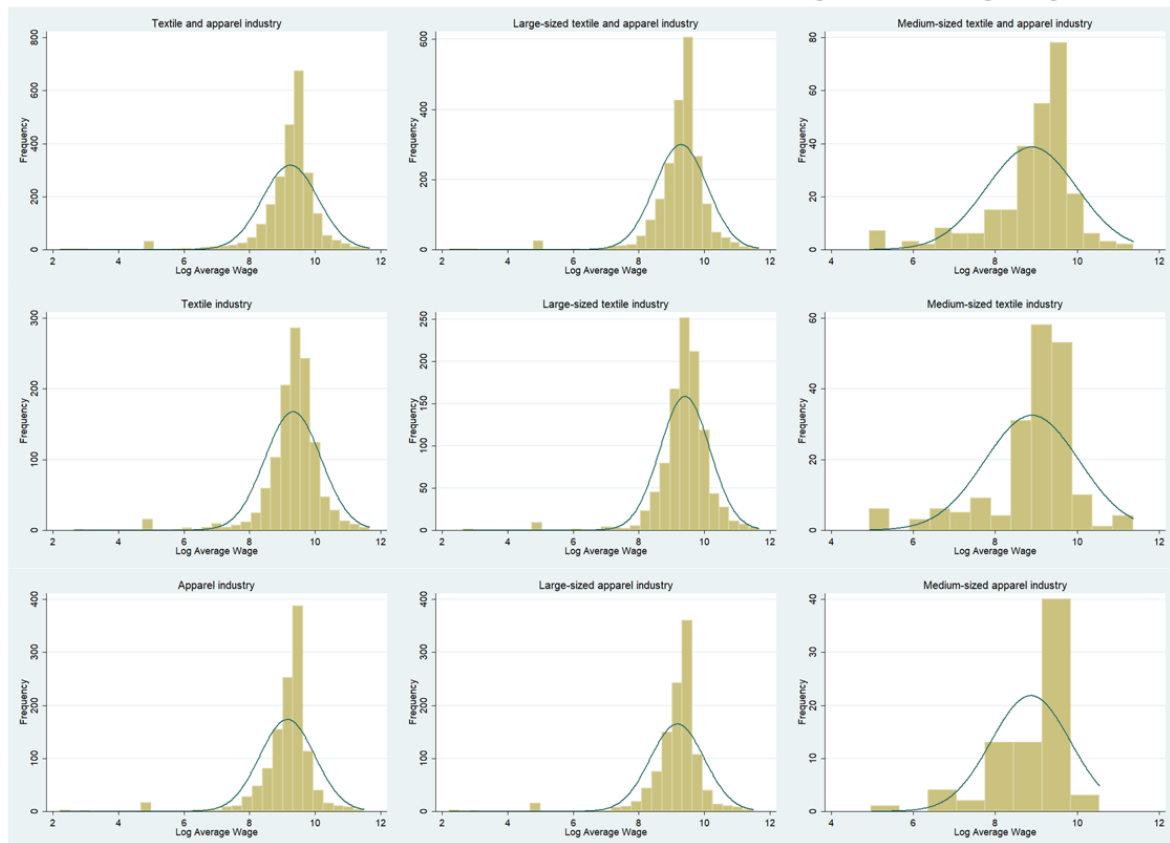
Histograms for import variables

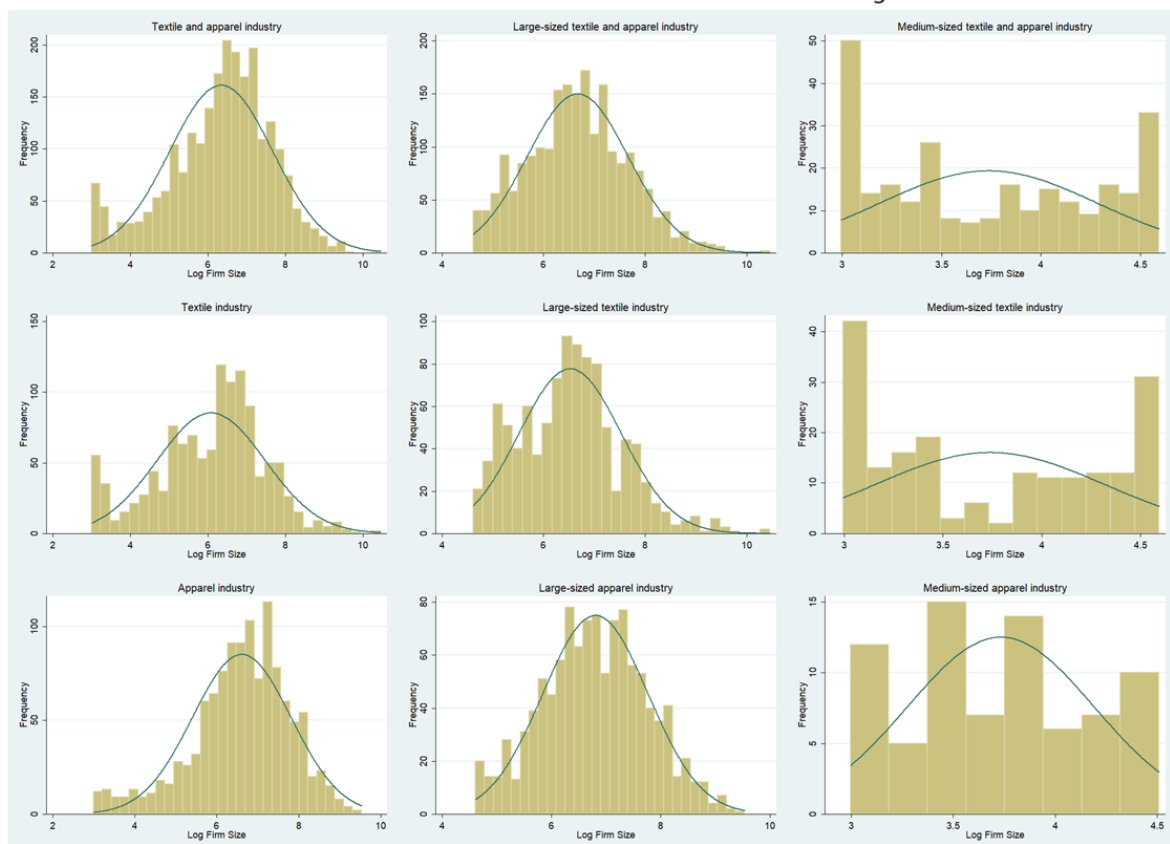## Histograms for labor productivity variables

Histograms for capital intensity variables

Histograms for average wage variables

Histograms for firm size variables

Appendix D. Performances of the Observed Indonesian Textile and Apparel Industries.

	2000	2001	2004	2006	2008	2009	2010	2011	2012	2013	2014	2015	CAGR
Firms													
Textile	81	60	70	45	80	97	126	130	140	135	118	118	3.48%
Apparel	106	66	110	42	80	83	102	116	118	118	114	124	1.44%
Total production values													
Textile	1.61E+10	8.39E+09	1.19E+10	5.44E+09	8.26E+09	8.29E+09	1.33E+10	1.78E+10	1.87E+10	2.32E+10	1.56E+10	1.65E+10	0.22%
Apparel	8.27E+09	6.52E+09	7.26E+09	2.27E+09	3.63E+09	4.59E+09	5.37E+09	6.58E+09	7.72E+09	8.24E+09	7.10E+09	9.85E+09	1.6%
Export ratio - mean													
Textile	58.13	55.82	46.27	59.22	43.57	49.63	51.21	48.55	42.27	42.16	46.21	44.78	-2.34%
Apparel	90.00	88.89	84.68	85.33	75.75	85.71	82.99	89.35	83.60	83.49	88.54	85.90	-0.42%
Export values													
Textile	1.04E+10	4.13E+09	5.88E+09	2.49E+09	2.18E+09	2.69E+09	3.94E+09	4.40E+09	4.18E+09	5.06E+09	2.86E+09	2.89E+09	-10.99%
Apparel	7.95E+09	4.74E+09	5.21E+09	1.68E+09	1.67E+09	2.25E+09	2.46E+09	3.32E+09	3.63E+09	3.83E+09	2.64E+09	3.82E+09	-6.45%
Raw materials values													
Textile - imported	4.51E+09	2.22E+09	2.68E+09	1.29E+09	2.12E+09	2.13E+09	3.30E+09	4.25E+09	5.06E+09	4.14E+09	3.52E+09	5.64E+09	2.05%
Textile - domestic	6.24E+09	2.48E+09	3.20E+09	1.55E+09	1.93E+09	2.49E+09	4.02E+09	5.76E+09	5.86E+09	5.53E+09	4.27E+09	4.89E+09	-2.19%
Textile import ratio to its total inputs	42%	47%	46%	45%	52%	46%	45%	42%	46%	43%	45%	54%	2.25%
Apparel - imported	3.48E+09	2.27E+09	3.02E+09	1.05E+09	1.46E+09	1.80E+09	2.17E+09	2.26E+09	2.60E+09	2.97E+09	2.97E+09	5.41E+09	4.09%
Apparel - domestic	1.63E+09	1.42E+09	1.22E+09	2.56E+08	5.13E+08	5.08E+08	6.36E+08	8.19E+08	7.86E+08	1.08E+09	1.00E+09	1.55E+09	-0.46%
Apparel import ratio to its total inputs	68%	62%	71%	80%	74%	78%	77%	73%	77%	73%	75%	78%	1.21%

Note: CAGR is compound annual growth rate. Unit values for total production, exports and raw materials are in thousand Indonesian rupiahs.
Source: Author's calculation on the Indonesian textile and apparel industries based on Indonesian Large and Medium-sized Manufacturing Survey by the Indonesian Central Bureau of Statistics, 2000-2015.

Appendix E. Detailed Statistics on the Sub-Sectors of the Indonesian Textileand Apparel Industries.

Categories	5-KBLI09	Type	Medium-sized	Large-sized	% of total firms
Upstream N: 454	13112	spinning	16	318	14.04
	13131	yarn dyeing	14	56	2.94
	13111	fiber		32	1.35
	13113	spinning		15	0.63
	13997	fiber		3	0.13
Midstream N: 543	13121	weaving	51	222	11.48
	13132	finished fabric	9	63	3.03
	13133	finished fabric	6	64	2.94
	13911	knitting	14	38	2.19
	13134	finished fabric	35	12	1.98
	13912	others textile	9	8	0.71
	13122	weaving	7	5	0.5
Downstream N:1382	14111	garment	50	829	36.95
	14301	knitted garment	8	127	5.67
	14132	others textile	6	82	3.7
	13930	others textile	11	56	2.82
	13921	others textile	3	32	1.47
	14303	others textile	1	29	1.26
	14131	others textile	4	25	1.22
	13942	others textile	8	19	1.13
	13991	others textile	1	20	0.88
	13992	others textile		18	0.76
	14302	garment	7	7	0.59
	13993	others textile	1	8	0.38
	13929	others textile	2	7	0.38
	13999	others textile	1	6	0.29
	13941	others textile	1	5	0.25
	14112	garment		3	0.13
	13924	others textile		2	0.08
	13923	others textile	1	1	0.08
	14120	garment		1	0.04
Total			266	2113	100

Note: 5-KBLI09 is a 5-digit level of Indonesian Standard Industrial Classification 2009 series that is based on the ISIC Rev. 4 in 2007 and ASEAN-CIC in 2006.
Source: Authors' calculation on the Indonesian textile and apparel industries based on Indonesian Large and Medium-sized Manufacturing Survey by the Indonesian Central Bureau of Statistics, 2000–2015.

Appendix F. Descriptive Statistics for the Indonesian Textile and Apparel Industries.

Variables		Total Textile and Apparel Industries	By Industry	
			Textile	Apparel
Total Observations		2,379	1,200	1,179
Export value	*Mean*	3.97e+07	4.26e+07	3.66e+07
	St. Dev.	9.40e+07	1.15e+08	6.58e+07
	Min.	111	111	8,615
	Max.	1.55e+09	1.55e+09	8.40e+08
Imported input	*Mean*	3.04e+07	3.41e+07	2.67e+07
	St. Dev.	7.04e+07	7.50e+07	6.51e+07
	Min.	1,181	1,181	1,505
	Max.	1.46e+09	9.98e+08	1.46e+09
Labor productivity	*Mean*	42,929	59,220	26,347
	St. Dev.	154,788	208,461	59,918
	Min.	153	153	843
	Max.	3,355,328	3,355,328	1,137,925
Size	*Mean*	1,185	1,043	1,330
	St. Dev.	1,836	2,078	1,538
	Min.	20	20	20
	Max.	34,890	34,890	13,862
Capital intensity	*Mean*	82,502	115,326	49,095
	St. Dev.	533,354	514,750	549,854
	Min.	1.45	4.06	1.45
	Max.	1.37e+07	1.37e+07	8,692,709
Wage	*Mean*	13,167	14,478	11,833
	St. Dev.	9,859	10,994	8,346
	Min.	9.24	14.14	9.24
	Max.	115,756	115,756	97,916

Note: Unit values for export, imported input, and wage are in thousand Indonesian rupiahs. Unit values for capital intensity and labor productivity are in thousand rupiahs per labor.
Source: Authors' calculation on the Indonesian textile and apparel industries based on Indonesian Large and Medium-sized Manufacturing Survey by the Indonesian Central Bureau of Statistics, 2000–2015.