THE IMPACT OF IMPORT COMPETITION ON INDONESIA'S TEXTILE AND APPAREL INDUSTRIES: A DILEMMA BETWEEN EMPLOYMENT AND EFFICIENCY

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ABSTRACT

Free trade hurts. Surprisingly, this statement did not come from citizens of a developing country. That was actually the summary of a 2010 poll conducted by NBC/WSJ in the United States. It becomes apparent that the adversaries to the free trade are everywhere. Conversely, governments believe free trade is indispensable. These contrasting interests put governments in a dilemma. Governments need import competition for promoting efficiency of their industries, but it hurts the people. Free trade turns out to be a double-edged blade.

This dissertation tries to look deeper into this dilemma. This dissertation particularly investigates the impact of import competition on the number of workers, wages, and technical and scale efficiencies in Indonesia's textile and apparel industries. This research departs from the idea that import competition negatively affects the number of workers and wages, and it positively affects technical and scale efficiencies. Moreover, it is assumed that each correlation is governed by two regimes separated by a threshold. It is also assumed that the impacts of import competition are larger in the regime beyond the threshold.

Correspondingly, this study employs TAR model analysis.

This dissertation finds empirical evidence against the linearity in the null-hypotheses of the correlations. This dissertation also finds that the dilemma does not occur in the apparel industry as the threshold regarding the number of workers and wages are larger than the threshold regarding the two efficiencies. Unfortunately, the government of Indonesia needs to choose between inducing scale efficiency and protecting the number of workers and wages in the textile industry.

Chapter 1 Introduction

This chapter aims to introduce the circumstances surrounding this research. This chapter commences by describing the background of this research. This background is followed by three sections which elaborate the research problems, objectives which this research is intended to accomplish, and several questions which keep this research in focus. The next section underlines the significance of this research. Afterward, applied research methodology is presented. In addition, this chapter also elaborates several limitations of this research. The last part of this chapter specifies the content of this dissertation.

1.1. Research background

Nowadays, every country, to some extent, should involve in global trade. There is no country in this world, as a reason, whose domestic producers can produce all goods required in the domestic market. Some goods, which are not manufactured domestically, have to be imported from abroad. There is also no country whose domestic suppliers can sell all products at a lower price than foreign competitors.

Many consumers will undoubtedly prefer lower price goods regardless who the producers are. Additionally, there is no country whose domestic producers do not appreciate foreign market openings. These domestic producers will grasp every opportunity to export their products. These circumstances certainly also apply to Indonesia. There is little doubt that Indonesia needs to trade with other countries.

Past experiences asserted that disengagement with global trade deteriorated the economy of Indonesia. During the period between 1933 until the end of its colonialization, the Dutch colonial administration who ruled Indonesia at that time implemented *Crisis Invoer Ordonantie* (Dick, 2002, p. 158). This foreign policy was intended to protect Dutch manufacturers by keeping imports from Britain and Japan at bay. Sadly, undesirable impact arose as indispensable necessities became luxurious imports due to limited supply. As a result, living standard in the colony was deteriorated considerably. Similar situation happened when Indonesia was occupied by Japanese Military during World War II. The Allied navy ran an effective blockade which obstructed the exchange of goods and information among Japan and its occupied territories, including Indonesia. This situation turned Indonesia into an autarky. History noted that this period as the worst economic situation in Indonesia as basic needs such as foods, clothing, and medicines had to be rationed owing to dreadful scarcity (Dick, 2002, p. 164).

Protectionism was not implemented only by the colonial administration. The first two presidents of Indonesia conducted an experiment on restricting foreign trade. The first president, Soekarno launched *Berdikari* program. This program was initially set out to diminish Indonesia’s dependence on foreign resources by employing tariff and non-tariff barrier. Rather than delivering self-reliance economy, this program deteriorated the economy. This economic drawback made Soekarno lost his presidency. The second president, Soeharto, ignored his predecessor’s experience. He was also tempted by protectionism. At some stages of his rule, the government of Indonesia exercised import substitution industrialization policy (Wie, 2002, p. 209). This policy was intended to reduce dependency on imports and to shield infant substituting industries from ruthless foreign competition. Nevertheless, its extensive implementation caused more harm than good to the economy. These experiences proved that involving in global trade is vital to the economy of Indonesia. Regrettably, Indonesia has to learn these disadvantages of a closed economy in the hard way.

Moreover, protectionism is expensive as it raises the price of materials, and components (World Trade Organization, 2008, p. 5). Trade protection also increases the price of machineries and equipments. Consequently, it discourages industry restructuring and new investment. As a result, trade protection policy hampers manufacturers from lowering their cost of production. Sequentially, finished goods will remain expensive on account of protectionism.

In their argument against protectionism, the promoters of free trade believe that it is necessary to quantify the cost protectionism with the intention of providing evidence that protectionism injures the economy. The term cost of protection in this context can be referred as the economic loss caused by trade protection policy. The cost of protection is usually expressed as a percentage of GNP. Notably, economists recognize two major methods in measuring the cost of protection, i.e. allocative efficiency and x-efficiency.

The measurement of the cost of protection has a long history. The most prominent early measurement was proposed by Harry G. Johnson (Johnson, 1960). Johnson's measurement of the cost of protection was based on the method of allocative efficiency. This method of measuring the cost of protection utilizes common concepts in microeconomics, i.e. consumer surplus, producer surplus and government surplus.

When a consumer can purchase a product at a lower price than what the consumer is willing and able to pay, it is said the consumer obtains consumer surplus. In other words, consumer surplus is the difference between the actual price a consumer pay and the price he is ready to pay. Consumer surplus can be quantified as the price a buyer willing to pay minus the actual price which the buyer pays (Mankiw, Quah, & Wilson, 2008, p. 141). In an autarky supply and demand model, consumer surplus covers a triangular area below the demand curve and the above equilibrium price level.

Conversely, producer surplus can be depicted as the difference between the actual price a producer receives and the price which the producer is ready to accept. It arises when a producer receives higher price for a product than what the producer is willing and able to take. Producer surplus can be quantified as the price a producer receives from a buyer minus the cost of producing the product (Mankiw, Quah, & Wilson, 2008, p. 146). In an autarky supply and demand model, producer surplus covers a triangular area above the supply curve and below the equilibrium price level.

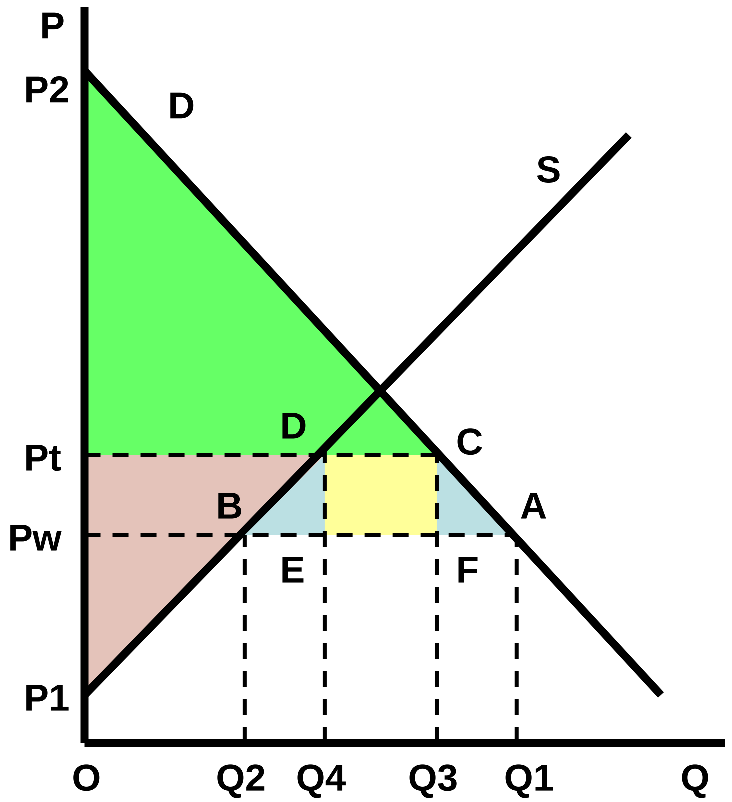
The other concept, the government surplus, can be depicted as the revenue which the government acquires by implementing its policy. In import case, government surplus comes in the form of duty revenue imposing tariff duty (Krugman, Obstfeld, & Melitz, 2012, p. 201). Government revenue concerning import activity is based on ad valorem or specific duty. As it name suggests, ad valorem duty was collected based on the value of the imported goods. Alternatively, specific duty was collected based on the quantity of the imported goods. Although ad valorem duty is more difficult to collect, it is more commonly used than specific duty.

The allocative efficiency method asserts that a change in economic policy will make some people win some benefit, but at the same time other people lose some benefit. When the benefit obtained by the winners is larger than the benefit lost by the losers, then it can be said that the policy’s change has increased allocative efficiency. On the contrary, the policy’s change is said to cost the economy when the benefit missed by the losers is larger than the benefit attained by the winners. Of course, it is more preferable that a change of economic policy can generate larger benefits than lost ones.

The allocative efficiency method proposed by Johnson indicated that protection policy costs the economy. The protection policy raises product’s price. This higher price enables producers to raise supply and obtain bigger surplus. At the same time, higher price reduces domestic demand. This higher price causes consumers lose some surplus. If the government’s policy is a tariff policy, the government will earn some surplus in the form of import duty. The cost of protection arises since the additional producers surplus combined with government surplus are smaller than the loss of consumer surplus.

The concept of cost of protection as a result of allocative efficiency can be understood better with the help of a partial equilibrium model depicted in Figure 1.1. In the state of free trade consumers surplus is shown by triangle PwAP2, and producer surplus is shown by triangle PwBP1. When the government imposes tariff policy, consumer surplus shrinks into triangle PtCP2 (green area). At the same time, producer surplus expands into triangle PtDP1 (red area). This policy also creates surplus for the government which is shown as square CDEF (yellow area). Partial equilibrium model in Figure 1.1 displays that not all surplus given up by consumers is transferred to both producers and government. Surplus as depicted by triangles BED and AFC is lost. Lost surplus, which is caused by allocative inefficiency, is called deadweight loss.

Figure 1. 1 Cost of protection – Allocative efficiency



Source: adapted from Panagariya (2002)

Johnson formulated an estimator for calculating the cost of protection (Johnson, 1960). Johnson expressed the cost of protection as $\frac{1}{2}\tau^2\eta V$, where τ was the proportion of tariff protection in the final domestic price, η was the arc-elasticity of demand for imports, and V was the initial domestic market value of imports. Usually, the cost of protection is expressed as a percentage of GNP. By using this estimator, Johnson calculated that the cost of protection of UK in 1970 was around 1 percent.

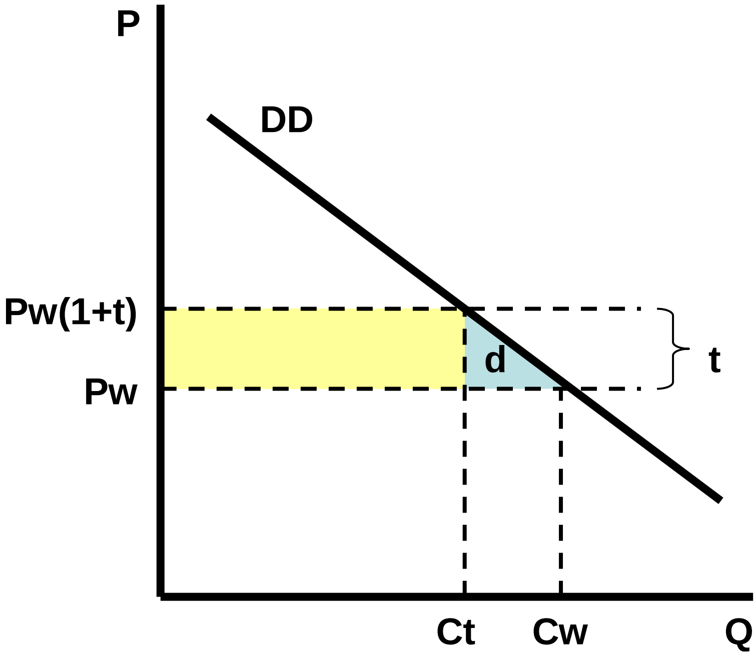
Many economists are not satisfied with the cost of protection estimate using allocative efficiency method which tends to yield trivial percentage of GNP. They believe that estimating the cost of protection by using allocative efficiency method does not capture all crucial aspects. Hence, they try to establish various methods in calculating the cost of protection. One of those methods, called x-efficiency, wins large support from economists.

The concept of x-efficiency was developed by Harvey Leibenstein (Leibenstein, 1966). X-efficiency is achieved when a firm works in a competitive environment. In a perfect competition circumstances, each firm has to attain an optimum level of efficiency because only those who have x-efficiency will survive. If a firm fails to do so, the firm is said to have x-inefficiency, and it will be driven out of business by the market mechanism.

Firms, which do not have x-efficiency, could only survive with privilege from the authority. This dispensation alters market mechanism from terminating these firms operation. Leibenstein also insisted that without competition and adversity firms do not feel the urge to improve their efficiency and they keep on operating inefficiently (Leibenstein, 1966). Protectionism costs the economy since these firms are allowed to work inefficiently.

Method of estimating the cost of protection due to x-inefficiency was developed by Joel Bergsman and Bela Balassa based on Leibenstein's idea (Panagariya, 2002). Panagariya explained Bergsman's method by using a partial equilibrium model which can be seen in Figure 1.2 (Panagariya, 2002). Let say that DD is the demand curve of an import-competing product, Pw is the product's world price, t is the tariff rate. After that, the product's domestic price can be denoted as Pw (1+t). When t tariff is removed, product's domestic price will equalize its world price. Consequently, consumption will increase from Ct (consumption with tariff) to Cw (consumption at the world price). As a result, there is a net gain in production which is shown as square tPwCt, and there is a net gain in consumption which is shown as triangle d.

Figure 1. 2 Cost of Protection – X-efficiency



Source: (Panagariya, 2002)

Balassa, following Bergsman, calculated cost of protection in several countries (Panagariya, 2002). The results were startling as they showed that estimates of x-efficiency's cost of protection were much larger than the one using allocative efficiency. For example, Brazil's allocative efficiency's cost of protection was 0 while x-efficiency's cost of protection was 9.5 percent of GNP. Another example, Pakistan's allocative efficiency's cost of protection was 0.8 percent while x-efficiency's cost of protection was 5.4 percent, so that the total cost of protection was 6.2 percent of GNP (Panagariya, 2002).

Both allocative efficiency and x-efficiency method in estimating the cost of protection exhibit that protection seriously hurts the economy. The combination of both of them revealed that the economy lost significantly owing to protection policy. As a developing country which is in quest of boosting economic growth, Indonesia needs to make the most of all resources it has. Indonesia cannot afford to endure such enormous loss from protectionism. The government of Indonesia should go as far as it takes to avoid protectionism policy.

Although it is clear that foreign trade is indispensable, it has not played an essential role in the contemporary economy of Indonesia. In comparison with other members of the Association of Southeast Asian Nations (ASEAN), Indonesia's foreign trade is quite unimpressive. Figures in Table 1.1 below exhibit that even exports and imports of Indonesia keep growing; its share of GDP is shrinking. These figures indicate that currently the economy of Indonesia is still pretty much driven by domestic economic activity. Then again, these figures also imply that there are plenty of rooms for Indonesia to expand its foreign trade.

Table 1. 1 The role of foreign trade in the economy of Indonesia

Year	GDP[1*]	Exports		Imports	
		Value[1*]	share of GDP[2*]	Value[1*]	share of GDP[2*]
2001	160447	62865	39.03	50549	30.76
2002	195661	65828	32.69	52697	26.39
2003	234772	69402	30.48	56947	23.14
2004	256837	82813	32.22	71471	27.54
2005	285869	99922	34.07	91511	29.92
2006	364571	115048	31.03	95262	25.62
2007	432217	130501	29.44	109588	25.39
2008	510245	154853	29.81	144936	28.75
2009	539355	132801	24.17	111610	21.36
2010	706558	174840	24.61	153537	22.98

[1*]Million USD, [2*]as percentage

Source: Word Development Indicators, the World Bank

That condition suggests that Indonesia can exploit further gains from foreign trade. By engaging in global trade, Indonesia allows the domestic consumer to enjoy goods which are not only manufactured domestically but also imported ones. This opportunity provides domestic consumers with a broader selection of goods in term of price and quality (World Trade Organization, 2008, p. 7). In addition, extensive competition assures that producer will offer goods at a lower price than its competitors. The Competition also drives manufacturers to keep improving the quality of their products. Briefly, foreign trade reduces the cost of living for consumer (World Trade Organization, 2008, p. 5).

On the other side, by opening its economy to foreign trade, Indonesia receives reciprocal treatment from its trading partners. It means foreign markets are open to domestic manufacturers to sell their products. Furthermore, these manufacturers can take advantages of a broader range of suppliers for their inputs of production. Lower input price allows manufacturers to reduce production cost. Inputs with better quality undoubtedly enable manufacturers to make better products. In addition, competition with foreign contenders impels domestic manufacturers to increase their efficiency by improving production method or acquiring advanced technology. Unquestionably, these gains from foreign trade motivate Indonesia to keep pursuing trade liberalization policy.

With the intention of expanding trade with the rest of the world, Indonesia has prudently embraced free trade policy. Since early 1990s, Indonesia thoughtfully opened its economy by engaging in several negotiations of trade treaty. 1992 is taken into account as the cornerstone of Indonesia's trade liberalization process when Indonesia and other members of the ASEAN established the ASEAN Free Trade Area (AFTA). Afterward, Indonesia's trade liberalization process was commemorated by Indonesia's accession into the World Trade Organization

(WTO) in 1995.

Indonesia's effort in pursuing free trade policy did not cease with those two occasions. Later on, Indonesia completed a number of trade agreements, which were conducted independently or as a member of the ASEAN. Bilaterally Indonesia has signed an economic partnership agreement with Japan which is known as agreement establishing Indonesia-Japan Economic Partnership (IJEP). Indonesia has also completed free trade negotiations as members of the ASEAN, namely ASEAN–Australia–New Zealand Free Trade Area (AANZFTA), ASEAN–China Free Trade Area (ACFTA), ASEAN–India Free Trade Area (AIFTA), ASEAN–Japan Comprehensive Economic Partnership (AJCEP), ASEAN–Korea Free Trade Area (AKFTA).

Table 1. 2 Exports and Imports of Indonesia by selected trading partner 2010

Country/ Region	Exports		Imports	
	Weight[1*]	Value[2*]	Weight[1*]	Value[2*]
ASEAN	70383.6	33347.5	36380.5	38912.2
Japan	61311.2	25781.8	3976.9	16965.8
ROK	57383.6	12574.6	5315.4	7703
China	137643.7	15692.6	10554.4	20424.2
Rest of Asia	107048.9	24755.6	18121.2	17016.9
Africa	3828.1	3657	4096.5	2455.4
Australia	5264.2	4244.4	7523.5	4099
New Zealand	1356.9	396.2	571.2	726.9
Rest of Oceania	341.4	249.8	35.6	54.3
NAFTA	8342.6	15761.2	8169.4	10720.5
Rest of America	2267.3	2740.3	7398.6	3212.9
European Union	20843	17127.4	3702.3	9862.5
Rest of Europe	2832.3	1450.7	4855.5	3509.7
Total	478589.1	157500.4	109592.1	134992.4

[1*] thousand ton [2*]CIF million USD

Source: Statistical Yearbook of Indonesia 2011, BPS-Statistics Indonesia [2011]

Those countries, with whom Indonesia ties trade alliance, are apparently its largest trading partners. Table 1.2 above discloses that, in 2010, Indonesia's exports to those countries added up to 64.6% of Indonesia's total exports. In addition, Indonesia imported goods which count up to 67.9% of total Indonesia's import of the same period. The government of Indonesia may expect that export and import activity of Indonesia will soar in the future by securing trade liberalization policy with those countries.

These free trade agreements, in fact, bring Indonesia into an exceptionally large free trade community. The ASEAN-China Free Trade Agreement and the ASEAN-India Free Trade Agreement, for instance, established two of the world's largest market integration. The ASEAN-China Free Trade Agreement formed a market of more than 1,940 million people with total GDP nominal around USD 8.788 trillion. The volume of trade of this market is only surpassed by the European Economic Area and the North American Free Trade Area. The ASEAN-India Free Trade Agreement also created a large market involving more than 1,811 million of people with combined GDP nominal about USD 3.643 trillion. Trade agreements which create enormous markets of this size can be expected to boost up trade among participating countries. This increase of trade will sequentially bring benefits for all population of these countries, including Indonesia.

Moreover, it seems that Indonesia and other contracting parties of those agreements establishing free trade area are inspired by the idea of cost of protection proposed by Johnson, Leibenstein, Bergsman and Balassa. Every single free trade agreements which they have established always stated increasing economic efficiency as one of their main objectives. By mentioning economic efficiency in the preamble of these free trade agreements, they acknowledged that protectionism burdened their economy.

Indonesia and other contracting parties of those agreements comprehend that free trade does not allow producers to continue operating inefficiently with high production cost. They believe that inefficient producers would not be able to survive in a free trade environment. Therefore, these producers will do whatever it takes to attain the minimum level of efficiency required in a free trade environment. Accordingly, these producers will be able to lower their production cost. As a result, consumers will gain from lower price and producers will gain from larger market. Indonesia and other contracting parties of those agreements are convinced that free trade will increase their overall welfare.

1.2. Research problem

Nevertheless, there are people who contest this trade liberalization policy. They insist that the government of Indonesia should keep protecting domestic industries even though these industries are laden with comparative disadvantage. These industries, they argue, are already well established. Besides, these industries employ scores of workers and capital which cannot be reallocated easily to other industries which have a comparative advantage. In fact, reallocating these resources will not only costly but also painful. It is then understandable why many people become the advocates of protectionism policy.

The debate between the supporters of free trade and the proponents of protectionism has been going on for decades. The crux of that debate is the role which governments should take in foreign trade. Governments are demanded to opt between active or passive role in foreign trade. The sponsors of free trade insist that governments should apply a policy of laissez-faire. This implies that government should take a passive role and let trade works naturally. On the contrary, the benefactors of protectionism persist that governments should take active policy in protecting domestic industry. This indicates that governments should take an active role and regulate the market.

Nowadays, the idea of trade liberalization has been accepted as conventional wisdom which is held by international agencies such as WTO, IMF and the World Bank. It is argued that trade liberalization will drive each country to be specialized in goods it produced more efficiently. In addition, through specialization each country can achieve economies of scale. As the result, each country can obtain higher welfare.

However, the WTO admits that when foreign trade offers various gains, it also presents challenges since domestic producers are exposed to competition from imports (World Trade Organization, 2008, p. 8). Undesirable impacts of import competition range from shrinking price-cost margin, losing market share and even closing of businesses. Subsequently, these impacts of import competition are transmitted to employment in the form of cutting wage and workers discharge. These flaws of foreign trade are rarely brought to light so that people usually fail to notice them.

It is factual that foreign trade improves economic growth. This improvement, nonetheless, is not immediately transformed into new business for capital owners or new employment for workers (World Trade Organization, 2008, p. 9). It compels adjustments before all parties are better-off. Government is required to redistribute benefits of foreign trade to support those who are hurt by foreign trade. Hopefully, these adjustments policies can help them to improve their efficiency and competitiveness or help them to switch to new business.

Furthermore, it has to be admitted that each country is attributed to specific characteristics which disable it from exercising laissez-faire. The conventional wisdom of trade liberalization assumes that, in the process of specialization, factors of production can move smoothly without restraint from those uncompetitive industries to the competitive ones. It is assumed that the transfer process will happen naturally, relatively fast and free of charge. Nevertheless, in reality it hardly ever works as assumed.

In reality, nobody dares to tell capital owners to shut down their less competitive business and start all over again in more competitive one. Changing one's business is certainly not an easy task. It definitely takes a lot of time to liquidate your current assets and turns it into some other form of assets. It is almost impossible to market machineries and equipment of dying industries. You could not expect to get profit from it. Switching your business is also unquestionably costly. Moreover, there are possibilities that you will fail in running a new business. Starting a new business which you do not have any knowledge or experience is close to unfeasible. Undoubtedly, the idea of transferring capital from one business to another is something that capital owners cannot take lightly.

When the impacts of import competition on capital owners are quite awful, the impacts on workers are a lot worse. In the same way, nobody dares to tell workers to move from one industry to another. Capital owners may be driven to transfer their assets with reasonable liabilities. Nevertheless, it is not viable to advise workers to quit their jobs and find jobs in another industry even if prospective jobs pay them higher. It is the uncertainty of being unemployed which make workers extremely reluctant to switch job. Surely, workers will fight harshly against any policy which might threaten their job security.

Indeed, workers who were displaced on account of import competition hope to find new jobs as soon as possible. They are frequently categorized as frictional unemployment which means they are in temporary transition state from one job to another. It can also be said that they are unemployed since they are preparing to start a new business. Whenever there is a matching process of workers and jobs, frictional unemployment occurs. In fact, frictional unemployment arises all the time as the economy always fluctuates owing to changes in supply and demand of labor (Mankiw, Quah, & Wilson, 2008, p. 635). The conventional wisdom of free trade assumes that this transition happens briefly. Thus, frictional unemployment, which arises as a result of import competition, would not be a substantial problem.

However, specialization, which is advocated by free trade, compels those workers to move from one industry to another. Those workers will not face many problems if they transfer within one industry. Switching job within the same industry does not require obtaining new skill or knowledge. Nonetheless, moving from one industry to another could be complicated. Unemployment status, which commences as frictional, could turn into structural unemployment. Structural unemployment takes place when those who are unemployed do not fit the specification required by job vacancies (Lipsey, Courant, & Ragan, 1999, p. 79). Every industry is unique with its own traits. Workers from one industry could not work in another industry straightforwardly.

Firstly, there is a mismatch between the skill or expertise used in the previous industry and the skill or expertise needed in the new industry. Production process in every industry uses its own distinctive technology. Additionally, for working with that technology, workers are required to hold particular skill. Skill, which is valuable in one industry, might be irrelevant in another industry. Displaced workers from import competing industry certainly need skill adjustment before applying for jobs in another industry. It certainly helps if there is such training program available to help them. If not, they must be unemployed for a longer time.

Secondly, workers who look for jobs may happen to be in a location far away from job openings. This problem may not seem as arduous as skill mismatch problem. Ousted workers from import competing industry just need to move to another town to get a job. Still, it means starting your life all over again.

Undoubtedly, it is something that everybody wants to avoid from happening.

Lastly, it might be true that specialization promoted by free trade creates new jobs in particular industries. Nevertheless, these new job opportunities in expanding industries may not be as many as jobs disappeared from import competing industries. Even when skill mismatch does not exist, and all expelled workers happen to be in the same locality as the job vacancies, still some of the workers might be kept unemployed.

Displaced workers from import competing industries are certainly worse off on account of trade liberalization. Structural differences between industries hamper their effort from getting new jobs. This can only mean that their period of unemployment will become exceedingly long.

The problem with those who are unemployed is that they lose their purchasing power. The problem will surely get more complicated when there is no unemployment insurance available. Indonesia is one of those countries which do not have such insurance system yet. If structural unemployment occurs in large magnitude and in a long time, lost purchasing power might induce the fall of aggregate demand.

A long-lasting low aggregate demand sequentially will instigate cyclical unemployment. It is understandable that this type of unemployment is also known as deficient-demand unemployment. As aggregate purchasing power drops, less products and services are demanded by the people. Consequently, the fall of aggregate demand will be derived into the fall of labor demand. It happens over and over again resulting in mass unemployment. There is also a possibility that it could drag the economy into a recession.

Furthermore, in modern economics, price plays a crucial and unique role in equalizing quantity demanded and quantity supplied of a product producing equilibrium condition. Let say there is a surge of demand or a drop of supply which both will cause the price to go up. Consequently, consumers will reduce demand and producers will increase supply until once again the equilibrium condition is restored. Similarly, when there is a surge of supply or a plunge of demand, the price will fall. Accordingly, producers will respond by cutting down production and consumers are attracted to spend more. Thus, in the same way, the equilibrium condition is restored once again. Logically, price is the market's mechanism for making adjustment and reinstating the equilibrium condition.

Wage is the price for labor. Afterwards, analogous to other product, the equilibrium in the labor market is also determined by wage. Wage defines the quantity of labor demanded and supplied. Whenever there is a change in the quantity of labor demanded or the quantity of labor supplied, wage will drive the market to reestablish the equilibrium condition.

Nonetheless, workers and their unions in Indonesia have succeeded to convince the parliament and the government in imposing minimum wage law. This intervention to labor market mechanism prevents wage from moving down below minimum wage. It hampers labor market from working properly.

Labor demand is not merely determined by firm owners. It is actually derived from the demand of the product manufactured by those firms. When the product demand falls, in this case owing to import competition, labor demand falls accordingly. If there is no intervention which means wage could make an adjustment without restraint to soften the demand shock, those firms do not have to displace their workers. On supply and demand model, labor demand shock will shift the labor demand curve to the left. However, if wage could reduce the magnitude of the demand shock, the labor demand curve does not have to shift. The labor demand curve will only get flatter. This means, if the workers agree to a lower wage, they may be able to maintain their jobs.

Unfortunately, minimum wage regulation thwarts this adjustment mechanism from working. Minimum wage law keeps wage above the equilibrium level of the labor market. Consequently, it reduces the quantity of labor demanded, and it raises the quantity of labor supplied (Mankiw, Quah, & Wilson, 2008, p. 639). In other words, firm owners lay off some of their workers in dealing with product demand shock even though more people are willing to work thanks to higher wage. As a result, unemployment arises. Workers displacement becomes unavoidable owing to failure in the labor market.

Furthermore, workers would be more reluctant to switch from one industry to another when unemployment benefit is absent. Unemployment benefit is a kind of social security scheme provided by governments. This benefit is paid to workers when they are laid off. Workers continue receiving this payment as long as they keep on searching for new jobs. Workers are no longer entitled to this benefit when they begin receiving salary from the new jobs.

Unemployment benefit plays as a cushion which alleviates economic shocks when workers are displaced. It stabilizes workers' level of consumption when they suddenly lose their income. With this benefit, workers saving can be expected to support their basic needs temporarily. In fact, consumption stabilization is the main purpose of unemployment insurance (Hamermesh, 1992, p. 2). Those workers can also use this benefit for covering their expenses during their job search. Furthermore, they can use this benefit for financing training course they might need in order to obtain new skills required in prospective jobs. In other words, unemployment benefit is provided to alleviate the impact of frictional and structural unemployment.

Unfortunately, unemployment benefit is absent in Indonesia. When workers are ousted, they earn nothing but a separation allowance. As a result, it will be extremely hard for them to keep their level of consumption. Moreover, they can forget that job searching expenses and training course financing. For workers in Indonesia, severance means a dreadful economic shock. Unemployment benefit, which plays as cushion mechanism in developed countries, does not exist to soften the tremor of that severance. Therefore, government of countries which do not have unemployment benefit will try their best to avoid workers lay off.

It is then understandable why the government of Indonesia faced strong opposition when those free trade agreements were instigated. It is also obvious that workers are the one who gave strongest rejection. In early 2010, labor unions organized massive rally in major cities such Jakarta, Surabaya, Semarang, Bandung and Makassar to protest the implementation of those free trade agreements, especially ACFTA (The Jakarta Post, 2010b). Workers saw those free trade agreements as President Susilo Bambang Yudhoyono's failure to protect the economy of Indonesia (The Jakarta Post, 2010c). This rally took place for a long time even though the government of Indonesia promised to support negatively affected industries (The Jakarta Post, 2010a). These workers took those free trade agreements as a clear and present threat.

It is clear that there are two opposing standpoints in assessing trade liberalization policy. By embracing free trade, the government of Indonesia is determined to establish a competitive environment for its industries. The government of Indonesia believes that foreign competition will drive domestic producers to improve their efficiency. The government of Indonesia sees efficiency as the key factor in boosting up economic growth. On the other hand, workers and factory owners, particularly those who engage in industries with comparative disadvantage, are threatened by free trade. They believe that free trade would benefit other people on their expense. They are the one who need to endure costly and painful adjustment.

This situation puts the government of Indonesia in a dilemma. Undeniably, free trade is a two-edged sword for many countries, both developed and developing counties (Vanzetti, McGuire, & Prabowo, 2005, p. 1). Obviously, the government of Indonesia must deal with two conflicting tasks. On one hand, the government of Indonesia intends to improve efficiency of its industrial sector. The government of Indonesia's tries to accomplish this objective by exposing its industrial sector to foreign competition. Foreign competition undoubtedly makes sure that domestic manufacturers and workers will meet all necessary requirements to improve their productivity and efficiency in order to survive. Additionally, as the Ricardian model suggests, foreign competition makes sure that all economic resources are devoted into industries which have a comparative advantage. That means the industrial sector of Indonesia is driven toward specialization. On the other hand, it is the duty of the government of Indonesia to protect the welfare of its manufacturers and workers. This responsibility also covers manufacturers and workers in industries which have a comparative disadvantage. The effort of the government of Indonesia in pursuing industrial efficiency and specialization should not be conducted on the expense of manufacturers and workers in industries which have a comparative disadvantage.

However, when it is impossible to avoid such cost, the government of Indonesia should do whatever it takes to assist manufacturers and workers in industries which have a comparative disadvantage. The government of Indonesia should give the opportunity to these people to improve their competitiveness by increasing their efficiency and productivity. These people need time to make required industrial restructuring, which hopefully turns comparative disadvantage into comparative disadvantage. Alternatively, when this industrial restructuring is unattainable, the government of Indonesia should assist the reallocation of capital and labor from these industries which are inflicted with comparative disadvantage to those which retain comparative advantage. This reallocation of capital and labor would be costly as well as painful; thus the assistance from the government will be indispensable.

That is why the government of Indonesia needs to be extraordinarily cautious in formulating foreign trade policy, particularly when the process of adjustment toward specialization of its industrial sector is in full swing. The government of Indonesia needs to set import competition at a particular level which can stimulate significant industrial efficiency. Conversely, the government of Indonesia cannot afford to allow import competition to pass a specific threshold which will make import competition severely detrimental to employment. Without recognizing these two thresholds of import competition, it would be difficult for the government of Indonesia to formulate an appropriate foreign trade policy.

The problem, which is faced by the government of Indonesia in formulating the proper foreign trade policy, is adopted as the research problem here. In short, this research sets forth with the intention of discovering two thresholds of import competition which are needed by the government of Indonesia. These two thresholds of import competition will make it possible for the government of Indonesia to formulate foreign trade policy which will stimulate significant improvement of industrial efficiency without bringing too much harm to capital owners and workers.

Once these two thresholds of import competition are revealed, the government of Indonesia will be able to control import competition effectively. Hopefully, the threshold of import competition beyond which industrial efficiency can be improved substantially is lower that the threshold of import competition beyond which employment will be deteriorated seriously. If this condition occurs, the government of Indonesia should maintain the level of import competition within the range confined by the two thresholds. If import competition gets lower than the lower threshold, the government of Indonesia should open its economy wider to stimulate industrial efficiency. Alternatively, if import competition goes beyond the upper threshold, the government of Indonesia should restrict trade to protect employment.

The government of Indonesia can manipulate the level of import competition by altering three variables, which can affect import competition. They are level of domestic production, level of imports, and level of exports. The most convenient way for the government of Indonesia to control import competition is by adjusting import duty tariff. If import competition is too low, the government of Indonesia can reduce import duty tariff to stimulate efficiency. Alternatively, if import competition is too harsh, the government of Indonesia can increase import duty tariff to safeguard employment. This management import competition can only be carried out if the two thresholds are acknowledged.

1.3. Research objectives

As mentioned above, this research is conducted with the aim of assisting the government of Indonesia in formulating an appropriate foreign trade policy, especially policy which regulates textile and apparel imports and exports.

Appropriate foreign trade policy will enable the government of Indonesia to stimulate industrial efficiency without putting too many people in trouble. The main objective of this research is developed based on the research problem stated above.

The main objective of this research is to investigate the level of import competition, which could affect textile industry and apparel industry significantly. This research focuses on the impact of import competition on two prime aspects of these industries, i.e. employment and efficiency. In order to obtain deeper insight on the impact of import competition on the employment aspect, the focus of this research is narrowed to number of worker and wage. For the same reason, the focus of this research use technical efficiency and scale efficiency for proxy of industrial efficiency.

The broad main objective of this research needs to be translated into several specific objectives. The first specific objective is to verify that the impact of import competition on the number of workers and wages in both textile and apparel industries really exist. Accomplishing this objective is critical in the early stage of this research. It would be useless to investigate the level of import competition which will severely deteriorate the number of workers and wages if the impact of import competition on the number of workers and wages does not exist.

The second specific objective is to confirm that the impact of import competition on technical and scale efficiencies in textile and apparel industries really occurs. This is another crucial specific objective which determines the subsequent stage of the research. This specific objective lays the robust foundation for investigating the level of import competition, which will boost technical and scale efficiencies in both textile and apparel industries. Without accomplishing this specific objective beforehand, investigation on this level of import competition would be meaningless. The first and second specific objectives are the stepping stones from which the key objectives of this research are reached.

After these two specific objectives are fulfilled, this research is able to proceed to the next level. The third specific objective of this research is determining the level of import competition beyond which the number of workers and wages are deteriorated seriously. Further, the fourth specific objective of this research is discovering the level of import competition beyond which technical and scale efficiencies can be enhanced considerably. These two specific objectives are the key objectives toward which this research is launched. Upon the accomplishment of these third and fourth specific objectives, this research will be able to offer the government of Indonesia the levels of import competition, which is necessary in formulating foreign trade policy, regarding textile and apparel industries in particular.

1.4. Research questions

Based on the theoretical framework and specific objectives which are developed for this research, the following research questions were designed to guide the empirical analysis:

1. Does import competition affect the number of workers in Indonesia's textile industry?
2. Does import competition affect the number of workers in Indonesia's apparel industry?
3. Does import competition affect wages in Indonesia's textile industry?

4. Does import competition affect wages in Indonesia’s apparel industry?
5. Does import competition affect technical efficiency in Indonesia’s textile industry?
6. Does import competition affect technical efficiency in Indonesia’s apparel industry?
7. Does import competition affect scale efficiency in Indonesia’s textile industry?
8. Does import competition affect scale efficiency in Indonesia’s apparel industry?

The preceding research questions require empirical evidences of the impact of import competition on each dependent variables to be presented. These eight research questions are developed further to probe the levels of import competition beyond which the behavior of the dependent variables changes substantially. With the purpose of directing this research to find these levels of import competition, the following research questions are designed.

9. When does import competition severely detrimental to the number of workers in Indonesia’s textile industry?
10. When does import competition severely detrimental to the number of workers in Indonesia’s apparel industry?
11. When does import competition severely detrimental to wages in Indonesia’s textile industry?
12. When does import competition severely detrimental to wages in Indonesia’s apparel industry?
13. When does import competition significantly boost technical efficiency in Indonesia’s textile industry?
14. When does import competition significantly boost technical efficiency in Indonesia’s apparel industry?
15. When does import competition significantly boost scale efficiency in Indonesia’s textile industry?
16. When does import competition significantly boost scale efficiency in Indonesia’s apparel industry?

These research questions are devised to maintain the focus of this research. These research questions also guide this research one step at a time. By discovering answers to these questions, this research can accomplish all specific objectives put up in the first place.

1.5. Significances of the research

The label of lower-middle-income economy is still attributed to Indonesia. In spite of this, today Indonesia is experiencing rapid transformation of its economy. Early 2011, Jim O'Neill of Goldman Sachs expressed that the term emerging markets was longer suitable for addressing the BRICs and four of the N-11: Indonesia, Korea, Mexico and Turkey (O'Neill, 2011). BRIC is an acronym labeled to a group of countries which are all believed to achieve the stage of newly advanced economic development by 2050. They are Brazil, Russia, India and China. Jim O'Neill classified Indonesia and ten other countries as N-11 or the next eleven. Goldman Sachs identified N-11 as having a high potential of becoming the world's largest economies in the 21st century along with members of the BRIC. Further, Jim O'Neill thought that it would be more appropriate to use the term growth market to address countries which are classified in the BRIC and the N-11

(O'Neill, 2011). Therefore, it would be more appropriate to consider Indonesia as a growth market rather than a lower-middle-income economy.

Jim O’Neill stood on solid ground when he convinced investors regarding the optimistic future of Indonesia. Indonesia has been foreseen to be one of the major players in the global economy in the future. Goldman Sachs asserted that, among the countries of N-11, Indonesia and Mexico were two countries whose size of economy could overtake the most of the G7 countries by 2050 (Goldman Sachs Global Economics Group, 2007, p. 134). In addition, Goldman Sachs also affirmed that among the current G7 countries only the United States which would be clearly larger than these two N-11 economies by that time (Goldman Sachs Global Economics Group, 2007, p. 141).

Nevertheless, Goldman Sachs pointed out that Indonesia was quite dependent on its economic growth (Goldman Sachs Global Economics Group, 2007, p. 146). Bank Indonesia, the central bank, recorded robust growth of the economy of Indonesia which grew at 6.1% in 2011 (Bank Indonesia, 2011, p. 6). As Goldman Sachs’ projection was based on this strong economic growth, it is essential for the government of Indonesia to sustain high economic growth to fulfill that expectation. Confidently, the government of Indonesia will be able to meet make it thanks to healthy public debt and budget deficit positions, strong trading networks and large numbers of population (O'Neill, 2011). Goldman Sachs forecasted that all of the N-11 countries retain the capacity to grow at 4% or more over the next 20 years, if they can maintain stable conditions for growth (Goldman Sachs Global Economics Group, 2007, p. 134).

Large population serves as an advantage and at the same time as a disadvantage to the economy of Indonesia. Indonesia was one of the most populous countries with over 231 million people in 2009. This year Indonesia’s population is estimated over 234 million. By 2015, Indonesia will have over 247 million people. In 2007, Indonesia sat on the fourth positions with only China, India and the United States surpassed Indonesia’s population. In addition, compared to other neighbor in South East Asian region, the most populous neighbor, Philippines (over 88 million) and Vietnam (over 85 million), were hardly close to half of Indonesia’s population. Those facts demonstrated that the government of Indonesia needs to pay serious concern to its population and employment problems.

If we look at the labor structure in Indonesia, we may find that, in 2009, Labor Force Participation Rate (LFPR) which indicated working age population who economically active was only about 67.60 percent. 2009 LFPR was increased by 0.27 percent from 2008 LFPR of 67.33 percent. This meant about 32.40 percent of working age population were not economically active because they were studying, housekeeping or others. Another thing worth to mention is 2009 open unemployment rate (OUR) which was 8.14 percent, which was lower by 0.32 percent from 8.46 percent in the previous year. This figure tells us that Indonesia's economic growth can only reduce open unemployment about 135.560 people. This is not a good thing especially when we notice that under employment (workers who work less than 35 hours a week) was increased by 0.88 percent from 31.089 million in 2008 to 31.363 million in 2009. These labor data revealed that assuring that workers can keep their jobs should be a crucial task for Indonesia's government.

That government's task becomes more important when many capital owners have been driven out of business and workers have been displaced as a result of import competition. Indonesia could not afford to lose jobs vacancy since labor force growth is higher than the growth of job opening. Thus, Indonesia’s government should protect import competing businesses, at least until they can survive on their own.

Those facts presented above rationalize the reason why Indonesia’s foreign trade policy becomes a fascinating and pertinent subject to study. Those facts indicate that Indonesia is acquiring a more prominent role in the global economy. Those facts also point out that Indonesia can only become a key player in the global economy, if it can maintain its high economic growth and control its level of unemployment. Thus, studies concerning the economy of Indonesia are needed more than ever to assist the government of Indonesia in directing its economy. That is the reason why Indonesia is chosen as the subject of this research.

Many people in Indonesia believe that the textile and apparel industries are the most vulnerable industries due to freer trade. The main reason is that they have not been fully recovered from the 1998 economic crisis. Even banks are still reluctant to provide loan for them since they are considered to have high credit risk. In addition, they are still struggling in restructuring old machinery. There has already been an escalating tension demanding higher protections. Factory owners and workers allegation that import competition has already hurt these industries, underlines the fact that some factories have been closed, and workers lost their jobs.

In fact, the government considers these industries as two of the most prominent industries. They are labor-intensive industries, which help the government in reducing unemployment and poverty. They also have helped the government in maintaining a healthy foreign exchange reserve through exports. Undoubtedly, the government faces a dilemma. The government has to protect the welfare of the people. At the same time the government also needs to promote industrial efficiency. Hence, hard evidence is needed that import competition has harmed the number of workers and wages before the government could employ tighter protection policy.

Unfortunately, there is no empirical evidence that import competition has already hurt the number of workers and wages in these two industries. Study on this subject in Indonesia has not been done before. Even similar studies conducted elsewhere (mostly in the United States) provided mixed results. This condition implies that study regarding the impact of import competition on both industries should be conducted. These facts induce this research to focus on Indonesia's textile and apparel industries. One of the contributions of this research is to provide empirical evidence that, on a certain level, import competition is seriously detrimental to the number of workers and wages.

This research departs from the notion that import competition hurts the number of workers and wages. On the other hand, import competition can also be used to boost technical and scale efficiencies. This research is expanded further to develop an analytical framework for finding the threshold of import competition beyond which the behaviors of the number of workers, wages, and technical and scale efficiencies change considerably. The application of that analytical framework is not limited to assess the non-linear correlation of variables in this research. This analytical framework could be a great value in determining non-linear correlation between diverse economic variables.

The findings of this research provide a deeper understanding on the impact of import competition on the number of workers, wages, and technical and scale efficiencies. This research strengthens the findings of previous studies which, argue that import competition can deteriorate the number of workers and wages in a particular industry. This research also confirms the idea that import competition can be used for boosting technical and scale efficiencies. This research suggests that the analytical framework, which is utilized in this research, is not restricted only for textile and apparel industries. This analytical framework can be expanded to investigate the impact of import competition on the number of workers, wages, and technical and scale efficiencies in various industries. However, differences in industry specific character have to be taken into consideration before applying this analytical framework in other industries.

In addition, a study, which synthesizes several threshold autoregressive (TAR) models, has not been done before. Many studies have been conducted to investigate threshold value in a TAR model, yet this threshold value is only used to explain the correlation between the independent variable and the dependent variable in that model. Different threshold values have never been used to concurrently explain the behavior of several dependent variables in one study.

This research claims to be the first in synthesizing several TAR models. This research uses the same independent variable in four TAR models applied in two different industries. Four threshold values are simultaneously used to explain the behavior of four dependent variables in response to the change in one independent variable. Accordingly, this research is able to compare the response of the dependent variables when the independent variable is altered.

This research opens new possibility to concurrently compare the impact of one independent variable on several dependent variables by synthesizing several TAR models. Synthesizing several autoregressive TAR models is not limited only to the variable of this research. It can be conducted as well in to concurrently compare the impact of any single independent variable on any set of dependent variables.

Furthermore, the findings of this research could have considerable value in informing the government and the people of Indonesia that import competition offer benefits as well as detriment to Indonesia's textile and apparel industries.

This research suggests that the government of Indonesia should carefully manage the level of import competition. Afterwards, the government can significantly stimulate efficiency in both industries without bringing serious impairment to the number of workers and wages. Although, the findings of this research are only valid for the case of Indonesia, other developing countries can learn the lesson from Indonesia's worthy experience.

1.6. Research methodology

This research primarily utilizes quantitative methods to analyze the impact of import competition on Indonesia's textile and apparel industries. This method is specifically used for determining the correlation between import competition and four features of these industries. These features include the number of workers, wages, and technical and scale efficiencies. In addition to quantitative method, this research also employs qualitative methods. This latter method is quite useful in elaborating the results of the quantitative method with regard to the nature and the surroundings of the two industries.

This research also takes advantage of methods and findings offered by previous studies. These methods give direction on how this research should be conducted while the findings are useful in making a comparison. Literature review in this research covers studies concerning conceptual issues such as the concept of import competition and the concept of efficiency. Besides literature review also encompasses studies which discuss the correlation between import competition and all dependent variables in this research, namely the number of workers, wages, and technical and scale efficiencies.

The main objective of this research is to find the thresholds of import competition, which enables the government of Indonesia to design an appropriate foreign trade policy. Hopefully, this policy can boost efficiency enhancement without bringing too much harm to the number of workers and wages, especially in textile and apparel industries. Nonetheless, before investigating these thresholds of import competition, this research needs to prove beforehand that import competition indeed affects the number of workers, wages, and technical and scale efficiencies. Thus, this research sets off by finding evidence that foreign trade, particularly import competition matters for inducing industrial efficiency. This evidence can justify whether Indonesia should pursue trade liberalization policy or not.

Concurrently, this research also tries to find evidence that foreign trade, predominantly import competition hurts the number of workers and wages. This evidence can justify the claim of capital owners and workers that import competition is detrimental.

With the intention of finding these evidences, this research utilizes quantitative approach. This research makes use time series data of import competition, number of workers, wages, and technical and scale efficiencies. Import competition is estimated by using imports, exports and domestic production data. Import competition, in this research, serves as independent variable while the number of workers, wages, and technical and scale efficiencies act as dependent variable. Next, correlation models between independent variable, namely import competition, and each independent variable are developed. Accordingly, there are four correlation models for each textile and apparel industries.

Afterwards, this research utilizes regression analysis to determine whether the change in import competition seriously affect each independent variable. Regression analysis is the most widely used quantitative approach in explaining one dependent variable in terms of one independent variable. Regression analysis is frequently used as a natural starting point of a research since the algebra and interpretations of this analysis are straightforward (Wooldridge, 2009, p. 21).

In this initial stage, the correlation between import competition and each dependent variable is assumed as linear. This assumption is utilized to simplify the analysis. This linear correlation signifies that one unit change in import competition has the same effect on each dependent variable (Wooldridge, 2009, p. 24). In this linear correlation, the magnitude of the impact of import competition on each dependent variable is simply the change in import competition multiplied by the coefficient of import competition in each correlation (Wooldridge, 2009, p. 23).

Regression analysis is a critical stage in this research as the results of this analysis determine whether it is feasible to continue to the next stage or not. Without evidence that the impact of import competition on each independent variable does exist, investigating the thresholds of import competition would be implausible. Hence, once regression analysis produces this crucial evidence, this research is cleared to move on to the succeeding stages.

In investigating the threshold of import competition, this research introduces the notion that all the correlations between import competition and each dependent variable are non-linear. This assumption distinguishes this advanced stage from the initial stage which assumes that all the correlations between import competition and each dependent variable are linear. This modification is necessary in obtaining a better understanding concerning the nature of these correlations. Furthermore, this research proposes that each correlation has two sections or regimes. This research maintains that the each dependent variable behaves differently in response to different levels of import competition in different regimes.

This notion can be understood better through the following illustrations. In the correlation between import competition and the number of workers, this research asserts that, below the threshold, the impact of import competition on the number of workers is immaterial. Nonetheless, if import competition is allowed to pass the threshold, it will be severely detrimental to the number of workers. In the first case, the level of import competition is low so that factory owners do not need to discharge too many workers. In the second case, the level of import competition is so harsh that it forces factory owners to close their business. Consequently, the number of workers who has to be laid off increases sharply.

Another illustration might make this notion even clearer. In the correlation between import competition and efficiency, this research affirms that, below the threshold, the impact of import competition on efficiency is immaterial. Below this level of import competition, factory owners do not really feel threatened by imports. They merely make a minor adjustment to cope this level of import competition. Nevertheless, if import competition is allowed to exceed the threshold, it will boost efficiency significantly. Within this level of import competition, factory owners are compelled to take drastic measure in improving their competitiveness. They need, for instance, to change combination of inputs, to alter production scheme, to increase production capacity, to bring new investment, or even to apply advanced technology.

This non-linear correlation between import competition and each dependent variable is analyzed by using TAR model. The TAR model is originally introduced by Howell Tong (Tong, Threshold Models in Non-linear Time Series Analysis , 1983). This model is an advanced method in regression analysis. In this analysis, the correlation between the independent variable and the dependent variable is partitioned into two or more segments. Those segments are separated by breakpoints which are commonly known as thresholds. This method can be extraordinarily useful in quantifying an abrupt change of dependent variable in response to the variation in independent variable.

This research requires data from a long period of observation. It is quite inapplicable to use primary data since it would be costly and time consuming. Thus, this research makes use secondary data of imports; exports; domestic production; number of workers; wages; and cost of material in both textile and apparel industries. All these data are arranged as time series, which cover the period from 1980 to 2009. All data are gathered from BPS-Statistics Indonesia.

1.7. Limitations of the research

Like most other researches, this study also has its limitations. Obviously, it is better if this research takes into consideration every factor which contributes to the change of the dependent variables. However, examining the role of all that factors would be impractical and time consuming. There is no assurance, in addition, that examining the impact of all that factors will make the correlation between import competition and each dependent variable even clearer. Hence, this research is conducted in a straightforward fashion without compromising its accuracy.

This research mainly faces two problems in assessing the research variables. The first one is in assessing import competition. The second one is in assessing efficiency in textile and apparel industries. Data of these variables are not captured in surveys and censuses. Hence, data of these variables need to be calculated from data of several economic indicators. There are several other problems, yet the impact of these problems is diminutive compared to these two main problems.

This research does not examine import competition as it occurs on the actual market. This research does not directly analyze the choice made by consumers.

Analyzing such choice demands the entire cost of delivering textile and apparel to the hand of consumers to be calculated. It is apparently extremely difficult to meet this demand. It is hard to estimate transportation cost from the port or the factory to the actual market. Transportation cost is determined by the distance from the port or factory to the actual market. The variation of this distance is enormous since there are many ports, factories and actual markets. It would surely be unfeasible, not to mention data of the distances are not available.

Therefore, this research associates imported textile and apparel as they arrive in the ports and domestically produced textile and apparel as they are transported from the factories. This research presumes that imported textile and apparel enter the domestic market when they are transported out of the ports. Similarly, this research presumes that domestically produced textile and apparel enter the domestic market as they leave the factories. It is taken for granted, in this research, that all costs which arise when textile and apparel are transported from the ports to the actual markets equals all cost which arises when textile and apparel are transported from the factories to the actual markets. Thus, both costs can be omitted from the assessment of import competition.

Moreover, this research acknowledges that there are many factors which determine each dependent variable. There are several determinants of the number of workers. Likewise, there are several determinants of wages, and technical and scale efficiencies too. Undoubtedly, some of these determinants might have a larger impact than import competition. However, this research is not intended to define the determinants of each dependent variable. The main objective of this research is to investigate the impact of import competition on each dependent variable. Even though other factors may have some bearings on the dependent variables, they are not the concern of this research. Accordingly, this research limits the focus only on the impact of import competition.

Additionally, the main tool in this research is TAR model analysis. This analysis is basically developed from the autoregressive model (AR). As the name suggests, this model regresses past values of the dependent variable in estimating its present value. This research expands the TAR model by introducing import competition as one of the independent variables. Consequently, This research limits the independent variables to import competition and past value of each dependent variable only.

In addition, the linear correlation analysis determines whether the TAR model should be performed or not. Unquestionably, the linear model should follow the structure of the TAR model analysis. Consequently, this research also limits the linear correlation analysis to make use only two independent variables, namely import competition and past value of each dependent variable. Otherwise, there would be no connection between the two analyses.

Furthermore, this research does not make use data from the same group of factories to assess the efficiency from 1980 to 2009. People may think that efficiency assessment of one year is incomparable to another year as the source of the data is inconsistent. Actually, the number of factory in each industry which consistently took part in the annual survey of BPS-Statistics Indonesia is rather small. If this research only uses data from these factories, the assessment could not supply an accurate condition of efficiency in textile and apparel industries. For that reason, this research makes use data from as many factories as possible in assessing efficiency of both industries.

1.8. Contents of the dissertation

This dissertation is presented in eight chapters. The first chapter offers an introduction to this research which covers a brief background of this research, research problems, research objectives, research questions, significances of this research, several limitations in conducting this research, as well as the methodology.

The second chapter discusses a comprehensive background in relation to trade liberalization process in Indonesia. In this chapter, Indonesia's experience in implementing different foreign trade policies is reviewed. This chapter also deliberates contemporary situation of Indonesia's trade liberalization policy. This chapter also tries to explain the current foreign trade policy undertaken by the government of Indonesia regarding textile and apparel industries.

Chapter three, a literature review, presents previous studies, which serve as the foundation of this research. Here, several studies, which elaborate the impact of import competition on employment, particularly the number of workers and wages, are presented. Several studies, which explain the correlation between import competition and industrial efficiency, are also introduced here. In addition, other studies, which justify the use of data envelopment analysis and threshold autoregressive model, are offered.

Chapter four discusses the theory of comparative advantage and the concept of competitive advantage, which are used as underlying theories in this research. Based on these underlying theories, several models are developed to describe the correlations between the research variables. At the end of this chapter, the research hypotheses are presented.

The next chapter, Chapter five, reviews the methodology which is utilized in this research. This chapter contains comprehensive discussions regarding regression analysis, data envelopment analysis, and threshold autoregressive model analysis.

Chapter six contains describes the analysis of this research and presents the findings. These findings are discussed later in Chapter seven.

The last chapter, Chapter eight, concludes the findings of this research. This chapter also talks about several policy implications as consequences of the findings produced by this research.

Chapter summary

This research departs from the dilemma faced by the government of Indonesia. The government sees that free trade can be used for inducing efficiency in Indonesia's industry. This efficiency is indispensable in boosting the growth of Indonesia's economy. Nevertheless, free trade is also harmful to workers, especially in industries with comparative disadvantage. This dilemma is adapted as the research problem of this dissertation. Thus, the research problem is the dilemma between employment and efficiency in Indonesia's textile and apparel industries. Afterward, the objective of this dissertation is defined as finding the threshold where the behavior of labor and efficiency change substantially. This research utilizes TAR model analysis to investigate abrupt change of the behavior of the number of workers, wages, and technical and scale efficiencies in response to the variation in import competition. This research makes use time series data from 1980 to 2009.

Chapter 2 The Evolution of Indonesia's Trade Policy Regime

This chapter is committed to providing historical background of trade liberalization in Indonesia. The contemporary foreign trade policy in Indonesia cannot be detached from Indonesia's experiences with different trade regimes implemented in the past. These experiences are taken into consideration when the government of Indonesia along with the parliament established the current policy. Therefore, looking back at historical economic episodes will provide a better understanding regarding Indonesia's current foreign trade.

2.1 Colonial era

Indonesia has experienced several changes of foreign trade regime since the colonial time until this modern day. Even though conventionally the account of modern Indonesia was dated back from its declaration of independence on 17 August 1945, it is worth to consider economic changes which took place since the colonial era. The outcome of those economic changes has a significant role in shaping the contemporary trade regime of Indonesia, including foreign trade policy regarding textile and apparel industries. This chapter sequentially discusses a number of trade regimes which have been put into effect in Indonesia. It begins by describing trade regime during the Dutch colonial era. Then, trade regime under the Japanese occupation is revealed. After that, attention is focused on the *Old Order* under President Soekarno and its trade regime. Subsequently, trade regime under Suharto's *New Order* is brought up, especially involving the beginning of trade liberalization process. Finally, bilateral and multilateral trade agreements after the 1998 reformation are reviewed.

Lindblad (2002, p. 115) maintained that, during the Dutch colonial rule, liberalism was set as the credo of the trade regime in the Netherland Indies. The colonial administration did not have any or at least minimum intervention in economic life of the colonial state. This policy was implemented for a remarkably long period, which started in 1870s. This policy was terminated in 1933 when the colonial administration put the Crisis Import Ordinance into practice. Lindblad (2002, p. 115) also mentioned that, during this period, the economy of the colonial state expanded due to foreign investment and free trade promoted by favorable climate of liberalism.

Moreover, Lindblad (2002, p. 116) elucidated, since the trade regime was extraordinarily liberal, the colonial administration barely imposed trade barrier (tariff as well as non-tariff) to imports and exports of the Netherland Indies. As an example, Lindblad (2002, p. 116) revealed that local textile manufacturers did not obtain protection more than the natural barrier of ocean freight rates. Therefore, domestic textile market of the Netherland Indies, at that time, was divided into three equal-size segments. Upper segment was supplied by imported high-priced and high-quality goods from Dutch's Twente and Britain's Lancashire. The middle segment was served with mid quality products imported from Japan. The lower segment was left for domestic manufacturers which produced lower quality of textile. This trade regime has created a competitive environment in the colony. As a result, there was no privilege for domestic or Dutch manufacturers, and they had to compete fairly with manufacturers from Britain and Japan.

The economy of the Netherland Indies flourished at the same time as the new boom of the world economy which was triggered by the second industrial revolution. This economic expansion was mainly fuelled by agricultural exports of the colony. On 1920s, exports from the colony included sugar, tea, coffee, and tobacco from Java; rubber from Palembang, Jambi, and West and South Kalimantan; Oil from Pangkalan Brandan and Balikpapan; tin from Bangka and Belitung; and copra from Sulawesi. Palm oil from Sumatra just became the colony's major export at the end of the colonial era. Most of export commodities of the colony are in raw conditions which were not processed prior to shipment abroad. Sugar milling and oil refinery were the only processing industry which took place in the colony. As the world industrialization was in full swing the demand for these commodities rose sharply, especially rubber and oil after the rise of the automobile industry in the United States and other industrialized countries. Lindblad (2002, p. 128) wrote that the Netherland Indies once acquired a remarkable global market share for several exports commodities. At that time, rubber export claimed 37% portion of the global market, while copra claimed 27%, palm oil claimed 24%, tea claimed 19%, and sugar claimed 11%. Additionally, the colony practically monopolized the world market for minor commodities, such as cinchona (main ingredient of medicine for malaria) and pepper. World market share for this export commodities were 91% and 86% respectively.

The economy of the Netherland Indies achieved its apex on 1920s. Lindblad (2002, p. 124) noted that, within this period, total exports of the colony soared drastically from 300 million guilders in 1905 to nearly 800 million guilders in 1917. Prosperity did not only come to Dutch firms, but also to local businessmen and plantation owners. Indigenous people of the Netherland Indies called this period as *hujan emas* (golden rain). On the other hand, imports to the colony also increased considerably. As money poured into the colony, demand for imports escalated. Major imports of the colony comprised of textiles, bicycle, sewing machine, and motor cars (Lindblad, 2002, p. 138). It is recorded that imports grew from 200 guilders in 1905 to 500 guilders in 1917 (Lindblad, 2002, p. 124). During this expansion period the colony as well its mother country, the Netherland, benefited from term of trade improvement of these commodities (Lindblad, 2002, p. 124). At that time, the index of the price of exports from the colony rose considerably in term of the price of its imports. Accordingly, the Netherland Indies was able to generate substantial surplus in balance of trade with the rest of the world.

Later, the destiny of the Netherland Indies shift dramatically as the worldwide economic depression began to strike in 1930s. The economic depression was prompted by the collapse of New York’s Wall Street Stock Exchange in October 29, 1929, known as the Black Tuesday. The crash of the Wall Street incited panic which caused people to lose confidence in the real economy (Parkin, 2005, p. 726). In the following month after the crash, the depression rapidly spread around the world. People were provoked to secure their wealth and reduced their consumption. As a result, there was deterioration in global aggregate demand and investment. This abrupt negative demand shock subsequently triggered a chain reaction which hauled the global economy into a deflationary spiral. Many firms were driven out of business due to a drastic decrease in demand. Those which survived were forced to cut their production radically. Consequently, many workers needed to be laid off. Those who managed to keep their job were forced to take lower wage. Still, they were in fact blessed. It was factual that wage fell, but price level dropped even larger, thus real wage actually increase. Therefore, those who still earned their wages did not actually suffered (Parkin, 2005, p. 726). However, this condition undoubtedly slashed aggregate purchasing power which in turn led to weaken demand even further. The depression, which started as demand deterioration, drag the global economy into a vicious circle where the cause was exacerbated by the problems it produced.

The deflationary circle distinguishes the 1930s economic depression from other depression ever happened. Uncertainty regarding the prospect of the global economy continued to generate negative demand shock during 1930 and the following two years (Parkin, 2005, p. 724). Governments everywhere faced difficulty in inducing consumption. Positive demand shock which was large enough to jump-start the global economy finally occurred when World War II broke.

The most severe impact of the 1930s economic depression was experienced by countries which relied heavily on exports of primary product, including the Netherland Indies. The colony suffered gravely because prior to the economic depression, escalating demand had induced immense investment for increasing productive capacity of major export commodities. This huge investment stimulated labor mobilization into production of major export commodities. Accordingly, production of major export commodities soared vastly. Lindblad (2002, p. 125) wrote there was, for example, twofold increase of sugar export from Java between 1902 and 1914. Then unexpectedly demand plummeted and purchasing orders were cancelled. Prospective investments and allocated factors of production were rudely turned into waste.

The most notable aftermaths of the economic depression were redistribution of income and structural change (Dick, 2002, p. 157). This long-run impact of the economic depression drove the colonial administration to take more inward-looking policies. Specifically, the colonial administration redirected factors of production toward industries which could fulfill domestic demand. In order to do so, the colonial administration developed small scale industries for manufacturing import substituting products. This policy was not only solved the problem of structural change but also it also improved term of trade imbalance by reducing dependence on imports. Subsequently, new industries were established alongside restored of old ones. Among the new industries were textile, automobile, rubber tires, margarine, shoes, battery, biscuit, light bulb, bicycle, glycerin, vehicle assembly, confectionery, metal fittings, rubber sandal, coconut oil and soap (Dick, 2002, pp. 160-161).

The government of Netherland strengthened this policy shift by implementing the Crisis Import Ordinance (*Crisis Invoer Ordonnantie Staatsblad* 1933 no. 349) on September 1933 (Dick, 2002, p. 160). This regulation authorized the colonial administration to impose quota by variety of imports and by country of origin. The impact of this regulation was remarkable that it enabled the colony to be self-sufficient in cigarettes, frying pan, paint, toiletry, beer, shoes and confectionery by 1938 (Dick, 2002, p. 161). Protection provided by this regulation was not intended for the manufacturing sector only, but it also expanded to cover food crop agriculture, such as rice, maize, cassava and soybean (Dick, 2002, p. 161).

The abandonment of classic liberal regime did not only occur in the colony. Government of other countries implemented more or less similar strategy. The United States government was the first to protect its domestic economy from foreign competition by introducing Smoot-Hawley Tariff Act. This act, which was signed into law on 17 June 1930 by President Herbert Hoover, raised import duty on over 20,000 imported commodities. This protection policy provoked other countries to retaliate even before it was enforced. As a result, global trade war was inevitable. Consequently, in a short period, global trade was almost disappeared (Parkin, 2005, p. 802).

Even though the colonial administration insisted that the 1933 Ordinance was not targeted at any particular country of origin, the public were aware that it was aimed toward restricting offensive exports of Japan (Dick, 2002, p. 158). During World War I, effective Germany's blockade discontinued imports from the mother country and other European countries to the Netherland Indies. Japanese products, therefore, were unchallenged to control larger market share in the colony. The Japanese enjoyed comparative advantage since their labor was cheaper than European countries. As Japan is closer to the Netherland Indies, the ocean freight was also lower. In addition, on December 1920, Japanese's yen was devaluated of nearly 60% against the US dollars and guilder (Dick, 2002, p. 158). Without government intervention, it was almost impossible for Dutch and local manufacturers to compete against imports from Japan. The 1933 Ordinance was remarkably effective that market share of Japan's imports was limited from 32% to just 15% between 1932 and 1937 (Dick, 2002, p. 159).

The 1933 Ordinance marked dramatic trade regime change in the Netherland Indies. The liberal trade regime which signified laissez-faire had been implemented for six full decades in the colony. Then, the great depression compelled the government of Netherland to put protection policy into action. The aim of this protection was quite clear, the colony needed to upsurge capacity utilization. After the economic depression, the industrial sector of the colony operated below its potential capacity, and imports made the condition even worse. Additionally, the colonial administration needed to alter the term of trade of the colony. Following the economic depression, exports of the colony fell sharply while imports remained quite unaffected. The protection policy was expected to lower imports while waiting for exports to recover and brought the term of trade back to balance. The 1933 ordinance was put into effect until Japanese occupation in 1942.

The Japanese occupation, from March 1942 until August 1945, brought many changes to the Netherland Indies, which then became known as Indonesia. Right after the Dutch colonial administration was eradicated, Indonesia was mobilized to support the Japanese military in winning the Pacific war. It did not take long for allied forces to recuperate and launch counter strike. Allied fleet uncompromisingly attacked and sank Japanese navy and merchant armada. This attack did not only disrupt communication between Japan and its occupied territories, but also obstructed flow of goods and raw materials. Consequently, Indonesia was isolated from foreign trade with the rest of the world and turned into an autarky. The Japanese military authority, as a consequence, attempted to minimize demands for imports and shipping (Dick, 2002, p. 165). In an attempt to do so, Indonesia was supposed to be made self-supporting in agriculture and manufacturing. Unfortunately, this effort of preventing foreign trade and promoting self-sufficiency had caused severe production inefficiency and serious loss of benefits from production specialization (Dick, 2002, p. 167). The Japanese occupation only took place in a short time, but it has impaired complex economic structure which had been long built during the Dutch colonial era.

2.2 Soekarno era

The Japanese capitulation to the allied forces, on board the battleship USS Missouri in Tokyo Bay on 2 September 1945, marked another episode in Indonesia's dynamic trade regime transformation. Local leaders exploited the absence of authority between Japanese surrender and the arrival of the allied forces to declare the independence of the Republic of Indonesia on 17 August 1945, with Soekarno as the first president. Then the next four years were the time of political, social, and economic instability which was crammed with armed conflict. The Netherland Indies Civilian Administration (NICA), which was backed by the allied forces, was ordered to regain control over its former colony. Oppositely, the new born government of the Republic of Indonesia was determined to defend its sovereignty. The NICA succeeded in occupying sizeable territory after launching the first military offensive known as *Politionale Actie* on July 1947. This military offensive forced President Soekarno and the Republican government to withdraw from Jakarta to Yogyakarta.

The military offensive was terminated when the Renville accord signed on January 1948. The Renville accord marked the ceasefire and allowed the NICA to gain control over a large part of its former colony. This area comprised of West Java, East Java and the outer islands. NICA then divided Sumatra, Kalimantan and Sulawesi and established several states governed by puppet governments. In contrast, the Republican government controlled only Central Java, a part of North

Sumatra and a part of South Sulawesi. Nevertheless, these puppet governments joined the Republican government when President Soekarno proclaimed a single unitary Republic of Indonesia in 1950.

After the Renville accord, the NICA managed to revive the economy on its territory and export activity of several commodities commenced (Dick, 2002, p. 169). Throughout the cessation of hostilities, the NICA succeeded in bringing plantations, mills, roads, and rail services on its territory back into operation and kicked off flow of exports. However, the NICA's authority was not completely acknowledged in the outer island. Local people of Sumatera and Kalimantan prospered from smuggling rubber to Singapore. The vast coastline of Sumatera and Kalimantan and uncooperativeness of the British authority in Singapore made it impossible for the NICA to stop unauthorized exports and imports. The NICA was under great pressure to restore exports in order to generate revenue which was desperately needed for rehabilitation of the Netherland after the World War II (Dick, 2002, p. 169). This pressure and the confidence of being able to defeat the Republican resistance in a single armed assault provoked the NICA to break the truce. Afterwards, the NICA launch the second military offensive on 18 December

1948.

This second military offensive caused more harm than good to the economy. In response to this second offensive, the Republican applied guerilla strategy by taking advantage of thick forest of the southern hills of Java as cover. The Republican could not match the NICA head to head due to limited military capabilities. Hence, the Republican attacked vulnerable Dutch establishments. The Republican sabotaged plantations, mills, dams, irrigations, roads and railways undefended by NICA. Factories and infrastructures, which were barely restored by NICA, were then abandoned. The damage during this second clash was more severe than during the Japanese occupation (Dick, 2002, p. 169). As a result, the economy, at least in Java, was paralyzed once again. The Dutch finally transferred full sovereignty to the Republican in December 1949 after fierce criticism by the UN. In addition, the United States also threatened to halt NATO and Marshall Plan aid which was essential for rebuilding the Dutch.

Dick (2002, p. 190) counted that the period between the transfer of sovereignty from the Dutch in 1949 until the beginning of the Soeharto era as a lost era in

Indonesian economic history. This period is known as the period of the *Orde Lama* (Old Order) in Indonesian history. The young and inexperienced government of Indonesia was too weak to be in charge of such vast territory with shattered economy and devastated infrastructure. In addition, the Round Table conference, where the transfer of sovereignty took place, compelled the new emergent government to shoulder an enormous financial burden of 4.5 guilders of public debt (Dick, 2002, p. 171). Furthermore, the government of Indonesia could not maximize the existence of well-established Dutch firms. The government of Indonesia was also obliged to safeguard Dutch interests in Indonesia. The government of Indonesia needed to consult the Dutch government before imposing any monetary or financial policy on these interests.

Unstable political environment was a further obstruction in building the economy of the new sovereign state. Under the Provisional Constitution of 1950, prime minister and cabinet were elected by and responsible to the parliament. Through the period of December 1949 to April 1957, seven cabinets were appointed and then thrown away by motion of no-confidence (Dick, 2002, p. 173). Only a few of them could last more than a year. Every time there was as shift in political alliance, the ruling parties became the marginal, and the majority of the parliament desired to form a new cabinet. As cabinets rose and fell, there was an absence of authority which made it difficult to implement any economic policy. This unstable political environment cost Indonesia a lost decade of economic development. This lost decade justifies why Indonesia was lagged behind the South Korea, Taiwan, Singapore and other members of ASEAN (Wie, 2002, p. 203).

Moreover, this circumstance at that time did not provide enough room for the government to work. Beside huge public debt, the colonial administration also left behind enormous budget deficit without reliable resources for generating revenue. The government of Indonesia could not rely on income tax because the tax base was very small. Tax base on 1957 was only half it was on 1939 (Dick, 2002, p. 175). Many businesses, which used to contribute to the colonial administration's revenue, were ruined throughout the armed conflict. In addition, businesses which were survived suffered losses. The income tax collected from the business sector was only 2% of total revenue (Dick, 2002, p. 175). The government of Indonesia could not expand the tax base as the people were too poor to bear extra financial burden. It left nothing else for the government but taxing exports and imports.

However, taxing exports and imports excessively compromised trade performance. As the government of Indonesia imposed higher rate for meeting increase in expenditure, exports and imports declined. Subsequently, revenue from taxing foreign trade declined as well. In 1951, foreign trade tax accounted for 70% of government's revenue, while in 1957 it declined to only 50% (Dick, 2002, p. 176). The escalation of rate also encouraged smuggling to avoid exports or imports tax and discouraged investment in the export sector. Smuggling activity used to be considered patriotic during colonial time, exporting natural products and importing military supplies for the Republican resistance. Nevertheless, this activity continued even after independence for private benefits, taking advantage of the infirmity of the new government.

Furthermore, since the beginning, the government of Indonesia embraced socialism as the basic principle in developing its economy (Dick, 2002, p. 172). Socialism, as the ideology of the republic, is preserve in the constitution and the state philosophy, *Pancasila*. Socialism was preferred because the founding fathers of the republic doubted laissez-faire economy, which is closely associated with colonialism. Moreover, at that time socialism was a popular ideology among leaders of newly independent states. Thus, it was clear that the government put the essence of socialism in formulating its economic policy.

The government of Indonesia put socialism into practice by taking over economic resources on behalf of nationalism and public welfare. Firms, which were used to be owned by the colonial administration, were seized with political sovereignty. These firms included banking, postal, railway, mining, and estates firms. Other assets, which were privately owned by Dutch nationals, such as tram, gas, and electricity firms were also nationalized. However, the government of Republic of Indonesia disbursed full compensation to the former owners. Other abandoned estates and industrial properties were placed under government control. In addition, the *Koninklijke Nederlandsch-Indische Luchtvaart Maatschappij* (KNILM), a subsidiary of the Dutch national airline KLM, was compelled into a joint venture to establish Indonesia's national airline, namely Garuda Indonesia Airways. The government of Indonesia could not immediately confiscate the assets of KNILM since Garuda Indonesia Airways still called for continuous transfer of technology from KNILM.

All those nationalized assets were then run by state owned firms. This policy was respected as the preeminent scheme to deliver wealth to the people under the spirit of nationalism and socialism. The establishment of these state owned firms was not only intended for generating revenue, but also to reduce the domination of Dutch firms through imperfect competition. Dutch firms were considered as representation of the bitterness of colonial exploitation. Afterward, the people and the government of Indonesia did not feel economically liberated as long as Dutch firms still dominated the economy. Therefore, in order to achieve their mission, the state owned firms were granted various privileges, which include trade credit from state owned banks and import or export licensing and government patronage. As a result, Dick (2002, p. 187) pointed out that nine state owned trading firms were put in charge of dealing with essential goods imports which regarded 70% of total imports. In addition, Dick (2002, p. 187) also mentioned that the seizure of Dutch owned plantation enabled the government of Indonesia to control about 50% of the output of the estate sector.

Further, the government also implemented import-substitution industrialization policy through the *Berdikari* (self-reliance) campaign. This campaign was launched by President Soekarno to emphasize his nationalism standpoint that Indonesia should free from any foreign influence. The president maintained that Indonesia should not depend on foreign assistance and should be self-reliance if Indonesia wanted to determine its own destiny. The government of Indonesia introduced import-substitution industrialization policy to support the campaign. This policy targeted large-scale key industry such as rubber milling, cotton spinning, cement, caustic soda, and coconut flour (Dick, 2002, p. 177). In this manner, the government imposed tariff and non-tariff barriers, to foreign trade. Consequently, this policy almost isolated Indonesia from the global economy. The non-tariff barriers ranged from import licensing to complete import ban for certain products. Initially the self-reliance campaign was funded solely by the government. Later, aid from the United States as well as from the communist bloc was also welcomed. By receiving aids from both sides, President Soekarno preserved Indonesia's stance as a member of non-aligned movement. This policy marked the continuity of protection policy, which was initiated by the colonial administration in 1940s as a response to the economic depression.

President Soekarno's inability to ease the economic burden from the shoulder of the Indonesian people intensified discontentment. President Soekarno’s failure to stabilize political circumstance and to cut down massive budget deficit hampered all short-lived cabinets of the new republic from delivering considerable economic improvement. Accordingly, during the *Orde Lama* the economy of Indonesia experienced retrogression. Even though the economy was not as devastated as under the Japanese occupation, the people had suffered enough. Therefore, when General Soeharto forced President Soekarno to step down there were almost no resistance. That was the end of President Soekarno's *Orde Lama* regime and the rise of the *Orde Baru* (New Order) under Soeharto as president.

2.3 Soeharto era

Regime change from President Soekarno to President Soeharto was followed by a transition of economic ideology. Although President Soekarno upheld the non-aligned notion as a political idea, the economic perspective of Indonesia during the old order was socialism. Moreover, President Soekarno’s disappointment of the United States support for *Pemerintah Revolusioner Republik Indonesia* (PRRI) insurgence in 1958 and The United States’s failure to meet committed aid made President Sukarno more inclined toward the communist bloc than the west. Furthermore, just before President Soekarno was overthrown, this disappointment grew into anti-western sentiment. Learning from the blunder of his predecessor, President Soeharto adopted a more pragmatic and nonideological perspective in restoring the economy of Indonesia (Wie, 2002, p. 203). Further, to contrast his regime with Soekarno's, President Soeharto introduced the term *Orde Baru* for his rule and labeled the one he replaced as *Orde Lama*.

This nonideological perspective made available more alternatives of economic policy to execute. Besides, it allowed the *Orde Baru* to conduct trade with all countries as well as to receive aid. Accordingly, the new government under President Soeharto's rule managed to reintegrate Indonesia with the global economy by gradually dismantling trade and investment barriers placed by the previous regime. The initial execution trade policy was the removal of partial import licensing system and export bonus in October 1966 (Hill, 2000, p. 239). The *Orde Baru* also improved investment climate by introducing Foreign Investment Law in 1967 and Domestic Investment Law in 1968. These investment laws reduced business uncertainty and improve investment protection. The key targets of these investment laws are not only fresh new investors, but also Dutch and Chinese entrepreneurs. These entrepreneurs were forced to evacuate away from Indonesia during the chaotic times in the 1950s. Further, the *Orde Baru* liberalized capital account transaction as well to allow more capital flow into and out of the country.

Additionally, reckoning the devastation of the economy left by the preceding regime, President Soeharto realized that the new administration would not last without foreign economic assistance, principally western countries and Japan (Wie, 2002, p. 195). The *Orde Baru* did not only need foreign economic assistance for instigating economic development but also for relieving the burden of foreign debt service. The preceding regime had accumulated a vast foreign debt obtained from both western and communist countries. The IMF considered Indonesia as one of Heavily-Indebted Poor Countries (HIPC) and recommended the Paris Club to assist Indonesia in restructuring its foreign debt. With the assistance of the Paris Club, the *Orde Baru* managed to reschedule foreign debt service to western countries and Japan in Paris in December 1966. The communist countries particularly the Soviet Union were reluctant to go along with the Paris

Club framework. Hence, debt service rescheduling negotiation with the communist countries was conducted separately. The negotiation with these communist countries was not as smooth as the one under Paris Club framework. Finally, *Orde Baru* was able to conclude foreign debt rescheduling agreement with the communist countries in 1971. Both debt rescheduling agreements were actually reached under similar terms. After the foreign debt service restructuring was completed, *Orde Baru* succeeded in inviting foreign aid. Foreign aid for Indonesia was coordinated by an aid consortium known as the Inter-Governmental Group on Indonesia (IGGI). IGGI, which was led by the Netherlands, comprised of western countries' biggest economies, Japan, and several international financial institutions including the World Bank, IMF, and Asian Development Bank.

As luck would have it, President Soeharto and his *Orde Baru* were blessed by two oil price booms which occurred in 1973/1974 and 1978/1979. This windfall reduced *Orde Baru*'s dependency on foreign trade tax so that it can relax its foreign trade policy. This policy change significantly encouraged imports and exports. The increase of foreign exchange earnings did not only relieve balance of payment and budget constraint, but also enabled *Orde Baru* to fund imports of capital goods, raw material, and intermediate inputs needed for supplying the rapid growing manufacturing sector. The increase in imports for the manufacturing sector was followed by an increase in import for consumption. Accordingly, trade performance at that time was much better than throughout the *Orde Lama*.

The increase in government revenue from oil taxes and oil profit share gave confidence to the *Orde Baru* to reverse its trade policy. This policy change was aroused further by economic nationalism sentiment. The people of Indonesia accused that the *Orde Baru* had sold out of the economy to Chinese entrepreneurs and foreign firms, especially Japanese, due to its earlier policy which was extraordinarily lenient toward new investment. This condition provoked anti-Chinese and anti-Japanese sentiment. In response to this sentiment and being enabled by the increase in government revenue, the *Orde Baru* revised its liberal and pro free market policies in favor of more interventionist policies. This policy change took the form of more active and direct role of the government in accelerating economic development (Wie, 2002, p. 208).

President Soeharto and his *Orde Baru* also became more confidence to launch import substituting industrialization policy (Wie, 2002, p. 209). It can be said that this policy inspired by similar policy launched by Indonesia's first Industry Minister, Sumitro Djojohadikusumo back in 1940s. The first phase of this import-substituting industrialization focused on manufacturing light consumer electric appliances and electronic devices to replace imported goods. This first phase was completed in mid-1970s. On the second phase, the Minister of State for Research and Technology, B.J. Habibie and the Minister of Industry, Soehoed put more emphasis on developing a range of hi-tech strategic products, such as aircraft and ship manufactures which were commissioned to state owned enterprises. Similar to those in the colonial time and the 1940s, import-substituting industries developed by *Orde Baru* also came under heavy protection from the government. At that time, Indonesia imposed the highest nominal as well as effective tariff rate for consumer goods manufacturing in Southeast Asian region (Wie, 2002, p. 222). This tariff barrier was also reinforced by a wide extent of non-tariff barrier. An example of this non-tariff barrier was the requirement for using local parts and components progressively. Several products, which had been completely manufactured in Indonesia, received total imports protection.

However, the implementation of the import substituting industrialization policy discontinued by the time the oil price boom subsided (Wie, 2002, p. 210). Three external factors constrained the government from pursuing import substituting industrialization policy. They were the falling of oil price which began in 1982, the Japan-United States currencies realignment which happened in 1985 and the recession which hit major industrial countries in the early 1980s. The fall of oil price plainly reduced government revenue from profit sharing and oil tax. The currencies realignment increased Japanese yen in which most of Indonesia's foreign debt was denominated. At the same time, the currencies realignment decrease US dollar in which Indonesia's export was trade. In this way, Indonesia earned less from its export, while in the same time the burden of its foreign debt got heavier. As a result, the currencies realignment deteriorated Indonesia's foreign debt service. The recession, which occurred in major industrial countries, made it worse as those countries reduced their demand of imported goods, including imports from Indonesia. This triple hindrance compelled the government of Indonesia to foster non-oil exports.

With the intention of developing industries which could enhance non-oil exports, the government launched a series deregulation package which removed trade and investment barriers gradually. For example, new foreign investments could directly come to Indonesia without being obliged to form a joint venture with local businesses. The first deregulation package which stimulated the shift from import-substituting industrialization toward export-oriented industrialization was implemented sluggishly due to opposition from several vested interest entrepreneurs (Wie, 2002, p. 211). This half-hearted policy in fact hurt downstream export-oriented firms. These firms had to purchase more costly materials from upstream protected firms owned by those vested interest entrepreneurs.

When the oil price dropped sharply in 1986, the government of Indonesia finally launched a full scale promotion of non-oil exports. Wie (2002, p. 211) noted that the oil price suffered a free fall to just 13 US dollar per barrel in 1986 from 25 US dollar per barrel in the preceding year. After the government’s policy shifted to export-oriented industrialization, materials for export-oriented firms could be acquired at world market price. The most noteworthy policy change was the 1986 deregulation. This policy abolished import duty and implemented drawback scheme for material used by firms which exported 85% of their production. Later, the threshold was lowered to 65% to stimulate more export growth. With the intention of promoting exports even further, the government strengthened non-oil exports competitiveness by gradually devalued the rupiah in September 1986. This devaluation certainly made exports from Indonesia even cheaper.

The second deregulation package was launched in May 1995. This deregulation package made the largest average tariff reduction since 1990 (World Bank, 1995, p. 39). Under this deregulation package customs duty tariff of 249 HS subheadings were abolished. In addition, customs duty tariff reduction of 15-35 percentage point was applied on 500 subheadings, 10 percentage points reduction was applied on 1,050 subheadings, and 5 percentage points reduction was applied on 4,500 subheadings. Moreover, this deregulation package also introduced the schedule of the following customs duty tariff cut. Tariffs below 20% were scheduled to be reduced to 5% by 2000, while Tariffs larger than 20% were scheduled to be reduced to 20% by 1998 and further to 10% by 2003. In addition, this deregulation package transformed non-tariff barriers in the form of restrictive import license of 69 HS subheadings into 5% to 10% tariff surcharges. Accordingly, national unweighted average tariff plus tariff surcharge was reduced to 15% from 37% in pre-1985, which indicated a slash of more than 50%. While weighted average tariff (by import value) was reduced to 9.5% from 22%.

2.4 Trade Agreements

2.4.1. ASEAN Free Trade Area

The series of deregulation package was not the only effort instigated by the government of Indonesia in liberating its foreign trade. In fact, those regulation packages were pursued simultaneously with triple-track multilateral, regional and bilateral trade negotiations. Indonesia carried out multilateral trade cooperation by actively involved in a series of trade negotiation under the General Agreement on Tariff and Trade (GATT) framework. The main outcome of those trade negotiations was Indonesia's accession to the World Trade Organization and Indonesia's commitments in reducing customs duty tariff rate. Alongside multilateral efforts, Indonesia was keenly engaged in establishing the ASEAN

Free Trade Agreement (AFTA) which promoted regional trade liberalization among members of the ASEAN. Further, Indonesia also established bilateral trade cooperation with its trading partners.

Members of the ASEAN realized that the largest volume of their foreign trade was conducted with each other. Intra-ASEAN trade is 24.5% of total ASEAN's foreign trade in 2009 (see Table 1). Then, it was understandable that the members of the ASEAN were very keen to strengthen trading relation among themselves before engaging other trading partners. The AFTA was established by members of the ASEAN as a trade bloc with the intention of making their manufacturing sectors more efficient and ready to compete in the global market. The AFTA works as a framework for eliminating or reducing barriers to trade, tariffs as well as non-tariff barriers, among the participating countries. The AFTA agreement was initially signed on 28 January 1992 in Singapore by six members, namely Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand. The AFTA entered into force on 1 January 1993. These six original signees were later joined by Vietnam which signed the agreement in 1995, Laos and Myanmar in 1997 and Cambodia in 1999. These four countries joined the AFTA as requirement when they became members of the ASEAN. Accordingly, today the AFTA comprises all ten members of the ASEAN.

Indonesia and other signatories of the AFTA agreed to implement Common Effective Preferential Tariff (CEPT) scheme in regulating flow of goods among them (Association of Southeast Asian Nations, 1992). CEPT works in a different way compare to common external tariff scheme which is employed by the European Union (EU). Under common external tariff scheme, members of the EU impose uniform tariff on goods imported to the union. Conversely, under CEPT scheme Indonesia as well as other participating countries of the AFTA is allowed to implement its own national tariff schedule on goods imported from outside the AFTA. Imported goods, which are originated from participating countries of the AFTA, can enjoy tariff rate of 0-5% under CEPT scheme. This tariff rate of 0-5% is applied to goods which have local AFTA content at least 40%. Fulfillment of this local content requirement is verified by government of the exporting country.

CEPT scheme administers all manufactured products, but Indonesia and other participating countries of the AFTA have options for excluding imports from

CEPT scheme. Indonesia can choose not to apply CEPT scheme on three cases, explicitly general exclusion, sensitive agricultural products, and temporary exclusion (Association of Southeast Asian Nations, 1992). The General Exclusion List covers products which cannot be imported since Indonesia believes that their importation might cause detriment to national security; public morals; protection of human, animal or plant life and health; and protection of artistic, historic or archaeological articles. Indonesia put 96 tariff lines in this General Exclusion List. That is 1.098% out of 8.737 tariff lines which Indonesia included in CEPT scheme. Sensitive agricultural products include agricultural raw materials and unprocessed products which are classified under Chapter 1 through 24 of the Harmonized Commodity Description and Coding System (HS) and agricultural products which have been minimally processed and slightly changed from their original form. Temporary Exclusion List comprises products which are excluded from CEPT scheme on a temporary basis. When Indonesia considers that products under temporary exclusions can compete regionally then they are included in CEPT scheme.

Furthermore, tariff reduction under CEPT scheme is scheduled in two tracks, specifically the Normal Track and the Fast Track (Association of Southeast Asian Nations, 1992). The Normal Track entails Indonesia to reduce customs duty tariffs above 20% to 20% within 5 to 8 years since the establishment of the AFTA, specifically by 1 January 2001. Then, these tariffs were reduced further to 0-5% in 7 years. Besides, Indonesia is also compelled to reduce customs duty tariffs of 20% or below to 0-5% in 10 years, specifically by 1 January 2003. The Fast Track also requires Indonesia to reduce customs duty tariffs above 20% to 0-5% within 10 years, explicitly by 1 January 2003. Additionally, Indonesia is obliged to reduce customs duty tariffs of 20% or below to 0-5% within 7 years, explicitly by 1 January 2000. This Fast Track covered 15 clusters of products, namely vegetable oil, cement, chemicals, pharmaceuticals, fertilizer, plastics, leather products, rubber products, ceramics and glass products, gems and jewelry products, textiles, pulp and paper, wooden and rattan furniture, copper cathodes, and electronics. Even though overall customs duty tariffs reduction to 0-5% was originally targeted to be completed by 1 January 2008, Indonesia and other participating countries continuously moved it forward. Actually, by the year 2002, customs duty tariffs reduction to 0-5% was already concluded for Indonesia and five original signatories. Vietnam completed customs duty tariffs reduction to

0-5% in 2006, Laos and Myanmar completed it in 2008, while Cambodia completed it in 2010. Today, Indonesia, together with other participating countries, is working to reduce almost all customs duty tariffs further to 0%, which will be completed by 2015 for six original signatories and 2018 for the other four countries.

When Indonesia signed the legal text of the AFTA, Indonesia was actually more committed to customs duty tariff reduction than required by the AFTA. By 2010, Indonesia has abolished customs duty tariff of more than 98.79% of 8.737 HS 10-digit level tariff lines in this framework. Indonesia only excluded 96 tariff lines under general exclusion scheme. Goods which are included in this general exclusion are alcoholic beverages and concentrates for alcoholic beverages; drugs; waste products; as well as firearms and munitions. Customs duty tariff of many sensitive agricultural products which were previously excluded from CEPT scheme had been abolished by 2010. There are only 9 tariff lines left in the exclusion list for sensitive agricultural products. These tariff lines cover several rice products. Indonesia will still impose 30% customs duty tariff for these products until 2014. In 2015, these customs duty tariffs will be reduced to 25%.

Initially Indonesia and other members of the ASEAN considered textile and apparel as sensitive products. When CEPT scheme was initiated, Indonesia and these other members put most of tariff lines for textile and apparel in the temporary exclusion list (Association of Southeast Asian Nations, 1992). The government of Indonesia opened 10 years window for the domestic textile and apparel industries to improve their competitiveness. The government of Indonesia supported this policy by imposing Most-Favored-Nation (MFN) tariffs for textile and apparel until 2002. After that, customs duty tariffs for textile and apparel were abolished entirely.

2.4.2. The World Trade Organization

After completing regional trade negotiation under AFTA framework, Indonesia moved farther by engaging in trade negotiation under the Uruguay Round. The Uruguay Round was the 8^{th} round of a series of multilateral trade negotiation which was conducted under the GATT framework. Major achievement of the Uruguay Round was the agreement on the establishment of the WTO. On 1 January 1995, Indonesia officially became a member of the WTO. However, Indonesia had been actually a signatory of the GATT since 24 February 1950. Today, 153 countries and customs territories work hand in hand to advance free trade globally. In the near future, 31 other countries, which currently hold status as observer, will join the WTO and advance free trade even further.

In promoting free trade under the WTO framework, Indonesia along with member countries puts a number of fundamental principles into practice, namely without discrimination, freer, predictable, more competitive, and more beneficial for less developed countries (World Trade Organization, 2003, pp. 10-13). The first principle is implemented in two treatments, specifically MFN and national treatment. MFN treatment rules that all members of the WTO should grant MFN status to each other and a member of the WTO should not discriminate other members of the WTO. If Indonesia grants a special favor, for instance lower tariff rate, to another member of the WTO, this special applies to all members of the WTO. National treatment governs that Indonesia, as a member of the WTO, should not discriminate foreign products. Accordingly, Indonesia should treat imported product and locally manufactured product as equal. The second principle indicates that Indonesia and all members of the WTO will continuously pursue reduction of tariff rate. The third principle gives confidence to foreign companies, investors, and government that trade barriers, both tariff and non-tariff barriers, should not be raised arbitrarily. After Indonesia makes tariff rate and market-opening commitments, it is bound to those commitments. Indonesia can only change those commitments after negotiating with the most concerned members of the WTO. This could mean Indonesia need to give compensation for loss of trade to them. More competitive principle is devoted to upholding open, fair and undistorted competition by discouraging unfair practice such as government discriminatory procurement, export subsidies as well as dumping practices. The last principle denotes that the WTO understands problems which are faced by less developed countries. Thus, the WTO recognizes that Indonesia and other less developed members need flexibility in time to implement WTO's provisions. The WTO together with developed members also provides technical assistances for developing institutional framework in less developed members. In addition, developed members give market-access commitments on goods exported from Indonesia and other less developed members.

Indonesia has liberalized the majority of its foreign trade under the WTO framework. So far, Indonesia has submitted 95.8% of all tariff lines under the WTO framework (World Trade Organization, 2011). That means Indonesia does not apply the WTO bound tariffs to only 4.2% of all tariff lines. Simple average of bound customs duty tariffs which Indonesia applies is 37.1% (World Trade Organization, 2011). Indonesia is committed to applying customs duty tariff no higher than this bound tariff. In addition, simple average of MFN applied customs duty tariff which Indonesia applies is 6.8% (Bank Indonesia, 2011). Indonesia applies this lower tariff to all its MFN counterparts.

Textile and apparel are two of the hardest-debated products under the WTO framework. Before 1995, negotiations regarding textile and apparel are conducted bilaterally among contracting parties of the GATT under the Multifibre Arrangement (MFA). Under the MFA, importing country discriminated exporting countries by granting different quotas. After 1995, the WTO implements Agreement on Textile and Clothing (ATC) which abolished the quota system. The ATC gradually integrated textile and apparel trade into the WTO framework.

Indonesia still applies high customs duty tariff for textile and apparel under the

WTO framework. Simple average of Indonesia's final bound customs duty tariff for textile and apparel are 26.4% and 35.0% respectively (World Trade Organization, 2011). These final bound customs duty tariffs are exceptionally high. In addition, simple average of Indonesia's MFN customs duty tariff for textile and apparel are 9.3% and 14.3% respectively (World Trade Organization, 2011). These MFN customs duty tariffs are lower than the final bound customs duty tariffs. Nevertheless, they are still quite high. Moreover, Indonesia's textile and apparel imports from MFN partners, which enjoy 0% customs duty tariff, are only 1.0% and 0.6% respectively. These facts underline that, under the WTO framework, Indonesia's textile and apparel industries are still heavily protected. Even imports of these two products from MFN partners are still subject to high customs duty tariff. It is also worth to note that apparel industry is more protected than textile industry.

Subsequent to its accession to the WTO, Indonesia did not stop pursuing trade liberalization process. Indonesia along with other members of ASEAN strengthened regional trade cooperation by expanding free trade agreement with several trading partners in the region. These free trade agreements are agreement establishing the ASEAN-China Free Trade Area (ACFTA) which was signed on 4 November 2002, agreement establishing the ASEAN-Japan Comprehensive Economic Partnership (AJCEP) which was signed on 8 October 2003, agreement establishing the ASEAN-Korea Free Trade Area (AKFTA) which was signed on 24 August 2006, agreement establishing the ASEAN-Australia-New Zealand Free Trade Area (AANZFTA) which was signed on 27 February 2009, and agreement establishing the ASEAN-India Free Trade Area (AIFTA) which was signed on 13 August 2009. Besides those regional free trade agreements, Indonesia and Japan has bilaterally signed the agreement establishing Indonesia-Japan Economic Partnership (IJEP) on 20 August 2007.

2.4.3. ASEAN-China Free Trade Area

China is the ASEAN's principal trading partner. Thus, the ACFTA is considered as the most prominent free trade agreement for Indonesia and other ASEAN countries. In 2009, the ASEAN's foreign trade with China contributed 11.6% of its total foreign trade, explicitly 178.185 billion US dollar (See Table 1.1 on Chapter 1). This total ASEAN foreign trade consisted of 81.591 billion US dollar ASEAN's exports to China and 95.594 billion US dollar ASEAN's imports from

China. This amount of foreign trade volume put the ACFTA as the third largest free trade area after the European Economic Area and the North American free trade area. In addition, the ACFTA combines two of the largest economies in the world. The implementation of the ACFTA adds together 7,790 billion US dollar of nominal GDP in 2010. Moreover, the ACFTA opens larger market for all participating countries. In 2010, the total population of ten members of the ASEAN plus China creates a market of 1,926 million people. This sizeable market put the ACFTA as the largest free trade area in term of population. Thus, it was clear why Indonesia along with other members of the ASEAN and China worked so hard to instigate the agreement establishing this free trade area.

Customs duty tariff reduction, which Indonesia was obliged to implement under the ACFTA, was conducted in four tracks, namely Early Harvest Program, Normal Track, Sensitive List and Highly Sensitive List (Association of Southeast Asian Nations, 2004). These tracks differ in term of their pace of tariff reduction. China launched the Early Harvest Program to accelerated customs duty tariff reduction under the ACFTA framework even before the onset of the ACFTA. Through this program, Indonesia and other members of the ASEAN attained early access to China’s huge domestic market prior to the establishment of the ACFTA. Customs duty tariffs reduction, which followed the Normal Track, was conducted in a shorter period compared to the Sensitive List and the Highly Sensitive List. This Normal Track is divided further into Normal Track 1 and Normal Track 2. Indonesia made a commitment to reduced customs duty tariff to 0-5% for at least 40% of tariff lines under the Normal Track 1 no later than 1 July 2005. Then, Customs duty tariff of 60% of these tariff lines were reduced to 0-5% no later than 1 July 2007. Indonesia was committed to abolishing customs duty tariff of all tariff line under this Normal Track by 1 January 2010. Furthermore, the ACFTA gave flexibility for Indonesia to keep customs duty tariff for goods which did not exceed 150 tariff lines. These tariff lines fall under the Normal Track 2. Customs duty tariff of these exceptional tariff lines shall be abolish no later than 1 January 2012. Thus, by 1 January 2012 all goods, which Indonesia placed in the Normal Track list, have become duty free.

Moreover, Indonesia placed goods which were intended to have a slower pace of customs duty tariff reduction in the Sensitive List. Goods which were intended to have even slower pace of customs duty tariff reduction than those under the

Sensitive List were place in the Highly Sensitive List. The ACFTA allows Indonesia to place up to 400 tariff lines at the HS 6-digit level and 10% of the total import value in the Sensitive Track. For goods which were placed in the Highly Sensitive List, Indonesia was allowed to place up to 100 tariff lines or 40% of the total number of tariff lines which Indonesia placed in the Sensitive Track, whichever is lower. Indonesia placed 304 and 47 tariff lines at the HS 6-digit level in the Sensitive List and the Highly Sensitive List respectively. Indonesia made a commitment to reduce the number of tariff lines in the Sensitive Track to 20% by 1 January 2012. Then, Indonesia shall reduce customs duty tariff of all tariff lines in this track to 0-5% by 1 January 2018. As for the Highly Sensitive List, Indonesia made a commitment to reduce the number of tariff lines in this track to 50% by 1 January 2015.

When the ACFTA was commenced, Indonesia and China had completed negotiation on 592 tariff lines at the HS 10-digit level which were regarded as 6.77% of all tariff lines under the Early Harvest Program (Association of Southeast Asian Nations, 2004). At that time, Indonesia placed 6.682 tariff lines at the HS 10-digit level or 76.47% of all tariff lines in the Normal Track 1

(Association of Southeast Asian Nations, 2004). Under the Normal Track 2, Indonesia placed 474 tariff lines at the HS 10-digit level or 5.42% of all tariff lines (Association of Southeast Asian Nations, 2004). In addition, 642 tariff lines at the HS 10-digit level which signified 7.34% of all tariff lines were put in the Sensitive List and 251 tariff lines at the HS 10-digit level which signified 2.87% of all tariff lines were put in the Highly Sensitive List (Association of Southeast Asian Nations, 2004). Only 96 tariff lines at the HS 10-digit level which represented 1.09% of all tariff lines were excluded from the ACFTA framework (Association of Southeast Asian Nations, 2004). These tariff lines were put in the General Exclusion List.

Regarding textile and apparel products, Indonesia placed most tariff lines which cover these products under the Normal Track 1. Indonesia placed 982 tariff lines at the HS 10-digit level or 84.51% of all tariff lines which cover textile products in the Normal Track 1 (Association of Southeast Asian Nations, 2004). There are 107 tariff lines at the HS 10-digit level or 9.21% of all tariff lines which cover apparel products under the Normal Track 2 (Association of Southeast Asian Nations, 2004). Customs duty tariff of 5% is imposed on imports of these products until 2011. After that, customs duty tariff for this product will be abolished. Additionally, 93 other tariff lines at the HS 10-digit level or 6.28% of all tariff lines which cover apparel products were placed in the Sensitive List (Association of Southeast Asian Nations, 2004). Customs duty tariff of 15% is maintained on imports of these products. It is obvious that the government of Indonesia is convinced that apparel industry still needs protection while textile industry can compete with other manufacturers in the ACFTA. The government of Indonesia is also convinced that only half of firms in the apparel industry which can compete internationally after 2011. The other half still needs high protection without any time frame.

2.4.4. ASEAN-Japan Comprehensive Economic Partnership and Indonesia-Japan Economic Partnership

After completing the ACFTA, it was natural that Indonesia along with other members of the ASEAN to turn to Japan, their second largest trading partner in the region. ASEAN-Japan trade volume is only slightly lower than ASEAN-China trade volume. In 2009, the ASEAN's imports from Japan were 9.6% of total the ASEAN imports while the ASEAN's exports to Japan were 11.4% of total the

ASEAN exports. On the other hand, the ASEAN is indispensable for Japan since the ASEAN as a group is Japan’s second largest trading partner after China. That is why members of the ASEAN and Japan were so eager to complete this economic partnership.

Customs duty tariff reduction under the AJCEP framework is more complicated than the ACFTA. While there are only three categories of goods under the ACFTA, there are 12 categories in the schedule of customs duty tariff elimination for Indonesia under the AJCEP. One category regulates customs duty tariff of goods under this category remain at their rate at the date of entry force of the AJCEP. Customs duty tariff of these goods shall not be increased or decreased. Indonesia included 329 tariff lines at the HS 10-digit level under this category (Association of Southeast Asian Nations, 2008a). There are 10 categories which regulate different schedules of customs duty tariff elimination. The period of customs duty tariff elimination ranges from as the date of entry force of the partnership to 17 years later. Customs duty tariffs under these categories are eliminated regularly in equal annual installments, except one category where the elimination is conducted in specified percentage. Indonesia eliminated customs duty tariff of 4.047 tariff lines at the HS 10-digit level the date of entry force of the partnership (Association of Southeast Asian Nations, 2008a). Another category regulates that several tariff lines are excluded from tariff commitment. That means Indonesia can increase or decrease customs duty tariff of goods under this category without consulting other parties. Indonesia put 868 tariff lines at the HS 10-digit level under this category.

Under the AJCEP, Indonesia and Japan have agreed to categorize textile and apparel as products whose customs duty tariff was abolished as from the date of entry into force of the AJCEP (Association of Southeast Asian Nations, 2008a). It is apparent that both Indonesia and Japan agreed that textile and apparel trade will be a one way trade. Indonesia will export and Japan will import textile and apparel.

After engaging in the AJCEP as a regional free trade agreement, the government of Indonesia and Japan believe that it is necessary to enhance economic partnership of the two countries bilaterally. This aspiration was manifested as Prime Minister Shinzo Abe of Japan and President Susilo Bambang Yudhoyono, of Indonesia signed the agreement establishing IJEP on 20 August 2007 in Jakarta. For Indonesia, this agreement is extraordinarily crucial as this is the first free trade agreement which Indonesia established bilaterally. In addition, the two countries took into account the AJCEP framework in establishing this bilateral economic partnership.

Japan and Indonesia have enjoyed close diplomatic relation for a long time. By the time the IJEP entered into force in 2008, Indonesia and Japan celebrated 50 years of their diplomatic relation. Japan has played a key role in Indonesia’s economic development since the early 1970s. Japan contributed to Indonesia’s economic development through overseas development aid, foreign direct investment, bilateral trade, and through transfer of technology and expertise. On the period from 1967 to 1999, Indonesia was recognized as the largest recipient of Japanese overseas development aid. During that period, Indonesia received approximately 3,432 billion yen. This accounted for 18.6% of Japanese overseas development aid. Japan is also recognized Indonesia’s largest creditor with loans of around 186.38 trillion rupiah.

Japan, in addition, is one of Indonesia's principal trading partners. Bilateral trade between the two countries has guaranteed Japan a stable supply of natural resources. Japan has been the destination of nearly 70% of Indonesia's fuel, metal and mineral exports in the last three decades. Indeed, in 2010 Japan was the destination of the largest share of Indonesia's export (World Trade Organization, 2012). At that year, the value of Indonesia's export to Japan was 25,781.8 million US dollar which account for 16.37% of the total value of Indonesia's export (BPS-Statistics Indonesia, 2011).

In term of imports, Japan ranked three among the major origins of Indonesia's import in 2010 (World Trade Organization, 2012). The value of Indonesia's imports from Japan was 16,965.8 million US dollar which account for 12.57% of the total value of Indonesia's imports (BPS-Statistics Indonesia, 2011). Indonesia's imports from Japan are mostly industrial inputs, capital goods and machineries.

Moreover, bilateral trade between Indonesia and Japan keeps increasing. In 2010, it also noted that there was an upsurge of Indonesia's import from Japan as well as

Indonesia's exports to Japan. At that year, the value of Indonesia's import from Japan increased 41.98% from 2009 (BPS-Statistics Indonesia, 2011). On the other hand, the value of Indonesia's exports to Japan increased 27.95% (BPS-Statistics Indonesia, 2011).

Customs duty tariff reduction under the IJEP framework is almost as complicated as the AJCEP framework. While tariff lines under the AJCEP framework is classified into 12 groups, tariff lines under the IJEP framework is classified into 10 groups. The period of customs duty tariff elimination under the IJEP framework is similar to similar to the AJCEP framework. The period of customs duty tariff elimination ranges from as the date of entry force of the partnership to 17 years later.

Nonetheless, the IJEP framework is more favorable to Indonesia than the AJCEP. Many customs duty tariffs will be eliminated from the base rate to free in more equal annual installments under the IJEP framework. For example, Customs duty tariff, which should be eliminated in four equal annual installments under the AJCEP framework, will be eliminated in 16 equal annual installments under the

IJEP framework.

Moreover, Indonesia gives similar treatment to textile and apparel products in the IJEP framework and the AJCEP framework. Customs duty tariffs covering textile and apparel products were eliminated as the date of entry force of each framework.

2.4.5. ASEAN-Korea Free Trade Area

Undoubtedly, South Korea has become one of the major players in the Asia Pacific region. The economy of South Korea ranks 15 in the world by nominal GDP and ranks 11 by purchasing power parity (IMF, International Monetary Fund, 2012). Currently, with 3.9% GDP growth, South Korea is still one of the fastest growing developed countries in Asia-Pacific. In addition, South Korea is the seventh largest exporter and the tenth largest importer in the world. These facts incite Indonesia and other members of the ASEAN to accept President Roh Moo Hyun's proposal regarding the AKFTA. After three years of negotiation, the agreement on the establishment of the AKFTA was signed in 2006.

The AKFTA takes the same approach of customs duty tariff reduction as ACFTA. Customs duty tariff reduction under the AKFTA framework is also conducted under Normal Track, Sensitive List and Highly Sensitive List (Association of Southeast Asian Nations, 2006). Customs duty tariffs of goods in the Sensitive List are reduced slower than those in the Normal track, while those in the Highly Sensitive List are reduced even slower than the Sensitive List. Under the AKFTA framework, Indonesia is allowed to place 10% of all tariff lines and 10% of the total value of imports from Korea or the ASEAN member countries as a whole in the Sensitive List. Indonesia is also allowed to classify further these tariff lines in the Sensitive List into the Highly Sensitive List. In the Highly Sensitive List Indonesia can place 200 tariff lines at the HS 6-digit level or 3% of all tariff lines and 3% of the total value of imports from Korea or the ASEAN member countries as a whole.

The AKFTA framework required Indonesia to complete customs duty tariff reduction for at least 50 % of the tariff lines placed in the Normal Track to 0-5 % by 1 January 2007 (Association of Southeast Asian Nations, 2006). Further reduction was required to be completed by 1 January 2009 for at least 90 % of the tariff lines. Subsequently, Indonesia was required to complete reducing tariffs for all tariff lines by 1 January 2010. However, the AKFTA gives flexibility for Indonesia to maintain several tariff lines placed in this track which do not exceed 5% until 1 January 2012.

Indonesia is obliged to complete customs duty tariff reduction of the tariff lines placed in the Sensitive Lists to 20% by 1 January 2012 (Association of Southeast Asian Nations, 2006). Later, Indonesia should complete customs duty tariff reduction of tariff lines placed in this lists to 0-5% by 1 January 2016. Indonesia has placed 885 tariff lines at the HS 10-digit level in this list.

Moreover, Indonesia divided tariff lines placed in the Highly Sensitive Lists in two groups. Customs duty tariff of tariff lines in the first group shall be reduced to be not more than 50% by 1 January 2016 (Association of Southeast Asian Nations, 2006). Indonesia placed 21 tariff lines in this group. Customs duty tariff of tariff lines in the second group shall be reduced by not less than 20% by 1 January 2016. Indonesia placed 381 tariff lines at the HS 10-digit level in this group. In addition, Indonesia has 133 tariff lines which are excluded from tariff concession under the

AKFTA framework (Association of Southeast Asian Nations, 2006).

It is noticeable that the government of Indonesia believes that the AKFTA is not a threat to domestic textile and apparel industries. Indonesia placed tariff line for textile and apparel products in the Normal Track. Therefore, by 2010 Indonesia had eliminated customs duty tariff regarding all textile and apparel products under the AKFTA framework.

2.4.6. ASEAN-Australia-New Zealand Free Trade Area

Indonesia and other members of the ASEAN completed regional free trade agreement by establishing the AANZFTA in 2009. Currently, the ASEAN's foreign trade with Australia and New Zealand is not as large as the ASEAN's foreign trade with China, Japan or South Korea. However, these two countries are indispensable trading partners of the ASEAN. Geographically, these two countries are very close to members of the ASEAN, especially Indonesia. Therefore, as postulated by the gravity model, foreign trade between the ASEAN and these countries will grow faster than foreign trade between the ASEAN and other trading partners.

Through the AANZFTA Agreement, ASEAN, Australia and New Zealand effectively create a free trade area of over 600 million people with a combined GDP of 3.8 trillion US dollar (IMF, International Monetary Fund, 2012). Intra-regional trade among ASEAN, Australia and New Zealand grows at an average of 16 per cent annually since the commencement of the FTA negotiations in 2005. With the removal of barriers to trade under the AANZFTA framework, further growth and expansion of intra-regional trade can be expected. Taken together, Australia and New Zealand comprise ASEAN's sixth largest trading partner. On the other hand, the ASEAN as a group is the second and the third largest trading partner of Australia and New Zealand, respectively.

The agreement on the establishment of the AANZFTA stipulates that this agreement entered into force by 1 July 2009. However, Indonesia ratified this agreement on 11 November 2011. Subsequently, Indonesia began implementing the AANZFTA by 10 January 2012.

Customs duty tariff reduction under the AANZFTA does not classify tariff lines into groups. All tariff lines are placed in one tariff reduction schedule. This schedule exhibits tariff reduction of each tariff line for every year from 2009 until 2025. After 2005, customs duty tariff reduction can be negotiated again by the AANZAFTA contracting parties. By the time Indonesia put the AANZFTA into effect, Indonesia had abolished customs duty tariff of the majority of the tariff lines. There are 8,122 tariff lines at the HS 10-digit level which became duty free at that point (Association of Southeast Asian Nations, 2009a). In addition, there are only 117 tariff lines at the HS 10-digit level which Indonesia excluded from the AANZFTA framework (Association of Southeast Asian Nations, 2009a).

Regarding textile and apparel products, the government Indonesia believes that the AANZFTA might pose a threat to domestic manufacturers. The government did not abolish customs duty tariff of all tariff lines which cover textile and apparel products. There were 718 tariff lines at the HS 10-digit level covering these products which became duty free by 10 January 2012 (Association of Southeast Asian Nations, 2009a). That only accounted for 57.62% of all tariff lines covering these products. The government of Indonesia still imposes customs duty tariff for the rest 42.38% of all tariff lines. Customs duty tariff as low as 3%

is imposed on 433 tariff lines at the HS 10-digit level (Association of Southeast Asian Nations, 2009a). 127 tariff lines out of these 433 tariff lines cover textile products while the other 306 tariff lines cover apparel products. These tariff lines will be duty free by 2013. Moreover, customs duty tariff as high as 10% and 15% are still imposed on 6 and 89 tariff lines at the HS 10-digit level respectively (Association of Southeast Asian Nations, 2009a). All of these 95 tariff lines cover apparel products. Customs duty tariff of these tariff lines will be reduced gradually. Customs duty tariff of 10% will be reduced to 8% by 2014 and to 5% by 2015. Finally, these tariff lines will be duty free by 2020. Customs duty tariff of 15% will be reduced to 13% by 2013, to 10% by 2014, to 8% by 2015 and finally to 5% by 2016. This 5% customs duty tariff will be maintained until 2025. After 2025, this customs duty tariff can be renegotiated by the AANZAFTA contracting parties. The government of Indonesia saw that the AANZAFTA might pose a higher risk to domestic apparel industry than textile industry.

2.4.7. ASEAN-India Free Trade Area

After completing intra-regional trade partnership, Indonesia and other members of the ASEAN moved forward to establish region-to-region trade partnership.

Trading partner, which was chosen for this region-to-region trade partnership, was India. India is considered as one of the Asian miracles. The IMF noted that currently the economy of India ranks eleven in the world by nominal GDP (IMF, International Monetary Fund, 2012). In term of purchasing power parity, the economy of India is even more spectacular as it ranks three in the world (IMF, International Monetary Fund, 2012). Free trade area among members of the ASEAN and India would have a significant impact on the global economy. This free trade area is one of the largest in the world with a huge market of 1.8 million people. Besides, this free trade area created an enormous economy with a total of combined GDP of 2.8 trillion US dollar.

Similar to other free trade agreement which has been established by members of the ASEAN, the AIFTA also classified tariff lines based on their customs duty tariff reduction schedule. Under the AIFTA framework, these tariff lines were classified as Normal Track, Sensitive Track, and Highly Sensitive Track (Association of Southeast Asian Nations, 2009b). Products, which were excluded from customs tariff duty concession under the AIFTA, were also classified in an exclusion list. However, customs duty tariff of product placed in this exclusion list will be reviewed annually with a view of improving market access.

Tariff lines, which were placed in the Normal Track, were those which will become duty free first. This track was divided into two tracks, namely Normal Track 1 and Normal Track 2. Tariff lines, which were placed in the Normal Track 1, will become duty free by 2013. Tariff lines, which were placed in the Normal Track 2, will become duty free by 2016. Indonesia placed 3,651 tariff lines at the HS 10-digit level the Normal Track1 and 409 tariff lines at the HS 10-digit level in the Normal Track 2 (Association of Southeast Asian Nations, 2009b).

Customs duty tariff of tariff lines, which were placed in the Sensitive Track and the Highly Sensitive Track, will be reduced gradually. Those, which were placed in the Sensitive Track, will have their customs duty tariff reduced to no more than 5% by 31 December 2016. Indonesia placed 3,486 tariff lines at the HS 10-digit level in this track (Association of Southeast Asian Nations, 2009b). Those, which were placed in the Highly Sensitive Track, will have their customs duty tariff reduced to 50% or by 50% or by 25% by 31 December 2019. Indonesia will reduce by 25% customs duty tariff of 533 tariff lines at the HS 10-digit level placed in this track.

Other than those tracks, the AIFTA also stipulated exceptional arrangement for special products. These special products refer to crude palm oil (CPO), refined palm oil (RPO), coffee, black tea and pepper imported to India. Customs duty tariff reduction of these special products will take place from 2010 until 31 December 2019. Final customs duty tariff will be 37.5% for CPO and RPO, 50% for pepper and 45% for coffee and black tea (Association of Southeast Asian Nations, 2009b).

Furthermore, the government Indonesia believes that the AIFTA may cause a serious threat to textile and apparel industries. Indonesia only placed a small number of tariff lines covering textile and apparel in the Normal Track. Specifically, Indonesia placed 120 tariff lines in the Normal Track 1 and 71 tariff lines in the Normal Track 2. The majority of tariff lines covering these products are placed in the Sensitive Track and the Highly Sensitive Track, explicitly 427 and 152 tariff lines respectively. Indonesia even excluded 250 tariff lines covering these products from the AIFTA framework and placed them in the Exclusion List.

Chapter summary

This chapter clarifies that, throughout the history, Indonesia has implemented protectionism and import substitution policies several times. Even before Indonesia acquired its independence in 17 August 1945, these policies had been put into practice by the Dutch colonial administration and the Japanese military authority. Dutch colonial administration instigated *Crisis Invoer Ordonantie* in response to the 1930s great depression. For different reasons, the Japanese military authority in Indonesia implemented import substitution policy during Japanese occupation from 1942 to 1945. This policy was implemented in response to allied navy blockade during the World War II.

This chapter also explicates that, after Indonesia's independence, the first two presidents experimented with these policies. For bolstering nationalism, President Soekarno launched Berdikari campaign in 1960s. This campaign was intended to promote national self-reliance by putting into action protectionism and import substitution policy. Later, President Soeharto also implemented these policies. Oil price boom in 1970s gave extensive confidence to President Soeharto's administration to detach from the global economy.

Moreover, this chapter mentions that these policies failed to deliver the expected results. In fact, these policies made the economy of Indonesia even worse. It is very unfortunate that Indonesia has to learn the drawbacks of these policies in the hard way.

This chapter describes that Indonesia's foreign trade policy becomes more inclined toward free trade. Currently, Indonesia has concluded the agreement on the establishment of the WTO and agreements on the establishment of several free trade areas. These free trade areas are AFTA, ACFTA, AJCEP, IJCEP, AKFTA, AANZFTA and AIFTA. As these free trade agreements involve Indonesia's largest trading partners, practically the majority of Indonesia's foreign trade has been liberalized.

Lastly, this chapter notes that the government of Indonesia is exceptionally careful in opening domestic market of several products. Some of these products are still under heavy protection. It is true that the government of Indonesia is committed to reduce or eliminate customs duty tariff of these products gradually. Nonetheless, this customs duty tariff reduction is conducted in very slowly. It gives manufacturers of these products time to deal with their comparative disadvantage. Some other products are even completely excluded from these free trade agreements.

Textile and apparel, as this chapter remarks, are among products whose trade liberalization process is carefully carried out. The government of Indonesia applies different foreign trade policies regarding textile and apparel products to different trading partners. Under the AFTA, the AJCEP and AKFTA frameworks, the government of Indonesia believes that it is unnecessary to protect textile and apparel industry. Under other free trade area frameworks, these products are considered as sensitive or highly sensitive products. Consequently, trade of these products is burdened with heavy tariff, which will be reduced in a long time. Some products are even excluded completely from the AIFTA framework.

Chapter 3 Literature Review

This chapter offers a brief review of previous studies which become stepping stones for this research. The first section of this chapter goes over several studies which measure import competition. The next section revisits previous studies which correlate import competition with the number of worker and wages. Afterward, several studies, which elaborate the concept of efficiency, are presented. The last section talks about studies which analyze the correlation between import competition and efficiency.

3.1. Measuring import competition

Import competition is put in the center stage of this research. All Analyses conducted in this study examine the impact of import competition on several dependent variables. Accurate assessment of import competition becomes an obsession in this research. Therefore, reviewing previous studies, which are based on import competition measurement, is tremendously crucial.

Unfortunately, it appears that scholars do not have universal agreement on the definition of import competition. It seems that the concept of import competition is still being developed. There are numerous studies which came up with different ways in defining import competition in the literature. As a result, there are various methods in measuring import competition. Nevertheless, these studies are useful in comprehending the nature of import competition.

Some of the scholars use import share as the proxy of import competition. Mion and Zhu (2010, p. 7), for example, defined import share as the ratio of import over import plus domestic production. This concept compares imports to the whole dimension of the domestic market. In a sense, this concept might diminish the bearing of import competition as the denominator of this ratio gets larger.

Ekholm, Moxnes, and Ulltveit-Moe employed different concept of import competition in investigating the impact of a change in international competitive pressure on industrial performance and restructuring. Ekholm, Moxnes, and Ulltveit-Moe introduced exports in their definition of import competition beside imports and domestic production. Ekholm, Moxnes, and Ulltveit-Moe (2012, p.

112) defined import competition as the ratio of imports over domestic production minus exports plus imports. This concept of import competition goes well with condition of a country which has a considerable amount of exports.

Van Beveren and Badia used applied another definition of import competition in analyzing the effects of import competition on firms' total factor productivity (TFP) in nine European countries. In this study, Van Beveren and Badia excluded exports in defining import competition. In addition, Van Beveren and Badia did not include import in the denominator. Thus, Van Beveren and Badia (2010) defined import competition simply as the ratio of imports over domestic production. By removing import from the denominator of the ratio, Van Beveren and Badia increase the bearing of import competition. However, this concept is not suitable in a country exports its goods to a large extent.

These concepts of import competition, for one reason or another, do not fully suit the condition of Indonesia's textile and apparel industries. Fortunately, they provide useful insights for defining import competition. Thus, by making some adjustments on these three concepts, this research comes up with a concept of import competition which suits the condition of Indonesia's textile and apparel industries.

3.2. Correlating import competition to number of worker and wages

Studies on the impact of import competition on the number of workers and wages have been done by many scholars. Although these previous studies do not arrive at the same conclusion, they provide important directions for this study.

Salant (1960) demonstrated the short-run effects of unilateral reduction of import barriers on domestic employment in the United States. Salant expressed the coefficients which correlated import growth to the number of workers. These coefficients were expressed as numbers of workers per million-dollar increase of imports. Salant observed effects of import expansion on the number of workers in 72 industries. In this study, Salant used 1953 price as the base price. Salant concluded that the gross decreases in the number of workers resulting from the increase of imports had a median value of 115 workers per million-dollar increase of imports.

Grossman (1987) developed a method to determine the extent to which import competition had been responsible for worker displacements and wage movements in specific, trade-impacted sectors. Grossman's method involved econometric estimation of reduced-form, industry-level, as well as wage and number of worker equations. This study observed nine manufacturing sectors in the United States by using monthly data from 1969 through 1979. The result indicated that wages were not very sensitive to import competition, whereas the responsiveness of the number of workers varied widely across sectors.

Revenga (1992) investigated the impact of increased import competition on the number of workers and wages in the United States manufacturing sector. Revenga maintained that a change in import competition shifted industry product demand. The impact of import competition was transmitted further to the domestic market. In this market, import competition shifted labor demand in the same direction as domestic product demand. Revenga also suggested that wage adjustments dampened the response of the number of workers. Revenga used ordinary least square (OLS), two stage least square (2SLS) and instrumental variable (IV) method. For industry import price variable, Revenga used a quarterly fixed-weight

Laspeyres index of transactions prices based on a 1980 import market basket. As measures of industry employment, Revenga used the number of production workers and average person-hours per week. For the wage variable, Revenga used average hourly earnings for production workers. Revenga also used average hourly earnings in services and average hourly earnings in trade as an alternative measures of wages. For capturing cyclical fluctuations in demand, two aggregate measures were used, namely the aggregate quarterly unemployment rate and quarterly real GDP. Revenga discovered that changes in import prices had a significant effect on the number of workers and wages. Revenga also offered a useful insight into methodological issues. Revenga found that OLS estimates seem to be significantly downward biased.

Suarez (1998) examines the effect of international competition on the number of workers and wages in seven Swiss manufacturing sectors from 1966 to 1986. Suarez used the seemingly unrelated regression (SUR) method which takes into account the correlation between error terms. Suarez concludes that a majority of the estimated coefficients reflect a negative impact of import competition on the number of workers and wages. However, the main result suggested that all elasticities had relatively small magnitude.

Shippen (1999) examined the effects of import competition on the number of workers and wages in the United States textile and apparel industries by using two models. In the first, the United States is considered as a price taker and following Grossman (1986) OLS is used. In the second model, the U.S. is assumed as a price-setter and following Revenga (1992) 2SLS is used. The results were mixed. The results of the OLS suggested foreign competition played a significant role in determining the number of workers and hours worked in the apparel industry. Textile industry, however, was not significantly affected by import prices in hours worked, number of workers, or wages. The results from the 2SLS which used weighted exchange rates to instrument the index import price variable were more consistent with these results, even though the standard errors were large. The coefficients of the import price variable with respect to the number of workers and hours worked were larger in these estimations for both industries than in the OLS. However, they were not significant. The results of 2SLS on the impact of import competition on wages were small and insignificant.

Oscarsson (2000) examined the effect of import competition on the number of workers and wages in 63 industries within the Swedish manufacturing sector between 1975 and 1993. As variables representing number of workers and wages, Oscarsson used the number of production workers, the number of hours worked by production workers, the number of non-production workers, wage sum for production workers (excluding payroll taxes), and wage sum for non-production workers excluding payroll taxes. Oscarsson also introduced a one-year long of lag. Oscarsson use generalized least square (GLS) assuming the variances of the observations are unequal (heteroscedasticity). In order to take away inflationary trend, Oscarsson divides all nominal prices by the CPI. Oscarsson concludes that import competition had a significant negative effect on the employment of both production and non-production workers.

Bhahmani-Oskooee and Chakrabarti (2003) examined whether the number of workers and wages in the United States manufacturing sector exhibited any long run relationship with import competition. In this study, Bhahmani-Oskooee and Chakrabarti used cointegration analysis. The results of this study are mixed. The overall cointegration analysis supported the results reported in Revenga's (1992) panel study. Nonetheless, this study indicated that, in the long run, a negative correlation between import price and the number of workers or a negative correlation between import price and wages were sector sensitive.

Joo (2002) examined the impact of increasing import competition on the number of workers and wages. Joo used aggregated annual data of 28 ISIC three digit manufacturing industries in Hong Kong, South Korea, Singapore and Taiwan. Mainly based upon Revenga's work, Joo's empirical analysis included 2SLS, OLS and IV (weighted producers' price as instrumental variables). This study found both the number of workers and wages were relatively sensitive to increasing import shares. This study also discovered the largest decline in the number of workers and wages is experienced by low capital-intensive industries. Moreover, Joo also revealed that OLS estimates show the existence of endogenous problem between import shares, employment and wages.

Tomiura (2003) examined the impact of imports on labor demand in 390 Japanese manufacturing industries. Tomiura used IV as wages, import price, and import share were considered as endogenous variables. Tomiura also used OLS for comparison to IV. Tomiura concluded that Japanese employment was significantly responsive to import prices changes and that the employment sensitivity varied positively depending on the industry import share.

Chakrabarti (2003) examined whether the number of workers and wages in the United States manufacturing sector exhibited any long-run relationship with import competition. Chakrabarti used a multivariate panel cointegration analysis in this study. Chakrabarti observed 12 two digit SIC manufacturing industries from the 3rd quarter of 1982 to the 4th quarter of 1992. The results of this study indicated that the United States manufacturing number of workers did not bear a long-run relationship with import competition, but manufacturing wages did. While the long-run, Chakrabarti found that the correlation between import price and manufacturing wages was sector sensitive. Panel estimation revealed a highly significant negative correlation between import price and manufacturing wages.

Sasaki (2007) analyzed the effects of import competition on the labor market in Japan by focusing on the relationship between import prices and manufacturing number of workers. Sasaki used dynamic generalized method of moments (GMM) to avoid problems stemming from simultaneity bias. Sasaki found that the number of workers declined by approximately 0.6 percent in the short run for each percent of import price decrease. Sasaki concluded import competition should be considered as an important cause for the harsh employment condition since the 1990s.

3.3. Defining efficiency

Productivity and efficiency are undoubtedly two of the most fundamental concepts in economics. Generally speaking, productivity refers to a measure of output which can be produced for a given unit of resource input (Lipsey, Courant, & Ragan, 1999, p. 195). It can also be said that the productivity of a firm is the comparison of the output it produces and the input it uses (Coelli, Rao, O'Donnel, & Battese, 2005, p. 2). From both descriptions, it can be inferred that productivity improved when a firm can raise output from the same amount of input.

Efficiency, as a comparison, refers to a process of production which converts a set of inputs into a designated output. Efficiency requires that valuable inputs not be wasted (Lipsey, Courant, & Ragan, 1999, p. 275). The term productivity and efficiency are closely related. Even sometimes people use them interchangeably. However, they are not actually the same thing. Ray (2004) differentiated these two terms by defining productivity as a descriptive measure of performance, while efficiency is defined as a normative measure of performance. Productivity describes performance of a firm in term of ratio outputs over inputs. Efficiency, on the other hand, measures performance of a firm by comparing it with the maximum attainable performance. Coelli, Rao, O'Donnell, and Battese (2005, pp. 3-5) decomposed efficiency into four types of efficiency, i.e. technical efficiency, scale efficiency, technical change and allocative efficiency.

The difference between productivity and those four types of efficiency can be explained by using s-shaped production function curve (Coelli, Rao, O'Donnel, & Battese, 2005, p. 3). All points above the curve represent the input-output combinations which are unobtainable with current technology. Whereas, all points on the curve display maximum output which can be produced by using the given input. In other words, these points show the input-output combinations which are technically efficient. A production method is called technically efficient if there are no other ways to produce a given output which use less of at least one output without using more of any other inputs (Lipsey, Courant, & Ragan, 1999, p. 188). Thus, all other points below the curve stand for technically inefficient productions. Inefficient firms, which are pictured below the curve, can improve their technical efficiency by adopting better production method or technology. Then, they can move closer until finally they are on the curve.

Despite the fact that all production methods, which are denoted by points on the curve, are technically efficient, their productivity is different. In addition, only one of them has the highest productivity. If rays are pointed from the origin to each point, the slope of the rays signify the productivity of each point. The point which holds both properties of technically efficient as well as highest productivity is the one whose ray has the steepest slope. As the line is the only one which does not cross the curve and only touch it on one point, the line is known as tangent line. Coelli, Rao, O'Donnell, and Battese (2005, p. 4) maintained that firms which are technically efficient can improve their productivity by exploiting scale efficiency. That means they move along the production function curve until they arrive at the highest productivity point.

In addition to the depictions of productivity and efficiency presented above, it is necessary to involve technical change. Technical change is an additional source of productivity change due to improvement of technology. Eventually, it is possible that firms apply better production method owing to new invention. As a result, those firms are able to raise their productivity. When technical change comes up, the production function curve shifts upward. It means that several points, which are previously unattainable, become possible because of the new production method.

Furthermore, the discussion of productivity and efficiency needs to address the issues of cost of production. Beside those two ways mentioned earlier, a firm can also to boost its productivity by introducing allocative efficiency. Allocative efficiency requires that a given quantity of output is produced at minimum cost (Coelli, Rao, O'Donnel, & Battese, 2005, p. 5). In order to attain allocative efficiency, a firm needs to adjust the combination of inputs so as to obtain their lowest prices (Azad, 2010, p. 28).

So far the above discussion has talked about four ways of which firms can improve their productivity. Particularly, they can increase their efficiency by obtaining technical efficiency, by exploiting scale efficiency, by pursuing technical change, and by introducing allocative efficiency. The combination of these four ways delivers an improvement to overall firm productivity.

3.4. Correlating import competition to efficiency

The idea of linking import competition to efficiency has been an important topic in the debate regarding trade liberalization. Many scholars have produced various arguments which support the notion that import competition affects firm level efficiency. This part of Chapter 3 is devoted to discussing several arguments which were used to correlate import competition and efficiency in earlier studies.

Min (1999) believed that the relation between import competition and domestic producers' behavior follows the import discipline hypothesis. This hypothesis states that tougher import competition will confine market power of domestic producers. Lower import price will certainly bring down domestic price which will reduce the price-cost margin of domestic producers. With the intention of regain previous level of price-cost margin, producers have to reduce cost since they do not have control over price anymore. When import competition becomes extremely tough, the ability to trim down cost becomes a matter of survival for them.

Earlier work of Tybout, de Melo, and Corbo (1990) was based on two arguments. Firstly, quite similar to Min (1998), Tybout, de Melo, and Corbo argued that tougher import competition removes monopoly power from domestic firms. In a market where competition is limited by entry barriers, domestic firms are likely to exploit monopoly power and tend to have rent seeking behavior. Consequently, as Tybout, de Melo, and Corbo explained these firms are short of incentive to engage in technical efficiency and/or scale efficiency. Secondly, Tybout, de Melo, and Corbo maintained that removal of trade protection may cause a decline in industry's average production costs. Trade liberalization will intensify competition. Consequently, inefficient small firms are forced to face the choice between taking up scale efficiency and being driven out of business. Consequently, small firms with high average production cost will not exist any longer or will produce at minimum efficient scale with lower average production cost. At the end, average production cost of the whole industry could be lowered.

Haddad (1993), also brought forth a line of reasoning, i.e. X-efficiency, capacity utilization, economies of scale, increased competition, and technological catch-up. Haddad explained that by exposing domestic producers to foreign competition, trade liberalization compels managers to give extra effort in reducing opportunity cost of leisure in order to diminish X-inefficiency. If those managers fail to do so, the firms would surely be eliminated from the competition. In line with that effort, managers are obliged to maximize capacity utilization by maintaining that installed equipment is fully used. By doing so, managers might be able to boost up output, achieve economies of scale and lowered average production cost. Accordingly, managers then need to expand their market by exporting their products. Moreover, Haddad also clarified that by removing protection, trade liberalization suppresses monopoly practices in the market. As a result, trade liberalization helps to diminish monopolistic inefficiency. Lastly, trade liberalization creates a harsh environment where the survival of a firm is determined by the level of technology it utilized. In this environment, managers need to monitor every occurrence of new innovation.

Generally, Njikam (2003) also used the arguments discussed above. Njikam, in addition, also saw that trade reform could induce efficiency improvement by encouraging better resource allocation and better access to inputs and intermediate goods. Trade reform stimulates market to guide resources allocation through comparative advantage mechanism. Owing to incentive for cost discipline, producers will specialize and produce goods which they have a comparative advantage. Thus, by exploiting their comparative advantage, these producers could attain cost efficiency requirement.

Chapter Summary

There is no definition of import competition which is accepted by the majority of scholars. Nonetheless, most of them define import competition as a ratio of import share. There are several variations of this definition which take account of domestic production and exports. These variations are determined by characteristics of countries which are studied.

Many scholars have studied the correlation between import competition and employment by using different methods. Some of these methods are OLS, 2SLS, IV, GLS, cointegration analysis, panel cointegration analysis and GMM. Most of them found negative impact of import competition on the number of workers and wages. However, the significance of the impact varied. In addition, the impact was sector sensitive.

Factory owners and managers can improve their efficiency by pursuing four measures. First, they can improve their technical efficiency by utilizing better production method which increases their output over input ratio. They can improve scale efficiency too by adjusting their scale of production so that all inputs are optimally used. They can also obtain technical change by applying new technology which allows them to operate more efficiently. In addition, they can exploit allocative efficiency by lowering their cost of inputs.

Some scholars claim that import competition has a positive impact on efficiency. They support this idea by using several arguments, such as import discipline hypothesis, monopoly removal, X-efficiency, capacity utilization, economies of scale, increased competition, technological catch-up, and better resource allocation. In a nutshell, they maintain that import competition forces factory owners and managers to improve their efficiency. Otherwise, they would be driven out of business.

Chapter 4 Theoretical framework

This chapter presents the basic idea of this research. This chapter commences by deliberating theory and concept upon which this research is developed. Based on these theory and concept, research models are developed. Then, null and alternative hypotheses tested in this research are defined by using these models. The models and the hypotheses are presented in this chapter as well.

4.1 Underlying theories

This research is developed based on the theory of comparative advantage. This theory was first explained by David Ricardo in his 1817 book ‘On the Principles of Political Economy and Taxation’. For most economists, this theory is usually referred to the Ricardian model of international trade. David Ricardo’s idea of comparative advantage was inspired by the theory of absolute advantage which came earlier.

The theory of absolute advantage was ordinarily introduced by Adam Smith in his legendary 1776 publication ‘An Inquiry into the Nature and Causes of the Wealth of Nations’. The theory of absolute advantage was developed based on the concept of absolute cost. In developing this theory, Adam Smith defined absolute cost by using solely labor productivity. A country is said to have an absolute advantage if it has lower absolute cost owing to higher labor productivity. This country has the ability to produce one unit of a certain good or service by using the less amount of input, specifically labor input, compared to other countries (Krugman, Obstfeld, & Melitz, 2012, p. 59). Accordingly, this country has the ability to produce goods or services at lower absolute cost.

The theory of absolute advantage can be utilized to determine whether foreign trade exists or not. A country may have an absolute advantage in producing some goods or services and it may have an absolute disadvantage in producing other goods or services. In this case, foreign trade takes place. Each country will produce only goods and service which it has an absolute advantage. At the same time, each country will import goods and services which it has an absolute disadvantage. Alternatively, it is possible that a country has an absolute advantage in producing all goods and services. When this happens, only the country which has an absolute advantage in producing all goods and services will gain benefit from foreign trade. The other country will not be benefited by foreign trade. As a result, foreign trade will not occur.

David Ricardo expanded Adam Smith's theory of absolute advantage by introducing the concept of opportunity cost. Opportunity cost is a one of the key concept in economics. It is often used to explain the relationship between scarcity and choice. In the theory of comparative advantage, opportunity cost is the number of unit of a product which can be produced by using a certain amount of resource which is reallocated in order to produce one unit of another product (Krugman, Obstfeld, & Melitz, 2012, p. 55). Opportunity cost of newspaper in term of magazine, for example, is the amount of the magazine which can be printed by using a particular amount of paper which is actually used to print one newspaper. That is to say opportunity cost is defined by cost of production of two goods or services.

A country is said to have a comparative advantage in producing one goods if the opportunity cost of producing these goods in term of other goods is less than the same opportunity cost in other countries (Krugman, Obstfeld, & Melitz, 2012, p. 56). Indonesia is said to have a comparative advantage in producing television, for instance, if the opportunity cost of producing televisions in term of computers is lower than the same opportunity cost in Japan. Alternatively, it can also be said that Japan has a comparative advantage in producing computers, since the opportunity cost of producing computers in term of television is lower than the same opportunity cost in Indonesia. When this case happens, Indonesia will produce televisions and import computers from Japan. Conversely, Japan will produce computers and import televisions from Indonesia. This is the kind of foreign trade pattern which is assumed by the theory of comparative advantage. The theory of comparative advantage claims that both countries will gain benefit from foreign trade.

David Ricardo’s theory of comparative advantage does not only determine the pattern of foreign trade between countries, but it also predicts the direction of industry specialization of a country. This theory maintains that a country will produce only goods and services it has a comparative advantage, and it will import goods and services it has a comparative disadvantage. Each country has its own specific characteristics which distinguish it from other country. It follows that each country has a comparative advantage in producing some goods and services while other countries have a comparative advantage in producing other goods and services. For that reason, foreign trade will always take place as there is no country which has a comparative advantage in producing all goods and service. For the same reason, industry specialization will occur in every country. Each country will devote its all limited valuable resources in producing goods and services it has a comparative advantage. Consequently, resources will be reallocated from industries which manufacture goods and services with a comparative disadvantage to other industries, which manufacture goods and services with comparative advantage. In a nutshell, this theory upholds the corollary that every country should specialize. When they do, this theory alleges that every country will gain benefit from economies of scale.

Nonetheless, the theory of comparative advantage is not beyond doubt. Indeed, many scholars have opposed this theory. Most of these scholars cast doubts that everyone will gain benefit from foreign trade. Initial critics came from the benefactors of mercantilism and economic nationalism. These scholars argued that even though some industries are initially burdened with comparative disadvantage, the government should shield and support these industries until they become globally competitive instead of forsaking them. They frequently produce infant industry arguments to support their cause. Any industry must deal with comparative disadvantages in its early stage. Newly constructed domestic industry surely cannot compete with more established foreign competitors. Hence, the government should give this industry an opportunity to transform comparative disadvantage into comparative advantage.

The most notable opposition to the theory of comparative advantage was maintained by Raúl Prebisch and Hans Wolfgang Singer in their renowned Prebisch-Singer Thesis. This thesis postulated that developing countries suffer from deteriorating term of trade with developed countries (Cohn, 2003, p. 126). Developing countries typically export primary products with relatively constant demands. In contrast, developed countries export manufactured goods with increasing demands. Consequently, the term of trade between developing countries and developed countries deteriorates over time. Exports of developing countries will become cheaper while exports of developed countries will be more expensive. Thus, Prebisch-Singer Thesis claimed that industrial specialization might deliver despair instead of increasing welfare.

Additionally, economist Ha Joon Chang (2002) recently contended that all major developed countries utilize the theory of comparative advantage for maintaining their superiority over developing countries. Chang alleged that, in the past, developed countries get rich by exploiting protectionism policy. In fact, in the early modern period many developed European countries embraced mercantilism to a certain degree. Chang argued that today these developed countries forbid developing country to employ protectionism policy by utilizing the theory of comparative advantage. As a result, developing countries will remain lagged behind developed countries.

These critics on the theory of comparative advantage stimulate scholars to seek breakthrough in formulating better foreign trade policy. One of the newly introduced innovations is the concept of competitive advantage. This concept suggests that a country or a firm should ensure market leadership by producing high quality goods to sell at a high price. In order to do that, this country or firm should develop its unique feature or combination of unique features, which enable it to outperform its present and potential competitors. These features may include abundant resources; lower wages; highly skilled workers; advanced technology; as well as sound business strategy.

Porter (1990, p. 37) placed competitive advantage at the heart of firm's positioning within industries. This positioning does not only include strategies concerning the firm's products or target customer group, but it actually involves the firm's total approach to competing (Porter, 1990, p. 37). Furthermore, competitive advantage is distinguished into two types, namely lower cost and differentiation (Porter, 1990, p. 37). Lower cost requires a firm to have higher efficiency in designing, manufacturing and marketing comparable product than its competitors. On the other hand, differentiation demands a firm to deliver unique and superior values to the customers. These values can be translated as high product quality, unique features, or opportune after-sales service.

A firm creates its competitive advantage from the way it organizes and performs discrete activities (Porter, 1990, p. 40). These activities are instigated by designing the product, followed by purchasing supplies, manufacturing, marketing and promotion, and concluded by providing after-sales service. These activities form a value chain which contributes to customer value. The firm will be able to gain competitive advantage over its competitors, if it can deliver comparable customer value in two ways. First, the firm can offer a lower price by performing the activities along the value chain more efficiently. Alternatively, it can differentiate by performing these activities in a unique manner which creates greater customer value and ask for a higher price.

A firm, in addition, develops its competitive advantage by perceiving better ways to compete within an industry (Porter, 1990, p. 45). These better ways can be expressed as a modification in product design, manufacturing perfection, new approach in marketing and promotion, and improved method in product distribution. Porter (1990, p. 45) recognized that the changes in these ways are conducted in moderately gradual development rather than radical transformation. These changes are resulted from a buildup of minor comprehending and correction rather than from a major technological breakthrough.

Moreover, Porter (1990, p. 19) maintained that competitive advantage is created and sustained through a highly localized process. Differences in national economic structures, values, cultures, institutions, and histories contribute profoundly to competitive success. The home base will be the location of many of the most productive jobs, the core technologies, and the most advances skills. The presence of the home base in a nation also stimulates the greatest positive influence on other linked domestic industries, and leads to other benefits to competition in the nation's economy.

In spite of those critics, foremost international organizations, especially the WTO, maintains strong faith in the theory of comparative advantage (World Trade Organization, 2010). These organizations continuously promote comparative advantage as the basis for the world trade. Today, comparative advantage has become the dominant economic ideology in many countries, including Indonesia. Therefore, it would be appropriate to use the theory of comparative advantage as the underlying theories in this research.

This research acknowledges that industrial specialization, which is expected by the theory of comparative, will drive reallocation of resources. This reallocation will occur from industries which manufacture goods and services with comparative disadvantage to other industries which manufacture goods and services with comparative advantage. This research affirms that this resources reallocation is costly and painful for capital owners and workers. These capital owners and workers require plenty of time and money to make the necessary adjustment, or in many cases to start all over again, in the new industries.

Moreover, this research also acknowledges that, in many cases, resources do not need to be reallocated. Industries, which manufacture goods and services with comparative disadvantage, might only need to be restructured to improve their competitive advantage. This restructuring can be done by exploiting lower cost and differentiation, as suggested by Porter. Resources, then, are not required to be reallocated to industries which manufacture goods and services with comparative advantage. Accordingly, capital owners and workers do not need to bear a lot of suffering. Restructuring an industry would certainly less costly and less painful than reallocating its resources. However, this restructuring requires time and money as well. Therefore, it is also appropriate to use the concept of competitive advantage to support the use of the theory of comparative advantage in this research.

Consequently, this research affirms that resources reallocation and industry restructuring surely need meticulous foreign trade policy. Hopefully, such policy may be able to alleviate the impact of foreign trade. Thus, the government of Indonesia needs to come up with foreign trade policy which supports capital owners and workers in making necessary adjustments. On the other hand, this policy needs to be able to stimulate efficiency as well. In view of the theory of comparative advantage and the concept of competitive advantage, this research is devoted to assisting the government of Indonesia in formulating an appropriate foreign trade policy, particularly regarding textile industry and apparel industry.

4.2. Research models

In this section, two research models upon which this research is conducted are presented. The first model describes the impact of import competition on the number of workers and wages in Indonesia’s textile and apparel industries. The second model expresses the impact of import competition on technical and scale efficiencies in Indonesia's textile and apparel industries.

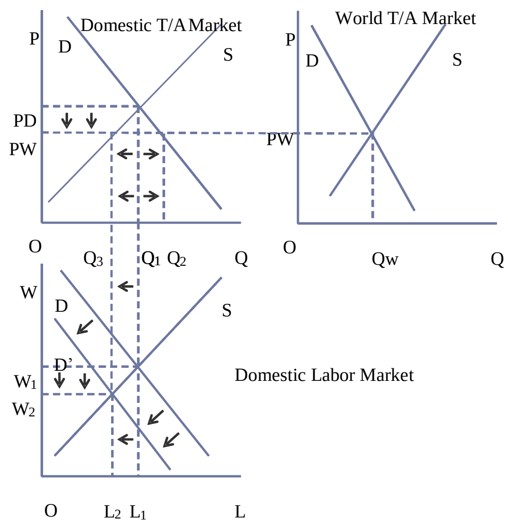
The correlation between import competition and the number of workers and the correlation between import competition and wages can be demonstrated through supply and demand models depicted in Figure 1. If Indonesia's domestic textile and apparel markets are in an autarky economy, the equilibrium price Pd of textile and apparel are determined by quantity supplied and quantity demanded at Q1.

Thereafter, when Indonesia's domestic textile and apparel markets are connected to the world textile and apparel market, domestic price will equalize with world price Pw following the law of one price. In the case of import competition, world price Pw is lower than the domestic price Pd. Thus, domestic price will decrease. Consequently, consumers raise textile and apparel demand from OQ1 to OQ2. Producers in Indonesia, however, reduce their supply from OQ1 to OQ3. The disparity between risen demand and reduced supply, Q3 to Q2, is filled up by imports.

The impact of import competition is then passed on to Indonesia's labor market.

Labor demand is derived from products demand. When products demand rises labor demand too rises, and vice versa. The impact of the fall of products demand shifts the labor demand curve to the left. Accordingly, the number of workers and wages fall. The model shows that the number of workers falls from OL1 to OL2 and wages falls from OW1 to OW2. By using these models, it can be presumed that import competition will make the number of workers and wages fall.

Figure 4. 1 Supply and demand models



Source: author's conception

Subsequently, it can be assumed that higher import competition will decrease the number of workers and wages in Indonesia's textile and apparel industries. Thus, in this research, import competition is expected to have a negative correlation with the number of workers and wages.

Unlike the impacts of import competition on the number of workers and wages discussed earlier, the impacts of import competition on technical and scale efficiencies are rather difficult to graph. This problem occurs as import competition does not directly affect technical and scale efficiencies. The level of technical and scale efficiencies are determined by the ratio of input over output in a production process. Import competition affects managerial decision on selecting the desired ratio of input over output.

Instead of focusing attention to domestic labor market, it is time to examine how factory domestic textile and apparel producers' response toward import competition. Opportunely, some parts of Figure 4.1 can be used to illustrate the impacts of import competition on technical and scale efficiencies. When Indonesia joins the world textile and apparel market, domestic price will fall to equalize with world price. Falling price certainly cuts down price-cost margin of domestic textile and apparel producers. Additionally, shrinking market share diminishes these producers' ability to control price. These producers can do nothing else but to reduce their cost of production to restore the previous level of price-cost margin. In some cases, import competition is so severe that domestic price becomes lower than the cost of production. When this condition applies, restoring the previous level of price-cost margin would be quite infeasible. Cost of production reduction might only help these producers to stay on business.

Cost of production reduction surely necessitates increasing efficiency, specifically technical and scale efficiencies. In order to improve their technical efficiency, these producers should increase their capacity utilization, modify their production scheme, or use better inputs. This measure requires that these producers should be able to produce more output by using the same amount of input. Alternatively, these producers should be able to produce the same amount of output by using less input. Accordingly, these producers will be able to increase the ratio of output over input. This also means these producers can operate at lower cost per unit. Hopefully, these producers might be able to regain some of their lost market share.

These producers can improve their production efficiency further by exploiting scale efficiency. These producers should adjust their scale of production to obtain the appropriate combination of inputs. Suppose that these producers' have excess of workers while their machinery utilization is optimum. These producers can improve their scale efficiency by installing new machinery. This option allows these producers to increase their scale of production. Alternatively, these producers can improve their scale efficiency by reducing the number of workers labor. This option decreases the scale of production of these producers. Both options produce better combination of inputs, namely the number of workers and machinery. Accordingly, these producers can operate at even lower cost per unit.

In this research, therefore, it is assumed that import competition compels Indonesia's textile and apparel producers to improve their technical and scale efficiencies. Thus, import competition is expected to have a positive correlation with technical and scale efficiencies.

4.3. Research hypotheses

This part of Chapter 4 reviews the hypotheses employed in this research one by one. Undoubtedly, hypotheses are the one of the most crucial element of this research. Punch (1999, p. 39) defined hypothesis as a predicted answer to a research question. From this definition, it can also be said that hypothesis is a proposed explanation for perceptible phenomena. This definition, in addition, implies that hypothesis corresponds to a certain research question. Hence, the number of hypotheses should always match the number of research questions.

In this part of Chapter 4, null and alternative hypotheses are developed from each research presented in Chapter 1. Null hypothesis is the hypothesis which is tested in a hypothesis test (Stock & Watson, 2003, p. 680). In hypothesis testing, this hypothesis is taken as true when there is not enough empirical evidence to prove that it is false. In this testing, data are used to find irrefutable evidence to prove that the null hypothesis is false (Wooldridge, 2009, p. 842). Null hypothesis is often denoted by H_0. Alternative hypothesis, on the other hand, is the hypothesis against which the null hypothesis is tested (Wooldridge, 2009, p. 835). Stock and Watson (2003, p. 672) asserted that the alternative hypothesis is accepted to be true when the null hypothesis is found to be false. Alternative hypothesis is commonly symbolized by H_1. Both hypotheses are the subjects in hypothesis testing. Hypothesis testing is a procedure to determine whether a specific hypothesis regarding a population is true or false by using observed samples (Stock & Watson, 2003, p. 678).

The first research question raised in Chapter 1 asks whether import competition affect the number of workers in Indonesia's textile industry. Based on this research question, the first null and alternative hypotheses are developed. The first null hypothesis affirms that import competition does not affect the number of workers in Indonesia's textile industry. Correspondingly, the first alternative hypothesis affirms just the opposite that import competition does affect the number of workers in Indonesia's textile industry. In addition, the correlation between import competition and the number of workers in Indonesia's textile industry is expressed as $txwkr_t = \alpha_0 + \alpha_1\ txcpt_{t-1} + \alpha_2\ txwkr_{t-1} + \varepsilon_t$. Thus, the first null hypothesis is expressed as $H_{01} : \alpha_1 = 0$ and the first alternative hypothesis is expressed as $H_{11} : \alpha_1 \neq 0$.

The same logic is applied to develop the other null hypotheses in this research. The second null and alternative hypotheses are derived from the second research question. This research question asks whether import competition affect the number of workers in Indonesia’s apparel industry. Thus, the second null hypothesis affirms that import competition does not affect the number of workers in Indonesia’s apparel industry. The second alternative hypothesis correspondingly affirms just the opposite. Afterward, the correlation between import competition and the number of workers in Indonesia’s apparel industry is expressed as $apwkr_t = \beta_0 + \beta_1\ apcpt_{t-1} + \beta_2\ apwkr_{t-1} + \varepsilon_t$. Hence, the second null hypothesis is expressed as $H_{02} : \beta_1 = 0$ and the second alternative hypothesis is expressed as $H_{12} : \beta_1 \neq 0$.

The third null and alternative hypotheses are derived from the third research question. This research question asks whether import competition affects wages in Indonesia’s textile industry. Accordingly, the third null hypothesis asserts that import competition does not affect wages in Indonesia’s textile industry. The third alternative hypothesis correspondingly asserts the inverse. Likewise, the correlation between import competition and wages in Indonesia’s textile industry is denoted as $txwge_t = \gamma_0 + \gamma_1\ txcpt_{t-1} + \gamma_2\ txwge_{t-1} + \varepsilon_t$. Hence, the third null hypothesis is denoted as $H_{03} : \gamma_1 = 0$ and the third alternative hypothesis is denoted as $H_{13} : \gamma_1 \neq 0$.

The fourth null and alternative hypotheses are similarly derived from the fourth research question. This research question asks whether import competition affect wages in Indonesia's apparel industry. In consequence, the fourth null hypothesis asserts that import competition does not affect wages in Indonesia's apparel industry. Correspondingly, the fourth alternative hypothesis asserts the inverse. In addition, the correlation between import competition and wages in Indonesia's apparel industry is denoted as $apwge_t = \delta_0 + \delta_1\ apcpt_{t-1} + \delta_2\ apwge_{t-1} + \varepsilon_t$. Hence, the fourth null hypothesis is denoted as $H_{04} : \delta_1 = 0$ and the fourth alternative hypothesis is denoted as $H_{14} : \delta_1 \neq 0$.

Moreover, the fifth null and alternative hypotheses are developed from the fifth research question. This research question asks whether import competition affects technical efficiency in Indonesia's textile industry. The fifth null hypothesis, accordingly, maintains that import competition does not affect technical efficiency in Indonesia's textile industry. The inverted statement is maintained by the fifth alternative hypothesis. Further, the correlation between import competition and technical efficiency in Indonesia's textile industry is written as $txtcf_t = \zeta_0 + \zeta_1\ ln$

$txcpt_{t-1} + \zeta_2\ txtcf_{t-1} + \zeta_3\, cri + \varepsilon_t$. Thus, the fifth null hypothesis is written as $H_{05} : \zeta_1 = 0$ and the fifth alternative hypothesis is written as $H_{15} : \zeta_1 \neq 0$.

By the same token, the sixth null and alternative hypotheses are developed from the sixth research question. This research question asks whether import competition affects technical efficiency in Indonesia's apparel industry. The sixth null hypothesis, accordingly, maintains that import competition does not affect technical efficiency in Indonesia's apparel industry. The inverted statement is maintained by the sixth alternative hypothesis. Further, the correlation between import competition and technical efficiency in Indonesia's apparel industry is written as $aptcf_t = \eta_0 + \eta_1\ ln\ apcpt_{t-1} + \eta_2\ aptcf_{t-1} + \eta_3\, cri + \varepsilon_t$. Thus, the sixth null hypothesis is written as $H_{06} : \eta_1 = 0$ and the sixth alternative hypothesis is written as $H_{16} : \eta_1 \neq 0$.

After that, the seventh null and alternative hypotheses are formed from the seventh research question. This research question asks whether import competition affects scale efficiency in Indonesia's textile industry. The seventh null hypothesis, in view of that, argues that import competition does not affect scale efficiency in Indonesia’s textile industry. The reversed statement is argued by the seventh alternative hypothesis. Next, the correlation between import competition and scale efficiency in Indonesia’s textile industry is inscribed as $txscf_t = \rho_0 + \rho_1 \ ln \ txcpt_{t-1} + \rho_2 \ txscf_{t-1} + \rho_3 \ cri + \varepsilon_t$. Thus, the seventh null hypothesis is inscribed as $H_{07} : \rho_1 = 0$ and the seventh alternative hypothesis is inscribed as $H_{17} : \rho_1 \neq 0$.

The eighth null and alternative hypotheses are similarly formed from the eighth research question. This research question asks whether import competition affects scale efficiency in Indonesia’s apparel industry. The eighth null hypothesis, accordingly, argues that import competition does not affect scale efficiency in Indonesia’s apparel industry. The reversed statement is argued by the eighth alternative hypothesis. Next, the correlation between import competition and scale efficiency in Indonesia’s apparel industry is inscribed as $apscf_t = \sigma_0 + \sigma_1 \ ln \ apcpt_{t-1} + \sigma_2 \ aptcf_{t-1} + \sigma_3 \ cri + \varepsilon_t$. Thus, the eighth null hypothesis is inscribed as $H_{08} : \sigma_1 = 0$ and the eighth alternative hypothesis is inscribed as $H_{18} : \sigma_1 \neq 0$.

The following null and alternative hypotheses are developed from eight research questions which are quite different from the first eight research questions. The first eight research questions require that the impact of import competition on four dependent variables in two industries to be proven. The subsequent eight research questions are developed as the extension of the previous ones. The latter research questions require that the level of import competition beyond which the behavior of the dependent variables change substantially to be determined. Each of these levels of import competition is assumed to function as a threshold in a TAR model. Therefore, the following null and alternative hypotheses contend around the linearity of the correlation between import competition and each dependent variable.

The ninth research question raised in Chapter 1 require that the threshold in the correlation between import competition and the number of workers in Indonesia’s textile industry to be determined. Based on this research question, the ninth null and alternative hypotheses are developed. The ninth null hypothesis affirms that the correlation between import competition and the number of workers in Indonesia’s textile industry is linear. Correspondingly, the ninth alternative hypothesis affirms just the opposite that the correlation between import competition and the number of workers in Indonesia’s textile industry is non-linear. In addition, the correlation between import competition and the number of workers in Indonesia’s textile industry is expressed in TAR model which is written as $txwkr_t = I_t[\alpha_{10} + \alpha_{11}\ txcpt_{t-1} + \alpha_{12}\ txwkr_{t-1}] + (1-I_t)[\alpha_{20} + \alpha_{21}\ txcpt_{t-1} + \alpha\rho_{22}\ txwkr_{t-1}] + \varepsilon_t$. Thus, the ninth null hypothesis is expressed as $H_{09}: \alpha_{11} = 0$ *and* $\alpha_{12} = 0$ and the ninth alternative hypothesis is expressed as $H_{19}: \alpha_{11} \neq 0$ *and* $\alpha_{12} \neq 0$.

The same logic is applied to develop the tenth null and alternative hypotheses. The tenth null and alternative hypotheses are derived from the tenth research question. This research question requires that the threshold in the correlation between import competition and the number of workers in Indonesia’s apparel industry to be determined. Thus, the tenth null hypothesis affirms that the correlation between import competition and the number of workers in Indonesia’s apparel industry is linear. The tenth alternative hypothesis correspondingly affirms just the opposite. Afterward, the correlation between import competition and the number of workers in Indonesia’s apparel industry is expressed in TAR model which is written as $apwkr_t = I_t[\beta_{10} + \beta_{11}\ apcpt_{t-1} + \beta_{12}\ apwkr_{t-1}] + (1-I_t)[\beta_{20} + \beta_{21}$

$apcpt_{t-1}$ $+\beta_{22}$ $apwkr_{t-1}]$ $+ \varepsilon_t$. Hence, the tenth null hypothesis is expressed as $H_{010}:$ $\beta_{11} = 0$ *and* $\beta_{12} = 0$ and the tenth alternative hypothesis is expressed as $H_{110}: \beta_{11} \neq 0$ *and* $\beta_{12} \neq 0$.

The eleventh null and alternative hypotheses are derived from the eleventh research question. This research question demands that the threshold in the correlation between import competition and wages in Indonesia's textile industry to be discovered. Accordingly, the eleventh null hypothesis asserts that the correlation between import competition and wages in Indonesia's textile industry is linear. The eleventh alternative hypothesis correspondingly asserts the inverse. Likewise, the correlation between import competition and wages in Indonesia's textile industry is expressed in TAR model which is denoted as $txwge_t = I_t[\gamma_{10} + \gamma_{11}\ txcpt_{t-1} + \gamma_{12}\ txwge_{t-1}] + (1-I_t)[\gamma_{20} + \gamma_{21}\ txcpt_{t-1} + \gamma_{22}\ txwge_{t-1}] + \varepsilon_t$. Hence, the eleventh null hypothesis is denoted as $H_{011}: \gamma_{11} = 0$ *and* $\gamma_{12} = 0$ and the eleventh alternative hypothesis is denoted as $H_{111}: \gamma_{11} \neq 0$ *and* $\gamma_{12} \neq 0$.

The twelfth null and alternative hypotheses are similarly derived from the twelfth research question. This research question demands that the threshold in the correlation between import competition and wages in Indonesia's apparel industry to be discovered. In consequence, the twelfth null hypothesis asserts that the correlation between import competition and wages in Indonesia's apparel industry is linear. Correspondingly, the twelfth alternative hypothesis asserts the inverse. In addition, the correlation between import competition and wages in Indonesia's apparel industry is expressed in TAR model which is denoted as $apwge_t = I_t [\delta_{10} + \delta_{11}\ apcpt_{t-1} + \delta_{12}\ apwge_{t-1}] + (1-I_t)[\delta_{20} + \delta_{21}\ apcpt_{t-1} + \delta_{22}\ apwge_{t-1}] + \varepsilon_t$. Hence, the twelfth null hypothesis is denoted as $H_{012} : \delta_{11} = 0$ *and* $\delta_{12} = 0$ and the twelfth alternative hypothesis is denoted as $H_{112} : \delta_{11} \neq 0$ *and* $\delta_{12} \neq 0$.

Moreover, the thirteenth null and alternative hypotheses are developed from the thirteenth research question. This research question claims that the threshold in the correlation between import competition and technical efficiency in Indonesia's textile industry to be found. The thirteenth null hypothesis, accordingly, maintains that the correlation between import competition and technical efficiency in Indonesia's textile industry is linear. The inverted statement that the correlation between import competition and technical efficiency in Indonesia's textile industry is non-linear is maintained by the thirteenth alternative hypothesis.

Further, the correlation between import competition and technical efficiency in Indonesia's textile industry is expressed in TAR model which is written as $txtcf_t = I_t[\zeta_{10} + \zeta_{11} \ln txcpt_{t-1} + \zeta_{12}\, txtcf_{t-1}] + (1-I_t)[\zeta_{20} + \zeta_{21} \ln txcpt_{t-1} + \zeta_{22}\, txtcf_{t-1}] + \varepsilon_t$. Thus, the thirteenth null hypothesis is written as $H_{013}: \zeta_{11} = 0$ *and* $\zeta_{12} = 0$ and the thirteenth alternative hypothesis is written as $H_{113}: \zeta_{11} \neq 0$ *and* $\zeta_{12} \neq 0$.

By the same token, the fourteenth null and alternative hypotheses are developed from the fourteenth research question. This research question claims that the threshold in the correlation between import competition and technical efficiency in Indonesia's apparel industry to be found. The fourteenth null hypothesis, accordingly, maintains that the correlation between import competition and technical efficiency in Indonesia's apparel industry is linear. The inverted statement is maintained by the fourteenth alternative hypothesis. Further, the correlation between import competition and technical efficiency in Indonesia's apparel industry is expressed in TAR model which is written as $aptcf_t = I_t[\eta_{10} + \eta_{11} \ln apcpt_{t-1} + \eta_{12}\, aptcf_{t-1}] + (1-I_t)[\eta_{20} + \eta_{21} \ln apcpt_{t-1} + \eta_{22}\, aptcf_{t-1}] + \varepsilon_t$. Thus, the fourteenth null hypothesis is written as $H_{014}: \eta_{11} = 0$ *and* $\eta_{12} = 0$ and the fourteenth alternative hypothesis is written as $H_{114}: \eta_{11} \neq 0$ *and* $\eta_{12} \neq 0$.

After that, the fifteenth null and alternative hypotheses are formed from the fifteenth research question. This research question requests the threshold in the correlation between import competition and scale efficiency in Indonesia's textile industry to be defined. The fifteenth null hypothesis, in view of that, argues that the correlation between import competition and scale efficiency in Indonesia's textile industry is linear. The reversed statement is argued by the fifteenth alternative hypothesis. Next, the correlation between import competition and scale efficiency in Indonesia's textile industry is expressed in TAR model which is inscribed as $txscf_t = I_t[\rho_{10} + \rho_{11} \ln txcpt_{t-1} + \rho_{12}\, txscf_{t-1}] + (1-I_t)[\rho_{20} + \rho_{21} \ln txcpt_{t-1} + \rho_{22}\, txscf_{t-1}] + \varepsilon_t$. Thus, the fifteenth null hypothesis is inscribed as $H_{015} : \rho_{11} = 0$ *and* $\rho_{12} = 0$ and the fifteenth alternative hypothesis is inscribed as $H_{115} : \rho_{11} \neq 0$ *and* $\rho_{12} \neq 0$.

The sixteenth null and alternative hypotheses are similarly formed from the sixteenth research question. This research question requests the threshold in the correlation between import competition and scale efficiency in Indonesia's apparel industry to be defined. The sixteenth null hypothesis, accordingly, argues that the correlation between import competition and scale efficiency in Indonesia's apparel industry is linear. The reversed statement is argued by the sixteenth alternative hypothesis. Next, the correlation between import competition and scale efficiency in Indonesia's apparel industry is expressed in TAR model which is inscribed as $apscf_t = I_t[\sigma_{10} + \sigma_{11} \ln apcpt_{t-1} + \sigma_{12} apscf_{t-1}] + (1-I_t)[\sigma_{20} + \sigma_{21} \ln apcpt_{t-1} + \sigma_{22} apscf_{t-1}] + \varepsilon_t$. Thus, the sixteenth null hypothesis is inscribed as $H_{016}: \sigma_{11} = 0$ *and* $\sigma_{12} = 0$ and the sixteenth alternative hypothesis is inscribed as $H_{116}: \sigma_{11} \neq 0$ *and* $\sigma_{12} \neq 0$.

The variables and the parameters of these linear and TAR models are specified in Chapter 6.

Chapter summary

This chapter presents the theory of comparative advantage and the concept of competitive advantage which are used as the foundation of this research. The theory of comparative advantage envisages that all countries will specialize and resources will be reallocated to industries which have a comparative advantage. The concept of competitive advantage, in addition, envisages that firms with comparative disadvantage might be able to survive if they can improve their efficiency. Accordingly, this research acknowledges that appropriate foreign trade policy is needed to help firms with comparative disadvantage conducting necessary adjustments. In view of that, this research investigates the impact of import competition on the number of workers, wages, and technical and scale efficiencies to help the government of Indonesia formulating the appropriate foreign trade policy.

Moreover, this chapter also presents several models which demonstrate the correlation between research variables. The first model presents a negative correlation between import competition and the number of workers. The second model presents a negative correlation between import competition and wages. The third model presents a positive correlation between import competition and technical efficiency. The last model presents a positive correlation between import competition and scale efficiency.

Lastly, this chapter presents null and alternative hypotheses which are tested in this research. The first eight null hypotheses state that there is no correlation between import competition and each dependent variable. The last eight null hypotheses state that the correlations between import competition and each dependent variable are linear. The alternative hypotheses state the inverse of the null hypotheses.

Table 4 Summary of null hypotheses

Hypothesis	Variable		Industry	Correlation
	Independent	Dependent		
#1	Import Competition	Number of workers	Textile	None
#2		Wages		None
#3		Technical efficiency		None
#4		Scale efficiency		None
#5		Number of workers	Apparel	None
#6		Wages		None
#7		Technical efficiency		None
#8		Scale efficiency		None
#9		Number of workers	Textile	Linear
#10		Wages		Linear
#11		Technical efficiency		Linear
#12		Scale efficiency		Linear
#13		Number of workers	Apparel	Linear
#14		Wages		Linear
#15		Technical efficiency		Linear
#16		Scale efficiency		Linear

Source: Author’s concept

Chapter 5 Research Methodology

This chapter is devoted to explaining the entire research methodology which is employed in this research. The aim which this chapter intended to accomplish is to provide a thorough narrative of how this research is conducted. This chapter commences by describing the term research methodology, continued by explicating the inductive reasoning, and then moves on to assess the quantitative and qualitative method, follow on by providing a description of variables and data, and finally this chapter talks about statistical instruments.

5.1. Research methodology

The English term research is derived from French verb *rechercher*, which means to search or to look for. Research is commonly accepted as the effort of searching for knowledge. Research has been known as a human endeavor to seek new facts and expand the boundary of human knowledge. Moreover, research sometimes also means obtaining an in-depth understanding of observed phenomena. Occasionally, acknowledge phenomena are worthless to the welfare of the society.

Afterwards, scholars conduct research to investigate what benefit those phenomena can bestow the society. Research, additionally, may be defined as an effort to prove a hypothesis. Hypothesis will not be accepted as knowledge unless it is proved true. That is why researchers perform research to test the hypothesis. When the hypothesis is proved to be true then it is recognized as new knowledge. If the research proves that the hypothesis is false, the researcher should find another explanation for the phenomena in hand.

Some scholars define methodology as principles or philosophical assumptions which underlie an activity. For some other, methodology is also known as a set of steps which has to be followed in conducting an activity. The first group considers methodology as a perspective, while the second one sees it as a set of procedures. Strauss and Corbin distinct the first definition as methodology whiles the second definition as method (Strauss & Corbin, 1998, p. 3). Either way, methodology makes it possible to craft a plan and foresee any obstacle with the intention of guaranteeing success.

Research methodology can be generally accepted as a way of thinking about research as well as a systematically organized procedure in conducting research. It may refer to frameworks which guide researchers in the step-to-step process of the inquiries. Understandably, research methodology is one of the most crucial features in carrying out a research. By complying with research methodology, a scholar ensures that the research is exercised in a standardized fashion. This will facilitate other researchers to follow the progress of the research and enable them to audit the research once it is completed. Further, research methodology directs the researcher to concentrate his interest. This way, the researcher can focus his attention only toward phenomena which are relevant to his research and keep away from beating around the bush. The researcher, subsequently, does not waste valuable resources on irrelevant issues. By sticking to research methodology, the researcher could also avoid duplication of research processes. Research methodology leads the researcher on a certain designated path toward the aim of the research. The researcher could evade going back and forth in performing the research. There are many research methodologies which scholars are familiar with. The step order of those research methodologies may vary depending on the subject matter and the researcher’s way of thinking.

5.2. Inductive Reasoning

The first feature of the research methodology in this research is the reasoning aspect. Reasoning refers to manner how the phenomena in hand are perceived and how the conclusion is constructed. Most academicians are devotees of two manners of reasoning, i.e. deductive reasoning and inductive reasoning. Deductive reasoning, also known as deductive logic, commences with a general idea of whole the phenomena. Afterwards, it draws a specific conclusion focused on certain phenomenon. Scientists consider deductive reasoning as a top-down approach since it started with a general theory, which the narrowed into a hypothesis. The research is then narrowed further with observation, and finally leads to a confirmation of the theory. The arguments in deductive reasoning are derived from laws, theories, or other widely accepted principles.

Inductive reasoning, on the contrary, set off with observations of each individual phenomenon. After that, it discovers the pattern which connects every phenomenon. Finally, it assembles a conclusion concerning the entire phenomena. Inductive reasoning leads researcher to make a generalization out of a series of all pieces of information. Differ from deductive reasoning, inductive reasoning is regarded as a bottom up approach which start with observations and move all the way up to pattern of relationship, tentative hypothesis, and end up with a theory. The arguments in inductive reasoning, accordingly, are extracted from observations or interviews.

The kind of reasoning which is applied in this research is the inductive reasoning. Data of each variable is obtained in the commencement of the research. Then, those data are analyzed to uncover the pattern of correlation of the data. Finally, conclusion is developed based on that correlation. The inductive reasoning is believed more appropriate for this research because it is more open-ended by nature. The conclusion of inductive reasoning may differ from the conventional wisdom. Unlike deductive reasoning where the conclusion follows necessarily from the premises, inductive reasoning allows the conclusion follows probably from the premises.

5.3. Quantitative method and qualitative method

The second feature of research methodology addressed in this chapter is the research method. When a researcher talks about research method, usually he refers to either qualitative or quantitative methods. The quantitative method will be discussed first and followed by the qualitative method.

Quantitative research method, as the name reveals, deals with quantitative attributes of the examined phenomena. In this fashion, the relationship among investigated phenomena could be depicted in mathematical or econometric models. Next, observations capture those attributes in numerical figures. Many scientists are fond of this method since quantitative method allows the relationship among phenomena to be determined by using statistical tools. This way, the causal direction of that relationship can be measured accurately, as well as its magnitude. One of the strengths of this method is that the result can be compared directly with results of other research. This method also makes it possible for the result gained from samples to be generalized into the entire population.

Qualitative research method, quite the opposite, works with qualitative attribute of phenomena in hand. Some researchers classify any research which comes up without any quantification procedure or use no statistical instruments as qualitative research (Strauss & Corbin, 1998, p. 11). While the quantitative method is aimed to answer yes or no questions arise from the research, the qualitative section is devoted for deeper exploration which answer the how questions (Barbour, 2008, p. 11). The ultimate purpose of this variety of research method is to grasp an in-depth understanding of a specific phenomenon. This type of research method does not pay any attention to quantities characteristic of the object of research. Thus, it does not engage either measurement or statistics. Qualitative method relies heavily on the researcher's perception on the observed phenomena. For that reason, the researcher needs to keep his neutrality. The strength of qualitative research is its ability to provide rich and complex comprehension of the issue in question. Qualitative method is also effective in identifying intangible factors, such as social norms, socioeconomic status, gender roles, ethnicity, and religion, whose role in the research quantitative research issue may not be readily apparent.

A number of scientists do not consider qualitative and quantitative method as two discrete research methods. Instead, both of them may be performed as a continuum. A research could be started with quantitative method and then be followed by qualitative method, or the other way around. When used along with quantitative methods, qualitative method can be used to explore the meaning and the implication of quantitative results. Likewise, if quantitative method is employed in broader qualitative framework, it produces precise and testable expression to qualitative ideas. A kind of research which utilizes the combination of both qualitative and quantitative method is often called as mixed-method research or triangulation. The advantage of using this mixed-method research is that a researcher can be more confident with the result if different methods lead to the same conclusion.

One of the techniques in the mixed-method research is corroboration. The purpose of this corroboration technique is to ensure that the research findings accurately reflect the actual phenomena, whatever they may be. As a result, a researcher can increase the validity of the result, and it will be seen as credible or worthy of consideration by others. Corroboration technique involves three varieties of triangulation. They are triangulation of multiple data sources, triangulation of methodology and triangulation of researcher. The first variety uses data from several sources. The second utilizes multiple methods, such as quantitative method and qualitative method. It is possible that the result of quantitative method is confirmed by using qualitative analysis, or the other way around. The third one involves a number of researchers. The last one is also known as investigator triangulation or cross-examination.

The theme of this research is the impact of import competition on textile and apparel industries in Indonesia. It departs from general accepted hypothesis which maintains that import competition actually affects an industry. This research is designed to prove that the impact of import competition on textile and apparel industries actually exists in Indonesia and to measure the magnitude of that impact. The other target that this research intends to achieve is to determine when the behavior of both industries changes drastically to variations in import competition. It is clearly seen that this research sets forth using quantitative method when it statistically proves the existence of the impact, measures its magnitude and determine the threshold of the response. However, it is believed in this research that quantitative alone could not provide a thorough explanation regarding import competition impact on the textile and apparel industies. Thus, in order to strengthen the analysis, this research also uses qualitative method. Therefore, this research undoubtedly falls under the category of mixed-method research. By combining quantitative method and qualitative method, this research can be expected to overcome the weakness or intrinsic biases and the problems that come from single method analysis. Hence, credible and valid results of this research can be fulfilled.

This research departs by using a quantitative analysis with the purpose of obtaining affirmation of hypothesis first. This hypothesis testing is considered as highly important because if the null hypothesis cannot be rejected then the whole research will lose its significance. When the null hypothesis is rejected, and the alternative hypothesis is taken as true then this research is good to continue to the next stage.

The qualitative analysis is put intentionally after quantitative analysis so that it can verify the result of the quantitative analysis. It is also expected that the quantitative analysis can provide comprehensive interpretation of the quantitative result. This will be done by comparing the quantitative result with the result of earlier researches of the same theme. It can be expected that the qualitative analysis can present clear explanation of all similarity and differences revealed from the comparison.

Another reason for putting qualitative analysis behind is because qualitative analysis is open to a wider discussion regarding the result of the quantitative analysis. Qualitative analysis allows many aspects of the result to be discussed. This means the narrow perspective of the quantitative analysis can be overcome. Consequently, this research can offer a complete picture and enhanced coverage of the phenomena in hand (Barbour, 2008, p. 151).

5.4. Variables and data

Furthermore, in this part of Chapter 4, the variables and the data used in this research are thoroughly discussed. Data serves as input for this research. There is a quote which says that garbage in, garbage out. That means the quality of the whole research is decided by the quality of the input. Accordingly, quality control of this research is instigated by obtaining reliable data from a legitimate source.

Data are habitually grouped by scholars as primary and secondary data. Primary data are data which are gathered directly by researcher. Primary data are usually collected by researchers directly from observation or interview. Secondary data, conversely, are indirectly obtained by researchers through other institution or individual. Researcher may acquire secondary data from literature study, newspaper articles, company's database, previous researches or statistic bureaus.

This research is designed to investigate the behavior of two industries, explicitly Indonesia's textile and apparel industries, in response to the change in the level of import competition from time to time. In fact, this research requires that observation should be conducted in a long period of time. This requirement makes it inappropriate to use primary data. Hence, this research only uses secondary data as input.

Additionally, this research employs TAR model analysis which requires as many potential threshold values as possible. One potential threshold value is attributed to each observed year. Thus, it would be better if this research can use observation which covers a longer period of time. Unfortunately, this research can only use time series data which cover 30 years period from 1980 to 2009. This research finds that time series data before 1980 are inconsistent. Therefore, with the intention of maintaining the quality of this research, older data than 1980 are not used.

Frequently, some phenomena do not exhibit quantitative attribute which can be measured directly. Thus, in quantitative research, researchers need to use proxies as stand-ins for phenomena that cannot be directly measured. These proxies, instead of the phenomena, become the variables of the quantitative research. Afterward, all phenomena and their proxies pertinent to this research will be assessed one by one.

As this research talks about the impact of import competition on textile and apparel industries, it is clear that the phenomena in questions are import competition, and the behavior of textile and apparel industries. The first phenomenon to be assessed is the import competition. Import competition is the term many researchers used for describing the struggle of domestic product against imported ones. Import only takes place when the price in the international market is lower than the domestic price; assuming that the goods produced abroad and the ones produced domestically are identical. Moreover, import competition only happens when imports reduce market share of domestic product.

Import competition acts as the independent variable of this research. As the expression discloses, independent variable is assumed as the variable whose value may be determined freely without reference to other variables. In this research, its value is taken simply as given. Independent variable serves as a predictor. That means independent variable is accepted as a variable whose value determines the value of other variables, specifically the dependent variables.

Nevertheless, import competition is an abstract concept which cannot be measured directly. Conveniently, there are many possible features of import competition which can be used as a proxy in this research. This research finds it more appropriate to define import competition as the ratio of imports over domestic production minus exports. This definition of import competition is adapted from previous studies to suit the condition of Indonesia's textile and apparel industries. Those previous studies are presented in Chapter 3. Technically, this definition of import competition exhibits quantitative attributes which can be recorded and graphed. Practically, these attributes can be obtained without problems. Imports and exports data are easily obtained since all import and export declarations must have them. Production data can be obtained through annual industrial survey and socioeconomic censuses. This definition also performs as a perfect proxy given that the ratio speaks for the exact condition of import competition. Import competition intensifies whenever imports rise, domestic production falls, or exports rise. On the contrary, import competition declines whenever imports fall, domestic production increase, or exports fall.

The other phenomenon, which this research observes, is the behavior of the textile and apparel industries. This research intends to investigate two features of these industries, i.e. employment and efficiency. Employment is chosen because it brings to light the workers' side of the story in both industries. Efficiency, in the same way, reveals the managerial adjustment performed by the factory owners. These two features are intentionally chosen since workers and factory owners are the most prominent stakeholders of these industries. The impact of import competition on each feature is analyzed separately in this research. Both employment and efficiency act as dependent variables in these separate analyses.

Dependent variable is the one whose value is altered by independent variable. Thus, it is assumed that the value of dependent variable changes when the value of independent variable changes.

Employment is formally defined as the state of being employed or having a job. However, for the purpose of this study, employment is related to broader labor issues. There are two proxies which this research uses for employment, namely the number of workers and wages.

Both the number of workers and wages are proper proxies since both of them are picked out from demand and supply model of domestic labor market. As import competition gets loosen, the demand for domestic products rises. Factory owner may raise wage to motivate the workers. Moreover, factory owner may also hire more workers to meet higher demand. Quite the reverse, as import competition gets tougher, demand for domestic products falls. Consequently, factory owner may need to lay off some workers to avoid bankruptcy. Factory owner may not be able to adjust wage due to minimum wage regulation.

Efficiency is undoubtedly one of the most fundamental concepts in economics. Generally speaking, the concept of efficiency refers to a process of production which converts a set of inputs into a designated output. Efficiency requires that valuable inputs not be wasted. Accordingly, the process of production should not consume available inputs more than necessary. The process of production is efficient if a firm can produce outputs as many as possible from a given amount of inputs. Alternatively, if it produces less than maximum output then it is said inefficient. Efficiency in economics term is quite different from efficiency in engineering term. Engineering efficiency usually applies to the physical amount of inputs and output. While, economic efficiency refers to the value of inputs and output. Thus, in an economic sense efficiency compares the cost of production and price of the product.

There are many concepts for defining efficiency in an economic sense. But, for the purpose of this study, it is more appropriate to use technical and scale efficiencies for the measurement. Technical efficiency, also known as productive efficiency, talks about the method or scheme which enables a firm to utilize its resources efficiently. A firm works technically efficient if it can manufacture one product at the lowest attainable cost of production. Hence, productive efficiency demands that each firm employs least costly technological and managerial process of production. Conversely, any firm which is not technically efficient produces its output at higher cost of production. Furthermore, scale efficiency deals with adjusting the level of production. Firms which are technically efficient do not necessarily have achieved scale efficiency. Firms which have achieved both technical and scale efficiencies are those who have the largest ratio of output over input. That means they have the highest productivity.

In this research, technical and scale efficiencies are estimated by using data envelopment analysis (DEA). This analysis measures both efficiencies of a firm by comparing its performance to the performance of the most efficient firms in the industry. In other words, these most efficient firms set the benchmark for the analysis. DEA compares the ratio of output over input of each firm in the industry. Thus, this analysis uses output data, namely production data, and three input data, namely, the number of workers, wages and the cost of materials.

In addition, this research uses four control variables in the models. They are gross domestic product (GDP), the number of workers in the manufacturing sector, wages in the manufacturing sector, and concentration ratio in the textile and apparel industries. GDP is is used to capture the macro economic condition of Indonesia. The number of workers and wages in the manufacturing sector are used to capture the dynamic condition of the manufacturing sector. The concentration ratio of the textile and apparel industries is used to capture the competition among firms in each industry.

It is worth to note that selecting appropriate data for this research needs to be done cautiously. Correlating import data to production, number of workers, wages, and cost of materials data turns out to be a bit tricky since they are arranged under different classifications. BPS Statistics Indonesia organizes import data under Harmonized Commodity and Coding System (HS), a commodity classification which is maintained by World Customs Organization. On the other hand, production, number of workers, wages, and cost of materials data are categorized under International Standard Industrial Classification (ISIC). This is an economic activity classification which is maintained by United Nations Statistics Division.

Associating those data is actually challenging since both classifications are revised from time to time. As a starting point, BPS Statistics Indonesia still uses ISIC Rev. 3 up to now. Nonetheless, correspondence table for HS and ISIC does not exist in the literature. Favorably, United Nations Statistics Division provides HS edition 2002 to CPC (Central Product Classification) Ver. 1.1 correspondence table and CPC Ver. 1.1 to ISIC Rev. 3.1 correspondence table. By using those two tables, ISIC Rev. 3.1 . HS 2002 Edition correspondence table can be constructed. The HS 2002 has to be explored up to six digit subheadings to obtain accurate correlation.

All data used in this research are obtained from BPS-Statistics Indonesia. This government agency is the only institution which has the authority to gather and publish Indonesia’s official statistics. BPS-Statistics Indonesia gathers data from censuses and surveys which are conducted in a regular cycle. BPS-Statistics Indonesia conducts censuses every ten years. Population census, for example, is carried out at the years ended with zero; agricultural census is carried out at the years ended with three; while economic census is carried out at the years ended with six. In between censuses, BPS-Statistics Indonesia conducts statistical surveys annually. These surveys include national socioeconomic surveys, surveys for manufacturing establishment, intercensal population surveys, and labor force surveys. BPS-Statistics Indonesia disseminates Indonesia's official statistics through its publications, such as Statistical Yearbook, BPS Strategic Data, Trends of Selected Socio-Economic Indicators of Indonesia and other specific topics data publications. Conveniently, BPS-Statistics Indonesia also attends specific data inquiries. In addition, Indonesia's statistics presented in the website of international institutions such as the World Bank, the IMF and The WTO are derived from BPS-Statistics Indonesia's publications.

5.5. Data envelopment analysis

Some parts of this research investigate the correlations between import competition and efficiency in Indonesia's textile and apparel industries. Therefore, it is necessary to obtain an accurate measurement of efficiency, particularly technical and scale efficiencies, in both industries.

The simplest measure in assessing productivity is in the form of the output-to-input ratio. The commonly used ratios are output per worker and output per hour of labor (Lipsey, Courant, & Ragan, 1999, p. 195). However, the result of this kind of measure can be misleading since it does not isolate the gain in output that are actually attributable to some other inputs (Cooper, Seiford, & Tone, 2007, p. 1). Hence, this kind of measure cannot be employed to gauge overall productivity of a firm. Assessment of overall productivity of a firm requires an output-to-input ratio which takes into account all output and all input (Cooper, Seiford, & Tone, 2007, p. 1).

Largely, there are four main approaches in estimating productivity, i.e. least-square econometric production models, total factor productivity (TFP) indices, stochastic frontier analysis (SFA), and data envelopment analysis (DEA) (Coelli, Rao, O'Donnel, & Battese, 2005, p. 7). However, the foremost methods are SFA which is based on econometrics and DEA which is based on mathematical programming. These traits differentiate SFA as a parametric analysis from DEA as a non-parametric analysis. Moreover, SFA and DEA are considered superior to least-square econometric production models and total factor productivity indices because SFA and DEA do not assume that all firms are fully efficient (Coelli, Rao, O'Donnel, & Battese, 2005, p. 133). Hence, SFA and DEA make it possible to measure inefficiency.

In SFA and DEA, efficient firms are those who produce by using maximum attainable production method. Others are considered as inefficient. When they are displayed in a graph, the efficient ones are those which are on the production possibility frontier, while others are presented below the frontier. SFA and DEA measure firms' efficiency by comparing production function of those firms with production possibility frontier. That is why SFA and DEA are called frontier analysis. SFA and DEA assess efficiency score of each firm by calculating the distance of each firm to the frontier. In DEA, the efficiency score is set between 0 and 1. Those which are on the frontier, are given score 1, and the inefficient ones obtain efficiency score below 1 depending on their level of efficiency.

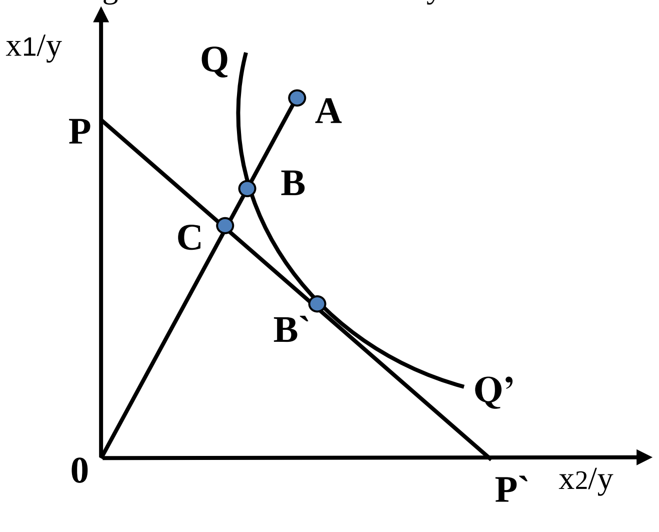
This research, following Chirwa (1998) and Adewuyi (2006), employs DEA for measuring efficiency of Indonesia's textile and apparel industries. DEA is preferred over SFA because it does not require production possibility frontiers to be estimated beforehand. As opposed to SFA which uses estimated production frontier, DEA uses production function of the most efficient firms as frontier. In output oriented analysis, the most efficient firms are those who produce maximum output by using a given set of inputs. Alternatively, in input oriented analysis, the most efficient firms are those who use minimum input for producing a given amount of output. DEA holds the assumption that if one firm in an industry can produce a certain amount of output by making use of a specific set of input, other firm in the same industry should be able to achieve a similar level of production. Hence, while SFA compares firms' performance with an approximated benchmark, DEA measures efficiency by comparing performance of the most efficient firms with performance of the rest of the firms in the industry.

Furthermore, DEA is selected since it incorporates returns to scale in estimating efficiency. Returns to scale is a term in the production function which concerns with the behavior of outputs in response to changes in inputs. In other words, Returns to scale indicates the degree by which output increases when all inputs are added up proportionally. This feature enables DEA to measure scale efficiency of a firm.

This research measures technical efficiency by using radial efficiency measure.

This measure is proposed by M.J. Farrell. Farrell (1957, pp. 254-255). It maintains that overall efficiency of a firm consist of two components, i.e. technical and price efficiencies. Technical efficiency indicates that firm's ability to produce as many as possible by using a given set of inputs. Price efficiency, in addition, specifies the ability of that firm to use the inputs in the best proportions, considering their prices. This price efficiency is similar to allocative efficiency which is mentioned by Coelli, Rao, O'Donnell, and Battese in Chapter 3. In radial efficiency measure, technical and price efficiency are measured as a long a ray from the origin to the observed production point. This measure is illustrated in Figure 5.1.

Figure 5. 1 Radial efficiency measure



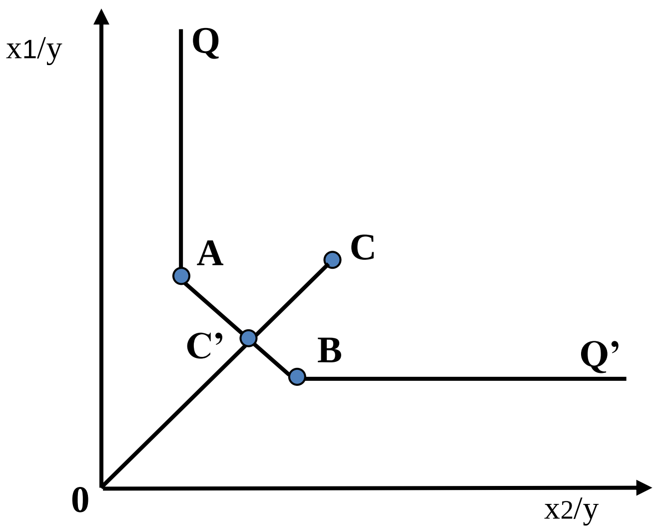
Source: adapted from Farrell (1957, p. 255)

Figure 4.1 displays combinations of inputs x_1 and x_2 for producing output y. In this figure, PP' is an isoquant line, while QQ' is an isocost line. Isoquant line shows all combinations of x_1 and x_2 which produce the same amount of y. Isocost line, on the other hand, shows all combinations of x_1 and x_2 with the same total cost. Firms which have achieved technical efficiency are placed on the isoquant line. Likewise, firms which have achieved price efficiency are placed on the isocost line. Firms which have achieved both technical and price efficiency are placed where the isoquant line touches the isocost line. Inefficient firms are placed above the isoquant and isocost lines.

In Figure 5.1, B is indicated as a firm which has achieved technical efficiency but it has not achieved price efficiency. Thus B is placed in the isoquant line but it is above the isocost line. If B has achieved overall, namely technical and price efficiencies, it is placed at B'. A is indicated as an inefficient one as it is placed above both isoquant and isocost lines. Technical efficiency of A is defined by the ratio TE = 0B/0A. Price efficiency of A is defined by the ratio PE = 0C/0B. Hence, overall efficiency of A is defined by the ratio OE = 0C/0A. From these ratios, it can be concluded that overall efficiency is the product of technical and price efficiency measures as OE = TE x PE = 0B/0A x 0C/0B = 0C/0A.

These efficiency measures assume that the production function is known. Therefore, the isoquant line can be constructed. As a matter of fact production function is seldom known. In SFA, the production line is estimated from the sample data. Farrell (1957) proposed an alternative by introducing a non-parametric piece-wise linear convex isoquant. This isoquant is constructed from the production function of firms which have achieved technical efficiency. This isoquant assumes that there is no firm to the left or below it. The form of this isoquant is illustrated in Figure 5.2.

Figure 5. 2 Piece-wise linear convex isoquant



Source: adapted from Coelli, Rao, O’Donnell, and Battese (2005, p. 136)

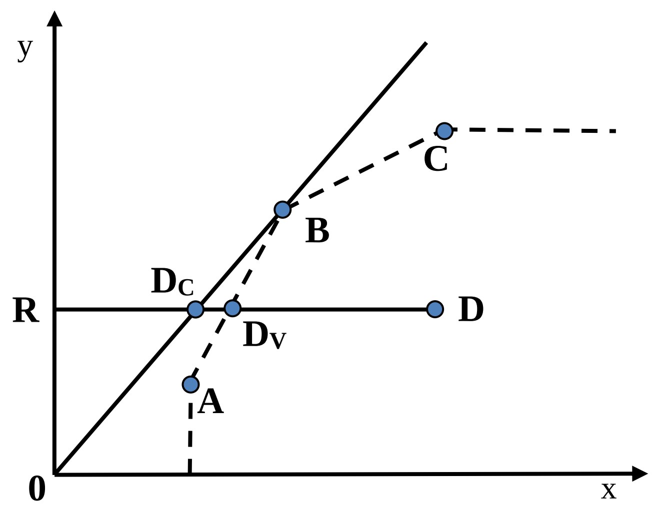
In Figure 5.2, the piece-wise linear convex isoquant is constructed by A and B.

They are firms which have the highest technical efficiency. There is no firm to the left or below the isoquant as there is no firm which has higher technical efficiency. Suppose C is an inefficient firm, then its technical efficiency is defined by the ratio TE_C = 0C'/0C. Farrell's measure of efficiency was developed into data envelopment analysis by A. Charnes, W.W. Cooper and E. Rhodes [1978].

As the measure of technical efficiency make use of the ratio of output over input, it is important to take into account the concept of return to scale. Return to scale refers to the change in output as a result of a proportional change in all inputs. If the output of a firm increases by the same proportional increase of all input, this firm is said to have a constant return to scale (CRS). Alternatively, if the output does not increase by the same proportional increase of all inputs, then the firm is said to have variable return to scale (VRS). VRS can be differentiated further into increasing return to scale (IRS) and decreasing return to scale (DRS). IRS occurs when the output increase by more than proportional increase of all inputs, while DRS occurs when the output increase by less than proportional increase of all inputs.

The CRS assumes that each firm is producing at an optimal scale of production. In reality, this condition hardly ever occurs. Most of the time, the firms are averted by imperfect competition. If CRS model is used to assess efficiency while not all firms are producing at an optimal scale of production, it will deliver technical efficiency which is biased by scale efficiency (Coelli, Rao, O'Donnel, & Battese, 2005, p. 150). For measuring efficiency where not all firms are producing at an optimal scale of production, VRS assumption has to be introduced into the efficiency measure. R.D. Banker, A. Charnes and W.W. Cooper [1984] proposed an extension to the CRS DEA model which takes into account VRS. DEA model which includes VRS specification is illustrated in Figure 5.3.

Figure 5. 3 DEA model with VRS



Source: adapted from Coelli, Rao, O’Donnell, and Battese (2005, p. 152)

In Figure 5.3, the CRS frontier is depicted with 45 degree slope. This slope indicates that an increase in input x is responded by an increase in output y by the same proportion. The intermittent line from A to B indicates VRS frontier which has more than 45 degree slope. This slope indicates increasing return to scale. The intermittent line from B to C indicates VRS frontier which has less than 45 degree slope. This slope indicates decreasing return to scale.

Suppose D is an inefficient firm. CRS technical efficiency of D is defined by the ratio $TE_{CRS} = RD_C/RD$. This measure of CRS technical efficiency is confounded by scale efficiency. VRS technical efficiency of D is defined by the ratio $TE_{VRS} = RD_V/RD$. Accordingly, scale efficiency of D can be defined by the ratio $SE = RD_C/RD_V$. Therefore, CRS technical efficiency of D can be decomposed into VRS technical efficiency and scale efficiency as shown by $TE_{CRS} = TE_{VRS} \times SE = (RD_V/RD) \times (RD_C/RD_V) = RD_C/RD$.

Furthermore, this research does not perform assessment on allocative or price efficiency of Indonesia’s textile and apparel industries. Assessment on allocative or price efficiency requires price data. Unfortunately, price of inputs differ significantly across firms. Most of the time, price of inputs is affected by the amount purchased. Larger procurement certainly gets a discount. At times, it is also influenced by the relationship between a firm and its supplier. A firm which has close ties with its supplier is able to get lower price. In addition, wage is definitely determined by the size of the firm. In addition, a large firm is undoubtedly able pay higher salary than smaller ones. Consequently, this study is unable to obtain accurate price of input data which is applicable to all firm.

Additionally, this research does not perform assessment on technical change as well. Technical change is a summation of how technology employed by a firm changes over time. It is obtained by comparing level of productivity at different times. It is not a time series data. As it cannot be correlated with import data, it cannot be used in this research.

5.6. Linear correlation model

This section of Chapter 4 is dedicated to exploring regression analysis used in this research. The correlation between research variables is investigated by using regression analysis, linear regression analysis to be exact. This type of analysis is popular among researchers who conduct quantitative analysis. Linear regression analysis is more preferable for this research because it does not only prove whether that correlation actually exists, but also determines the causality and the magnitude of that correlation. Linear regression analysis is applied because it is assumed in the early steps of this research that the correlations between research variables are linear. It is easier to determine the correlation between variables if their correlation is linear. Once the correlation between variables is determined, the analysis can be built up to more sophisticated one.

Linear correlation suggests that the change in the dependent variable is constant in response to a one-unit change in the independent variable (Wooldridge, 2009, p. 841). That means the change in the dependent variable correspondence proportionally to the change in the independent variable. Suppose a multiple linear correlation between a dependent variable and two independent variables is expressed as $y = \beta_0 + \beta_1 x + \beta_2 x_2 + u$. In this correlation, y denotes the dependent variable, β_0 denotes the constant term, x_1 denotes the first independent variable, β_1 denotes the parameter which corresponds to x_1, x_2 denotes the second independent variable, β_2 denotes the parameter which corresponds to x_2, and u denotes the error term. Parameter can be defined as a value which describes the population's correlation (Wooldridge, 2009, p. 843). Hence, the direction and the strength of the impact of x_1 and x_2 on y are described by β_2 and β_2 respectively. If the researcher is specifically concerned about the impact of x_2 on y, then β_2 is the parameter of interest. In linear correlation, there is no restriction on how y and x defined. Indeed, y and x can be defined in their normal or log forms. This correlation remains linear provided that the parameters β_0 and β_1 are linear (Wooldridge, 2009, p. 46).

The most relevant results of a linear correlation analysis are the parameters which correspond to each independent variable. These parameters are commonly called regression coefficients (Ramanathan, 2002, p. 77). Regression coefficient can be defined as a constant which represents the rate of change of the dependent variable as a function of changes in the independent variable. In other words, regression coefficient indicates the sensitivity of the dependent variable in response to the change in the independent variable. If the correlation between these variables is depicted as a regression line, regression coefficient defines the slope of the line.

However, the regression coefficient cannot be used directly for testing the null hypothesis. Even though regression coefficient plainly indicated the nature of a correlation, it cannot function on its own. There are other regression results which need to be taken into consideration in hypothesis testing. Two of the most essential ones are the level of significance and the standard error of the parameter.

Level of significance exhibits the probability of making Type I error (Anderson, Sweeney, & William, 2008, p. 343). This kind of error arises when a researcher rejects the null hypothesis when it is actually true. Level of significance is also known by the term level of risk (Mason, Lind, & Marchal, 1999, p. 307). Determining the level of significance is done by comparing *p*-value (probability value) obtained from regression analysis with a pre-designated level of significance which is usually denoted by the Greek symbol α. *p*-value is the greatest level where the test fails to reject the null hypothesis (Davidson & MacKinnon, 2004, p. 127). Lower *p*-value indicates bigger chance a researcher commit Type I error. In contrast, if a test of significance produces a *p*-value which is higher than α-level, the result of the regression analysis is referred to as 'statistically significant'. In other word, the result is accepted that Type I error is unlikely to occur. When a statistic is significant, the researcher can be very sure that the regression analysis is reliable. The level of significance is a number between 0 and 1. Researchers customarily have used either level of significance of 0.05 (usually called the 5% level of significance) or 0.01 (Davidson & MacKinnon, 2004, p. 125). Determining the level of significance is an arbitrary task for researchers. Most of them choose subjectively level of significance of 0.05 for no other rationale than that it is conventional.

The standard error of a statistic is the standard deviation of the sampling distribution of the sample mean (Mason, Lind, & Marchal, 1999, p. 281). Standard errors are important because they reflect how much sampling fluctuation a statistic will show. The inferential statistics involved in the construction of confidence intervals and significance testing are based on standard errors. What the standard error gives, in particular, is an indication of the likely accuracy of the sample mean when compared with the population mean (Anderson, Sweeney, & William, 2008, p. 272). The standard error, in other words, gives a measure of how well a sample represents the population. The standard error of a statistic depends on two values, i.e. the standard deviation and the sample size (Mason, Lind, & Marchal, 1999, p. 281). In general, when the standard deviation is large, the standard error is also large. Nonetheless, the larger the sample size the smaller the standard error. The standard error of a parameter is commonly denoted by the letter *se*. The smaller the standard error, the less the spread and the more likely it is that any sample mean is close to the population mean. When the sample is representative, the standard error will be small. A small standard error is thus a good thing.

Beside regression results which are related to the parameters, there are other features which define the reliability of the regression model. These features of the regression model determine whether other variables should be included in the model. If other variables need to be included, then the parameter of interest might be overestimated. Two of the most important features of a regression model are the coefficient of determination and the sum of square residuals.

Coefficient of determination, usually denoted by R^2, is a measurement which provides some information about the goodness of fit of a model (Anderson, Sweeney, & William, 2008, p. 562). It typically summarizes the discrepancy between observed values and the values expected under the model in question. It is also useful for discovering the proportion of the variance of the dependent variable from the independent variable. That is to say coefficient of determination determines the total variation in the dependent variable which can be explained by or accounted for the variation of the independent variable (Mason, Lind, & Marchal, 1999, p. 431). The value of R^2 spread between the ranges 0 to 1. The value 1.0 of R^2 indicates that the regression line perfectly fits the data. Thus, values approaching 1 are desirable for a research. The value 0.7 of R^2 connotes that approximately seventy percent of the variation in the dependent variable can be explained by the independent variable. The Other thirty percent of the variation can be explained by unknown or inherent variables.

The sum of square residuals is obtained from analyzing the distribution of the residuals from a linear regression model. Residuals are the deviations of observations from the fitted function. This term can be best explained by using a scatter diagram. In this diagram, every pair of the observation of independent variable and the observation of dependent variable is represented by one dot. In a linear relationship, the fitted function is a straight line which has the best fit to all the dots. Residuals are the distance between the dots of the observation set and the fitted line. It is necessary to have the sum of square residuals as small as possible. This only occurs when the residuals are normally distributed. Consequently, if the residuals are not normally distributed, it is certainly impossible to obtain the smallest sum of square residuals possible. That means the fitted function is not suitable to explain the relationship between the independent and the dependent variable.

It can also be said that if the residuals are not normally distributed, then the research model could be misleading. The residuals are not normally distributed when the research model does not define the function of the independent variable or the dependent variable properly. Probably, the independent variable, in reality, has nothing to do with the change of the dependent variable. This could also happen when an important variable is missing. Correcting one or more of these systematic errors may produce residuals that are normally distributed.

Furthermore, it is essential in linear regression analysis that the estimator has unbiased, consistent and efficient characteristics. An estimator can be represented as a rule or formula which associates data to produce a numerical value for a parameter of interest (Wooldridge, 2009, p. 838) (Ramanathan, 2002, p. 38). In regression analysis, the bias of an estimator is defined as the variance between its expected and its true values (Davidson & MacKinnon, 2004, p. 88). An estimator is accepted as unbiased if its bias is zero for all its admissible values. Suppose $\hat{e}$ is the expected value of the estimator and e is the true value of the estimator. Correspondingly, the biasedness of the estimator can be denoted as $\hat{e} - e$. Additionally, the estimator is said to be unbiased when $\hat{e} = e$. the biasedness of an estimator is indicated by the standard error of the estimate. Of course, it would be better if the estimator has a standard error as lowest as possible.

An estimator is acknowledged as consistent if its parameter converges in probability to the population parameter as the sample size grows (Wooldridge, 2009, p. 836). Consistency also means that the expected value of the estimator approaches the true value of the estimator as the size of the sample increases (Ramanathan, 2002, p. 45) (Davidson & MacKinnon, 2004, p. 92). An estimator, in addition, is accepted as more efficient if it can yield more accurate estimates by using the available information (Davidson & MacKinnon, 2004, p. 104). Efficiency of two estimators can be evaluated by comparing their variances. Unquestionably, it is preferable to have an estimator with lower variance (Ramanathan, 2002, p. 43).

In order to obtained unbiased, consistent and efficient estimator for time series data, several assumptions regarding the correlation need to be satisfied. The first of these assumptions necessitate that the correlation should have linearity in the parameters and the time series data should be stationary (Wooldridge, 2009, p. 382). The assumption of linear in parameters requires that the dependent variable is a linear function of the independent variables. Let a correlation is defined as $y = \beta_0 + \beta_1 x + \varepsilon$. This correlation is accepted as linear since it specifies that y is determined in a linear way by the parameters β_0 and β_1 (Heij, de Boer, Franses, Kloek, & van Dijk, 2004, p. 93). Nonetheless, this assumption does not restrict the form of the dependent and independent variable as they can be in quadratic, cubic, natural logs or other forms.

The stationary part of the assumption, likewise, requires that the time series data should have stable probability distributions over time (Wooldridge, 2009, p. 378). This assumption of stationary holds if any collection of random variable in the sequence is taken and then this sequence is shifted ahead h time periods, for instance, the joint probability distribution must remain the same. Unfortunately, many economic time series usually exhibit trending behavior as they tend to grow over time (Heij, de Boer, Franses, Kloek, & van Dijk, 2004, p. 578). It means economic time series display a regular pattern of seasonal variation.

When analyzing the correlation between dependent and independent variables, ignoring the fact that both variables are trending in the same or opposite directions can be misleading (Wooldridge, 2009, p. 360). False conclusion can be drawn that the independent variable does affect the dependent variable as they are actually uncorrelated. If a regression model finds a correlation between two trending variables just because both of them grow over time, this model suffers from a spurious regression problem (Wooldridge, 2009, p. 363). This problem is usually indicated by a high value of the coefficient of determination (R^2) while the value of Durbin-Watson statistic (*d*) is low (Granger & Newbold, 1974, p. 117). It can be concluded that there is actually no indication of a true relationship between the two variables. Therefore, if this problem is not properly taken care, the regression analysis might lead to a false conclusion.

The second assumption necessitates that the correlation should not have perfect collinearity (Wooldridge, 2009, p. 382). This assumption requires that there are no linear correlations among the independent variables. This assumption also requires that none of the independent variable which is constant. There can be linear correlation among the independent variables since this assumption only prohibit these variables to be perfectly correlated. A perfect correlation between two variables will produce Pearson correlation coefficient of 1 for positive correlation and -1 for negative correlation. Hence, perfect linear correlation between independent variables can be consented if the correlation coefficient is neither 1 nor -1.

The estimated regression coefficients have partial effect or ceteris paribus interpretations (Wooldridge, 2009, p. 75). That means the impact of independent variable of interest on the dependent variable is interpreted while holding other independent variables fixed. In a multiple regression, if two or more independent variables have a perfect collinearity, the covariance between the regression coefficients will be exceptionally high. (Ramanathan, 2002, p. 216). As a result, it would be difficult to interpret individual coefficient of the independent variables.

Moreover, if two or more independent variables have a nearly perfect collinearity, the standard error of the regression coefficient will be exceedingly high (Ramanathan, 2002, p. 216). Consequently, *t*-statistics will be reduced considerably which will lead to a failure to reject the null hypothesis. When this happens it can be falsely concluded that there is no correlation between the dependent and independent variables.

The third assumption necessitates that the correlations should have zero conditional mean (Wooldridge, 2009, p. 382). This assumption requires that the average value of the error terms is uncorrelated with each independent variable in all time periods. This requirement can be denoted as $\text{Corr}(x_{tj}, u_t) = 0$, for all j (Wooldridge, 2009, p. 347). This assumption also implies that the expected value of the error term is zero, given the independent variable for all time periods. This requirement can be denoted as E(u_t |x_t) = 0, t = 1, 2, …, n (Wooldridge, 2009, p. 347).

Moreover, the fourth assumption necessitates that the correlation should be homokedastic (Wooldridge, 2009, p. 384). This assumption requires that the variance of the error term is constant across observations. In other words, the variance between the observed values and the estimated ones (residuals) are the same for all fitted values (Mason, Lind, & Marchal, 1999, p. 486). Suppose u is the error term, then this assumption can be denoted as Var(u|x_t) = σ^2. When the residuals remain constant for all estimated value, it is said that the correlation is homoskedastic. Quite the opposite, heteroskedasticity occurs when the variances of the residuals differ across observations.

Heteroscedasticity complicates the analysis because many methods in regression analysis are based on an assumption of equal variance. When it arises the standard errors of the regression coefficient will be downward bias (too small). Accordingly, these standard errors are not valid for constructing confidence intervals and t statistics (Wooldridge, 2009, p. 265). This problem causes independent variable to emerge as significantly influential when it, in fact, does not (Mason, Lind, & Marchal, 1999, p. 488).

Both the third and fourth assumptions undertake the error term. However, they deal with different attributes of the error term. While the third assumption deals with the expected value of the error term, the fourth assumption deals with the variance of the error term (Wooldridge, 2009, p. 53). The third assumption, regarding zero conditional mean, concerns with the unbiased feature of the correlation. If this assumption is violated, the correlation becomes biased. On the other hand, the fourth assumption, regarding homokedasticity, concerns with the efficiency features of the correlations. Likewise, if this assumption is violated, the correlation becomes inefficient.

The fifth assumption, last of all, necessitate that the correlation should not have serial correlation or autocorrelation (Wooldridge, 2009, p. 385). This assumption requires that the error terms in different time periods should not correlated to each other. This assumption can be denoted as $E(u_t u_s \mid x_t, x_s) = 0$ for all $t \neq s$ (Wooldridge, 2009, p. 385).

5.7. Threshold autoregressive model

This study is conducted under the notion that the correlations between import competition and each dependent variable, specifically the number of workers, wages, and technical and scale efficiencies are not linear. These correlations are governed by two different regimes which are divided by a threshold value. The number of workers, wages, and technical and scale efficiencies behave differently in these different regimes. That is to say, the behavior of the number of workers wages, and technical and scale efficiencies below the threshold value differs from their behavior beyond the threshold value. Accordingly, this study employs TAR model which allows the behaviors of the dependent variables to be determined by the state of each regime.

Assumption that the relationship of variables is linear may be useful sometimes in analyzing economic phenomena. This assumption simplifies the analysis and the results are straightforward. However, policy makers could make a serious mistake if they ignore the possibility that the relationship of variables is not linear at all. For example, it has been noticed that unemployment increases more sharply than it decreases in respect to variation of economic activity. This example underlines that the correlation between unemployment and economic activity is not linear.

Economists have proposed several models in analyzing the link between economic variables. One model recognizes the existence of different regimes and makes it possible that the behavior of economic variables is determined by the regime that takes place at a certain point in time (Franses & van Dijk, 2000, p. 69). This model is known as a regime-switching model. That means the behavior of economic variables may be different in each regime. This different behavior is indicated by different parameters of the same variable in a different regime.

In addition, this regime-switching model can basically be differentiated by the way the regimes evolve over time (Franses & van Dijk, 2000, p. 70). The first group assumes that the regimes can be distinguished by an observable variable. On the contrary, the second one assumes that the regimes are unobservable, but they can be differentiated by an underlying unobservable stochastic process (Franses & van Dijk, 2000, p. 70). The Threshold autoregressive (TAR) is the most prominent model of the first group.

The TAR model is originally proposed by Tong (1983) and discussed further in Tong (1990). This model assumes that the behavior of the variables in each regime can be defined by a linear autoregressive (AR) model. That is the relationship between variables in each regime is denoted by an AR model where the AR parameters of the variable are determined by each regime (Franses & van Dijk, 2000, p. 70).

The TAR model, in addition, also assumes that the ranges of regimes are defined by an observable threshold variable. Occasionally, the lagged value of the dependent variable operates as the threshold variable. In other words, the threshold variable is y_{t-d} (the lagged value of y with d as the delay parameter). In this case, the model is called self-exciting threshold autoregressive (SETAR) model. However, the threshold variable does not necessarily the lagged value of the time series itself (Enders, 2010, p. 449). The threshold variable does not have to be y_{t-d} every time, but it can also be an independent variable such as x_{t-d}. Even sometimes a variable which is not included directly in the autoregressive model may function as a threshold variable, e.g. time (t) (Enders, 2010, p. 449).

Enders (2010, p. 439) expressed the basic two-regime TAR model as:

$$y_t = \alpha_1 y_{t-1} + \varepsilon_{1t} \quad \text{if } y_{t-1} > 0, \text{ and} \tag{5.1}$$

$$y_t = \alpha_2 y_{t-1} + \varepsilon_{2t} \text{ if } y_{t-1} \leq 0 \tag{5.2}$$

Equation (5.1) and (5.2) exhibits AR process where y_t is determined by its lagged value y_{t-1}. Yet, y_t in each equation is determined by different regimes which are governed by the state of y_{t-1}. Here, $y_{t-1} = 0$ serves as a threshold which segregates of the two regimes. Under the regime which lies below the threshold, one AR process controls the $\{y_t\}$ sequence, namely $\alpha_2 y_{t-1} + \varepsilon_{2t}$. On the other hand, under the other regime, the $\{y_t\}$ sequence is controlled by another AR process, namely $\alpha_1 y_{t-1} + \varepsilon_{1t}$. Equations (5.1) and (5.2) can be written as a single equation:

$$y_t = I_t \alpha_1 y_{t-1} + (1-I_t) \alpha_2 y_{t-1} + \varepsilon_t \tag{5.3}$$

In equation (5.3), $I_t = 1$ if $y_{t-1} > 0$ and $I_t = 0$ if $y_{t-1} \leq 0$ (Enders, 2010, p. 440). In this equation I_t, a dummy variable, operates as the threshold variable which represent the value of y_{t-1}.

Furthermore, if the threshold value is known the observation can be split into two groups, each for above and below the threshold value. Then each AR part can be estimated separately as ordinary least square (OLS) model to form the full TAR model. Nonetheless, in most occasions the threshold value is unknown. To identify the threshold value, Enders suggested that every possible value of the threshold variable should be run by using OLS regression (Enders, 2010, p. 444). In each OLS regression, each possible value is treated as the threshold value. The regression with the lowermost sum of square residuals has the highest consistency of the threshold (Enders, 2010, p. 444) (Hansen, 1997).

When the threshold value is known and put into the threshold model, the model is converted into an ordinary AR model (Enders, 2010, p. 449). Below the threshold, the AR model which has threshold variable $(1-I)$ works. Otherwise, the AR model with threshold variable I works. Thus, a standard F-test can be applied for testing the overall significance of the model. Nevertheless, since the threshold value is unknown, standard testing procedure cannot be applied. When the threshold value is being estimated then it is not known which one of the regimes should be tested. Fortunately, supremum test, particularly the bootstrapping method proposed by Hansen (1996), can be utilized for obtaining the appropriate critical value (Enders, 2010, p. 449).

As the critical value listed in conventional F-table cannot be used, Hansen's bootstrapping method is initiated by estimating two sums of square residuals from running two regressions of a series of normally distributed random numbers which have a mean of zero and a variance of unity. For representing this random numbers in the following discussion, e_t will be used. The number of e_t should equal the number of the actual observation. Firstly, e_t is regressed on $I_t y_{t-1}$ and $(1\text{-}It)y_{t-1}$ for every possible threshold value. This regression can be expressed as $e_t = \alpha I_t y_{t-1} + \beta(1\text{-}It)y_{t-1}$. Let the sum of square residuals generated regression be symbolized by SSR_u. Next, e_t is regressed on the actual value of y_{t-1}. The sum of squares residuals obtained from this regression shall be noted as SSR_r. If T corresponds to the number of e_t and n corresponds to the number of parameters in the second regression, then the value of F can be calculated by using the following equation:

$$F = [(SSR_r - SSR_u) / n] / [SSR_u / (T\text{-}2n)] \tag{5.4}$$

This process should be replicated several thousand times to generate a distribution of critical values (Enders, 2010, p. 450).

Subsequently, the overall significance of the TAR model can be tested by comparing the F value of the TAR model to the distribution of the generated critical values. The F^* value of the TAR model can be calculated through the following formula (Enders, 2010, p. 450):

$$F^* = [(SSR_r^* - SSR_u^*) / n] / [SSR_u^* / (T\text{-}2n)] \tag{5.5}$$

In equation (5.5), SSR_u^*represents the sum of squares residuals obtained from the best-fitting TAR model, SSR_r^* serves as a symbol for the sum of squares residuals generated from restricting the model to be linear, T signifies the number of observation, while n is the number of parameters which are assessed in the linear model.

The hypothesis of linearity can be rejected if the F^* value of the TAR model is higher than the designated percentile of the distribution of the critical values (Enders, 2010, p. 450). For example, if the F^* value of the TAR model is higher than the 95th percentile of the distribution of the critical values, then the hypothesis of linearity can be rejected at 5% significant level.

Regime switching can also be caused by changes in the parameters of autoregressive moving average (ARMA) model (Heij, de Boer, Franses, Kloek, & van Dijk, 2004, p. 616). Such changes may be due to changes in economic regimes. This situation requires the model to be modified by adjusting the parameters over time (Heij, de Boer, Franses, Kloek, & van Dijk, 2004, p. 616). If the change of the parameters occurs at a particular time and this time is known, the process can be illustrated by using this AR (2) model as (Heij, de Boer, Franses, Kloek, & van Dijk, 2004, p. 617):

$$y_t = \alpha_1 + \beta_{11} y_{t-1} + \beta_{21} y_{t-2} + D_t^+(\tau)(\alpha_2 + \beta_{12} y_{t-1} + \beta_{22} y_{t-2}) + \varepsilon_t \tag{5.6}$$

In equation (5.6), $D_t^{+}(\tau)$ is put as a dummy variable which is given the value of 1 if $t \geq \tau$ and is assigned the value of 0 if $t < \tau$. In this model, therefore, one regime is described as AR model $y_t = \alpha_1 + \varphi_{11} y_{t-1} + \varphi_{21} y_{t-2} + \varepsilon_t$ when $t < \tau$. Alternatively, the other regime is described as AR model $y_t = \alpha_1 + \varphi_{11} y_{t-1} + \varphi_{21} y_{t-2} + \alpha_2 + \varphi_{12} y_{t-1} + \varphi_{22} y_{t-2} + \varepsilon_t$ when $t \geq \tau$. The switching from one regimes to the other happens abruptly when $t = \tau$. Hence, here $t = \tau$ is considered as the threshold which separate the two regimes.

Moreover, past value of y_t, for instance y_{t-1} can serves as the threshold as well (Heij, de Boer, Franses, Kloek, & van Dijk, 2004, p. 617). That is to say regime switching occurs when y_{t-1} equals to a particular value, let say 0. To suit this variation equation (1) can be altered by replacing $D_t^{+}(\tau)$ with $D_t(y_{t-1})$. Accordingly, equation (1) is converted into (Heij, de Boer, Franses, Kloek, & van Dijk, 2004, p. 617):

$$y_t = \alpha_1 + \varphi_{11} y_{t-1} + \varphi_{21} y_{t-2} + D_t(y_{t-1})(\alpha_2 + \varphi_{12} y_{t-1} + \varphi_{22} y_{t-2}) + \varepsilon_t \qquad (5.7)$$

In equation (5.7), $D_t(y_{t-1})$ is set as 1 when $y_{t-1} \geq 0$ and is fixed 0 when $y_{t-1} < 0$. In this model, consequently, one regime is expressed as $y_t = \alpha_1 + \varphi_{11}y_{t-1} + \varphi_{21}y_{t-2} + \varepsilon_t$ when $y_{t-1} < 0$. Alternatively, the other regime is described as $y_t = \alpha_1 + \varphi_{11}y_{t-1} + \varphi_{21}y_{t-2} + \alpha_2 + \varphi_{12}y_{t-1} + \varphi_{22}y_{t-2} + \varepsilon_t$ when $y_{t-1} \geq 0$.

In the model which is advocated by Heij, de Boer, Franses, Kloek, and van Dijk, the AR model where $D_t^+(\tau) = 0$ is carried over to the next regime where $D_t^+(\tau) = 1$. As a result, when $D_t^+(\tau) = 1$, both AR models function. This study uses the model recommended by Enders instead of the one suggested by Heij, de Boer, Franses, Kloek, and van Dijk since it is easier to distinguish the effect of each AR model.

Chapter summary

This research employs inductive reasoning to reveal the correlations between the research variables. Then, quantitative method is used for defining the correlations between the research variables. This method includes linear correlation and TAR model analyses. For these analyses, secondary data obtained from BPS-Statistics Indonesia are used. Later, qualitative method is also used for discussing the findings of this research.

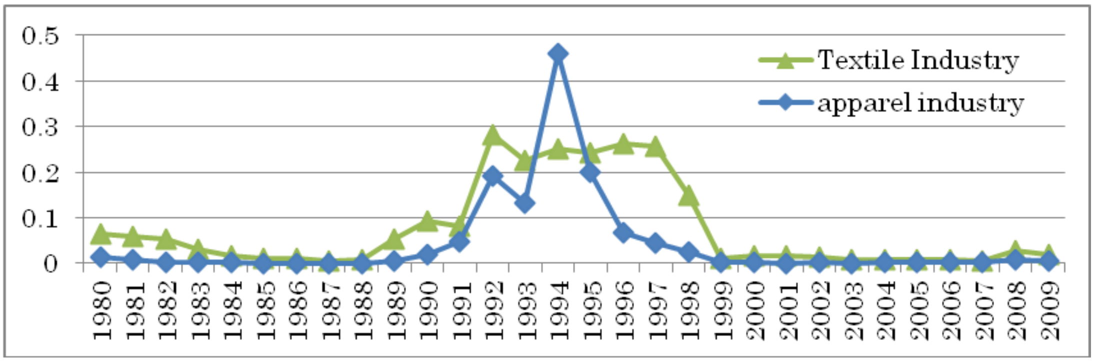
Chapter 6 Analysis and Findings

Undoubtedly, this chapter is the heart of this dissertation. This chapter details every procedure performed in this research. Basically, the analysis in this research utilizes two methods only, namely, linear regression and threshold autoregressive (TAR) model analyses. In addition, this research analyzes the correlation between import competition and four different dependent variables in two industries. These dependent variables are the number of workers, wages, and technical and scale efficiencies. Accordingly, there are eight correlations which this research scrutinizes. Both linear regression and threshold autoregressive (TAR) model analyses are performed on those eight correlations. Some people might consider it repetitive. Nonetheless, with the purpose of making it crystal clear, each procedure performed in this research is reported in this chapter.

6.1. Assessment on import competition faced by textile and apparel industries

This research defines import competition as a ratio of imports over domestic production minus export. Hence, this research makes use time series data of imports, domestic production and exports in calculating import competition. The change in import competition faced by textile and apparel industries within the period of 1980 until 2009 is depicted in Figure 6.1.

Figure 6. 1 Change in import competition faced by textile and apparel industries



Source: author's calculation

Figure 5.1 exhibits that, in the period between 1980 and 1989, import competition faced by both industries did not change much. Subsequently, there is an upsurge of import competition, which started in 1990 and ended in 1999. After that import competition moved in a similar fashion as before 1990. In addition, the change in import competition faced by textile and apparel industries within the period of 1980 until 2009 is summed up in Table 6.1.

Table 6. 1 Descriptive statistics of import competition faced by Indonesia's textile and apparel industries

Industry	Max	Min	Mean	Std. Deviation
Textile industry	0.28253	0.00588	0.07783	0.09734
Apparel industry	0.46017	0.00012	0.04394	0.09674

Source: author's calculation

Table 5.1 reports that the harshest import competition ever faced by the textile industry happened in 1992 when the level of import competition reached 0.28253. On the contrary, textile industry enjoyed the weakest import competition in 2007 when the level of import competition was merely 0.0058. Likewise, the most difficult year ever experienced by the apparel industry was 1994 when the level of import competition reached 0.46017. The weakest import competition ever faced by the apparel industry happened in 1988 when the level of import competition was only 0.00012. In addition, Table 5.1 reports standard deviation of the change in import competition. Standard deviations of import competition in textile and apparel industries could be lower if import competition did not intensify extensively between the period of 1990 and 1999.

6.2. Assessment on efficiency in textile and apparel industries

This research conducts input oriented – variable returns to scale efficiency measures. By conducting input oriented measures, this study only looks into possibilities of different sets of input which are used for producing a specific level of output. Input oriented measures are exercised because Indonesia’s textile and apparel industries consider the level of output as exogenous variable. The outputs of these two industries are pretty much determined by their buyers. Thus, in order to improve their efficiency, these industries can only deal with their inputs. Moreover, it is possible to carry out both constant returns to scale (CRS) and variable returns to scale (VRS) efficiency measures in DEA. VRS is preferred over CRS because VRS allows this research to explore scale efficiency.

In assessing input oriented efficiency, this study use three kinds of input and one output. These inputs are labors (the number of workers), wages and raw material (the cost of raw materials). The output which is used is the value of total production. In performing this efficiency assessment, this study makes use of DEAP Version 2.1 which is developed by Tim Coelli of University of New England.

Efficiency assessment by using input oriented VRS DEA model provides annual mean of technical efficiency scores and scale efficiency scores for each year from 1980 to 2009. For textile industry, the highest annual mean score of technical efficiency is 0.743 (1980), the lowest is 0.413 (1984), and the standard deviation is 0.07041. Additionally, for scale efficiency, the highest annual mean score is 0.857 (1980), the lowest is 0.093 (2009), and the standard deviation is 0.17748.

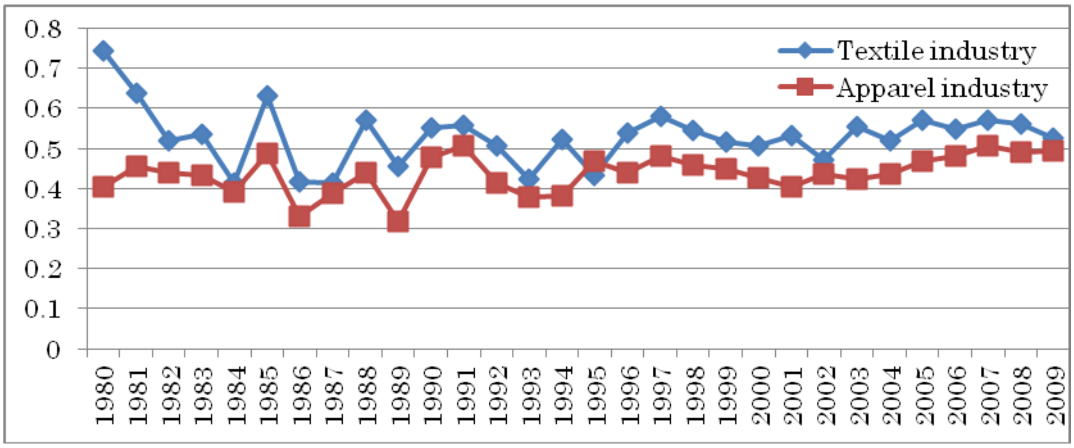
Furthermore, for apparel industry, the highest annual mean score of sefficiency is 0.506 (1991), the lowest is 0.317 (1989), and the standard deviation is 0.04716. In addition, for scale efficiency, the highest annual mean score is 0.652 (1982), the lowest is 0.178 (1985), and the standard deviation is 0.12454. Descriptive statistics of annual mean scores produced by DEA are presented on Table 6.2. In addition, the changes in technical and scale efficiencies in both textile and apparel industries are portrayed in Figures 6.2 and 6.3.

Table 6. 2 Descriptive statistics of efficiency annual mean scores

Efficiency	Max	Min	Mean	Std. Deviation
Textile industry:				
Technical efficiency	0.743	0.413	0.529333	0.070406
Scale efficiency	0.857	0.093	0.442533	0.177483
Apparel industry:				
Technical efficiency	0.506	0.317	0.4366	0.04716
Scale efficiency	0.652	0.178	0.4538	0.124545

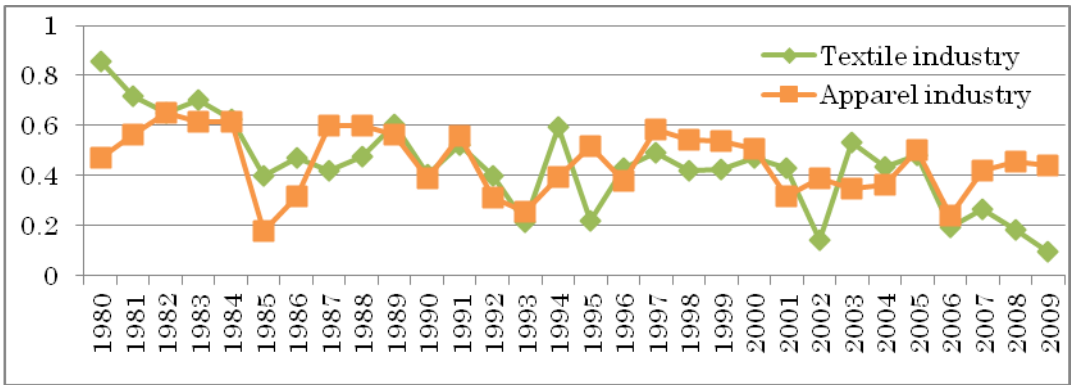
Source: author's calculation

Figure 6. 2 Changes in technical efficiency in textile and apparel industries



Source: author's calculation

Figure 6. 3 Changes in scale efficiency in textile and apparel industries



Source: author's calculation

6.3 Linear regression analysis

Linear regression analysis is employed in the early stages of this research. The main objective of this linear regression analysis is to determine the correlation between the independent variable, specifically import competition, and each dependent variable, namely the number of workers, wages, and technical and scale efficiencies in both textile and apparel industries. Determining these correlations is crucial in this research. If there is no correlation between import competition and each dependent variable, the TAR model analysis which is utilized afterward would be meaningless.

This linear regression analysis is conducted to test the first eight null hypotheses discussed in Chapter 3. These hypotheses state that import competition, as the independent variable, does not affect each dependent variable in Indonesia's textile and apparel industries. These regression analyses are conducted to discover empirical evidences which can be used to reject these null hypotheses. If these null hypotheses can be rejected, then the alternative hypotheses, which state the inverse, are accepted as true. That is to say import competition does affect each dependent variable.

The regression analyses are initiated by defining the correlation between import competition and each dependent variable. In the first analysis, the correlation between import competition and the number of workers in the textile industry is modeled as:

$$txwkr_t = \alpha_0 + \alpha_1\, txcpt_{t-1} + \alpha_2\, txwkr_{t-1} + \alpha_3\, gdp_{t-1} + \alpha_4\, ntwk_{t-1} + \alpha_5\, ntwg_{t-1} + \alpha_6\, txhhi_{t-1} + \varepsilon_t \quad (6.1)$$

In Equation (6.1), $txwkr_t$ specifies the number of workers in the textile industry, α_0 is the constant term, $txcpt_{t-1}$ specifies lagged value of import competition faced by the textile industry, α_1 specifies a parameter which corresponds to $txcpt_{t-1}$, $txwkr_{t-1}$ specifies lagged value of the number of workers in the textile industry, α_2 specifies a parameter which corresponds to $txwkr_{t-1}$, gdp_{t-1} specifies lagged value of GDP, α_3 specifies parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, α_4 specifies parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, α_5 specifies parameters which correspond to $ntwg_{t-1}$, $txhhi_{t-1}$ specifies lagged value of Herfindahl index in the textile industry, α_6 specifies parameters which correspond to $txhhi_{t-1}$, and ε unmistakably is the error term.

Subsequently, in a similar fashion the correlation between import competition and the number of workers in the apparel industry is modeled as:

$$apwkr_t = \beta_0 + \beta_1\, apcpt_{t-1} + \beta_2\, apwkr_{t-1} + \beta_3\, gdp_{t-1} + \beta_4\, ntwk_{t-1} + \beta_5\, ntwg_{t-1} + \beta_6\, aphhi_{t-1} + \varepsilon_t \qquad (6.2)$$

In Equation (6.2), $ap\mathrm{wkr}_t$ specifies the number of works in the apparel industry, β_0 is the constant term, $apcpt_{t-1}$ specifies lagged value of import competition faced by the apparel industry, β_1 specifies a parameter which corresponds to $apcpt_{t-1}$, $apwkr_{t-1}$ specifies lagged value of the number of workers in the apparel industry, β_2 specifies a parameter which corresponds to $apwkr_{t-1}$, gdp_{t-1} specifies lagged value of GDP, β_3 specifies parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, β_4 specifies parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, β_5 specifies parameters which correspond to $ntwg_{t-1}$, $aphhi_{t-1}$ specifies lagged value of Herfindahl index in the apparel industry, β_6 specifies parameters which correspond to $aphhi_{t-1}$, and of course ε is the error term.

Next, the correlation between import competition and wages in the textile industry is modeled as:

$$txwge_t = \gamma_0 + \gamma_1\, txcpt_{t-1} + \gamma_2\, txwge_{t-1} + \gamma_3\, gdp_{t-1} + \gamma_4\, ntwk_{t-1} + \gamma_5\, ntwg_{t-1} + \gamma_6\, txhhi_{t-1} + \varepsilon_t \qquad (6.3)$$

In Equation (6.3), $txwge_t$ specifies wages in the textile industry, γ_0 is the constant term, $apcpt_{t-1}$ specifies lagged value of import competition faced by the textile industry, γ_1 specifies a parameter which corresponds to $txcpt_{t-1}$, $txwge_{t-1}$ specifies lagged value of wages in the textile industry, γ_2 specifies a parameter which corresponds to $txwkr_{t-1}$, gdp_{t-1} specifies lagged value of GDP, γ_3 specifies parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, γ_4 specifies parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, γ_5 specifies parameters which correspond to $ntwg_{t-1}$, $txhhi_{t-1}$ specifies lagged value of Herfindahl index in the textile industry, γ_6 specifies parameters which correspond to $txhhi_{t-1}$, and once again ε is the error term.

Afterward, the correlation between import competition and wages in the apparel industry is modeled as:

$$apwge_t = \delta_0 + \delta_1\, apcpt_{t-1} + \delta_2\, apwge_{t-1} + \delta_3\, gdp_{t-1} + \delta_4\, ntwk_{t-1} + \delta_5\, ntwg_{t-1} + \delta_6\, aphhi_{t-1} + \varepsilon_t \qquad (6.4)$$

In Equation (6.4), $apwge_t$ specifies wages in the apparel industry, δ_0 is the constant term, $apcpt_{t-1}$ specifies lagged value of import competition faced by the apparel industry, δ_1 specifies a parameter which corresponds to $apcpt_{t-1}$, $apwge_{t-1}$ specifies lagged value of wages in the apparel industry, δ_2 specifies a parameter which corresponds to $apwkr_{t-1}$, gdp_{t-1} specifies lagged value of GDP, δ_3 specifies parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, δ_4 specifies parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, δ_5 specifies parameters which correspond to $ntwg_{t-1}$, $aphhi_{t-1}$ specifies lagged value of Herfindahl index in the apparel industry, δ_6 specifies parameters which correspond to $aphhi_{t-1}$, and ε is unambiguously the error term.

After that, the correlation between import competition and technical efficiency in the textile industry is modeled as:

$$txtcf_t = \zeta_0 + \zeta_1 \log txcpt_{t-1} + \zeta_2\ txtcf_{t-1} + \zeta_3\, gdp_{t-1} + \zeta_4\, ntwk_{t-1} + \zeta_5\, ntwg_{t-1} + \zeta_6\, txhhi_{t-1} + \varepsilon_t \qquad (6.5)$$

In equation (6.5), $txtcf_t$ specifies technical efficiency in the textile industry, ζ_0 is the constant term, $\log txcpt_{t-1}$ specifies lagged value of import competition faced by the textile industry in logarithmic form, ζ_1 specifies a parameter which corresponds to $\log txcpt_{t-1}$, $txtcf_{t-1}$ specifies lagged value of technical efficiency in the textile industry, ζ_2 specifies a parameter which corresponds to $txtcf_{t-1}$, gdp_{t-1} specifies lagged value of GDP, ζ_3 specifies parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, ζ_4 specifies parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, ζ_5 specifies parameters which correspond to $ntwg_{t-1}$, $txhhi_{t-1}$ specifies lagged value of Herfindahl index in the textile industry, ζ_6 specifies parameters which correspond to $txhhi_{t-1}$, and ε absolutely is the error term.

Then, in a similar fashion the correlation between import competition and technical efficiency in the apparel industry is modeled as:

$$aptcf_t = \eta_0 + \eta_1 \log apcpt_{t-1} + \eta_2 \; aptcf_{t-1} + \eta_3 \, gdp_{t-1} + \eta_4 \, ntwk_{t-1} + \eta_5 \, ntwg_{t-1} + \eta_6 \, aphhi_{t-1} + \varepsilon_t \tag{6.6}$$

In equation (6.6), $aptcf_t$ is technical efficiency in the apparel industry, η_0 is the constant term, $\log apcpt_{t-1}$ specifies lagged value of import competition faced by the apparel industry in logarithmic form, η_1 specifies a parameter which corresponds to $\log apcpt_{t-1}$, aptcf_{t-1} specifies lagged value of technical efficiency in the apparel industry, η_2 specifies a parameter which corresponds to $apcpt_{t-1}$, gdp_{t-1} specifies lagged value of GDP, η_3 specifies parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, η_4 specifies parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, η_5 specifies parameters which correspond to $ntwg_{t-1}$, $aphhi_{t-1}$ specifies lagged value of Herfindahl index in the apparel industry, ρ_6 specifies parameters which correspond to $aphhi_{t-1}$, and ε is obviously the error term.

Thereafter, the correlation between import competition and scale efficiency in the textile industry is modeled as:

$$txscf_t = \rho_0 + \rho_1 \log txcpt_{t-1} + \rho_2 txscf_{t-1} + \rho_3 gdp_{t-1} + \rho_4 ntwk_{t-1} + \rho_5 ntwg_{t-1} + \rho_6 txhhi_{t-1} + \varepsilon_t \quad (6.7)$$

In equation (6.7), $txscf_t$ specifies scale efficiency in the textile industry, ρ_0 is the constant term, $\log txcpt_{t-1}$ specifies lagged value of import competition faced by the textile industry in logarithmic form, ρ_1 specifies a parameter which corresponds to $\log txcpt_{t-1}$, $txscf_{t-1}$ specifies lagged value of scale efficiency in the textile industry, ρ_2 specifies a parameter which corresponds to $txscf_{t-1}$, gdp_{t-1} specifies lagged value of GDP, ρ_3 specifies parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, ρ_4 specifies parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, ρ_5 specifies parameters which correspond to $ntwg_{t-1}$, $txhhi_{t-1}$ specifies lagged value of Herfindahl index in the textile industry, ρ_6 specifies parameters which correspond to $txhhi_{t-1}$, and once again ε is the error term.

And lastly, in the same way the correlation between import competition and scale efficiency in the apparel industry is modeled as:

$$apscf_t = \sigma_0 + \sigma_1 \ ln \ apcpt_{t-1} + \sigma_2 \ aptcf_{t-1} + \sigma_3 \ gdp_{t-1} + \sigma_4 \ ntwk_{t-1} + \sigma_5 \ ntwg_{t-1} + \sigma_6 \ aphhi_{t-1} + \varepsilon_t \quad (6.8)$$

In equation (6.8), $apscf_t$ specifies scale efficiency in the apparel industry, σ_0 is the constant term, $log\ apcpt_{t-1}$ specifies lagged value of import competition faced by the apparel industry in logarithmic form, σ_1 is a parameter which correspond to $log\ apcpt_{t-1}$, $apscf_{t-1}$ specifies lagged value of scale efficiency in the apparel industry, σ_2 is a parameter which correspond to $apscf_{t-1}$, gdp_{t-1} specifies lagged value of GDP, σ_3 specifies parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, σ_4 specifies parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, σ_5 specifies parameters which correspond to $ntwg_{t-1}$, $aphhi_{t-1}$ specifies lagged value of Herfindahl index in the apparel industry, σ_6 specifies parameters which correspond to $aphhi_{t-1}$, and of course ε is the error term.

In these correlations, import competition is introduced as lagged value. The purpose of using lagged value of import competition is to give a chance for the number of workers, wages, and technical and scale efficiencies in textile and apparel industries to respond to changes in import competition. Import competition may not immediately affect these dependent variables in both industries. It takes some time before the impact of import competition is responded by these dependent variables. There is no fix rule regarding the length of the lag period. Nevertheless, several previous studies made use one year lag in their analysis. Therefore, following Oscarsson (2000), one year lag of import competition is utilizes in this analysis.

Moreover, in these correlations immediate lagged value of the dependent variables are brought in as independent variables. It is assumed in this analysis that the current number of workers, wages, and technical and scale efficiencies in a firm are affected by its past number of workers, wages, and technical and scale efficiencies. In addition, it is deemed best to uses only immediate lagged value of the dependent variables since the effect of lagged values wears off as the period gets longer.

The 1997 Asian financial crisis is included in the analysis because it is believed in this research that the crisis has significant macroeconomic-level effect on Indonesia. The crisis began to grasp Indonesia's rupiah in July 1997, but the hardest hit was experienced in November 1997. Before the crisis, the Rupiah was exchanged approximately at 2.600 for 1 US dollar. The exchange rate between the rupiah and the US dollar plunged to over 14.000 rupiah to 1 US dollar in January 1998. Immediate perception may suggest that lower rupiah exchange rate was advantageous for fostering exports. However, numerous Indonesian firms, including firms in textile and apparel industries have foreign debt in US dollars. These firms were instantaneously caught in financial catastrophe. They faced huge problem in financing their debt, as well as working capital. This crisis affected their production eventually. In this analysis, the crisis is introduced as a dummy variable. This variable separates the behavior of the two industries before and after the crisis. Therefore, the behavior of each dependent variable before and after the crisis can be compared to see the impact of the crisis.

As this study takes into account the principle of Pareto efficiency, the relationship between import competition and efficiency is not analyzed by using linear independent variable. As the independent variable should have diminishing marginal returns on the dependent variable, the relationship between these variables should be set as the level-log form (Woolridge, 2009, p. 704). That is a regression form where the dependent variable is stated in level form while the independent variable is put in logarithmic form (Woolridge, 2009, p. 841). Since it is assumed that import competition has diminishing marginal returns on efficiency then it would be appropriate if import competition, as the independent variable, is put in logarithmic form.

After the correlations between import competition and all dependent variables are defined, non-stationary trend of the time series data needs to be detected. This stage of the analysis is performed to verify whether the first assumption discussed in Chapter 5 has been satisfied. This research employs Augmented Dickey-Fuller (ADF) test to detect this trend.

The ADF test was originally proposed by David Alan Dickey and Wayne Arthur Fuller (1979). The null hypothesis which is examined by the ADF test states that the time series data is non-stationary (Wooldridge, 2009, p. 631). The ADF test produces negative statistics. The null hypothesis can be rejected if the ADF statistics is lower than the critical value at the designated significance level. Thus, the more negative the ADF statistic, the stronger the rejection of the null hypothesis at some significance level. Wooldridge (2009, p. 632) compiled large sample critical values for several significant levels. These critical values are -3.43, -3.12, -2.86, and -2.57 for 1%, 2.5%, 5%, and 10% significant level respectively. This test is executed by using *dfuller* command in Stata. The complete results of the ADF test are presented in Table 6.3.

The ADF test indicates that technical efficiency, lagged value of technical efficiency, scale efficiency and lagged value of scale efficiency in both textile and apparel industries are integrated of order 0. Concentration ratio (Herfindahl index of the apparel industry is integrated of order 0 as well. In other words, these variables are all stationary. This test also indicates that all other variables are non-stationary. Most of other variables are integrated of order 1. The exception is lagged value of the number of workers in the textile industry, which is integrated of order 2, and gross domestic product and wages of the manufacturing sector, which is integrated of order 3.

Table 6. 3 ADF test statistics

Variable	Stationary	Statistic	5% Critical value
Textile industry			
Lagged value of import competition	1	-4.953	-2.994
Lagged log value of imp. competition	1	-3.925	-2.994
Number of workers	1	-3.558	-2.992
Lagged value of the number of workers	2	-6.009	-2.997
Wages	1	-5.069	-2.992
Lagged value of wages	1	-3.246	-2.994
Technical efficiency	0	-6.055	-2.989
Lagged value of technical efficiency	0	-5.927	-2.992
Scale efficiency	0	-3.416	-2.989
Lagged value of scale efficiency	0	-3.83	-2.992
Concentration ratio (HI)	1	-8.323	-2.992
Apparel industry			
Lagged value of import competition	1	-6.955	-2.994
Lagged Log value of imp. competition	1	-4.19	-2.994
Number of workers	1	-4.694	-2.992
Lagged value of the number of workers	1	-4.893	-2.994
Wages	1	-5.19	-2.992
Lagged value of wages	1	-5.182	-2.994
Technical efficiency	0	-4.421	-2.989
Lagged value of scale efficiency	0	-4.535	-2.992
Scale efficiency	0	-4.018	-2.989
Lagged value of scale efficiency	0	-3.944	-2.992
Concentration ratio (HI)	0	-3.494	-2.989
Control variables			
GDP	3	-4.435	-2.994
Number of workers in mfg. sector	1	-3.827	-2.992
Wages in in manufacturing sector	3	-4.127	-2.994

Source: author's calculation

Time series data which are non-stationary have to be converted to stationary. This conversion can be made through the process of differencing (Ramanathan, 2002, p. 518). Suppose a correlation is modeled as $y_t = \beta_0 + \beta_1 x_t + \varepsilon_t$. The first difference of y_t is defined as $\Delta y_t = y_t - y_{t-1}$. In addition, the second difference is defined as the first difference of the first difference (Ramanathan, 2002, p. 518). The second difference is obtained by differencing the first difference. Hence, the second difference of y_t is defined as $\Delta^2 y_t = (y_t - y_{t-1}) - (y_{t-1} - y_{t-2}) = y_t - 2y_{t-1} - y_{t-2}$. Non-stationary variables, in this research, which are integrated of order 1 go through the first differencing to make them stationary. The lagged value of the number of workers in the textile industry is stationary after the second differencing.

Subsequently, the correlation between the independent variables and the error terms is assessed in this analysis. The pairwise correlation shows that the independent variables are uncorrelated with the error terms. In other words, these independent variables are not endogenous explanatory variables. Therefore, the regression models would not be bothered by endogeneity problem. Moreover, the pairwise correlation also indicates that only weak correlations among independent variables are detected. There is no perfect collinearity between the independent variables.

After the problem of non-stationary and collinearity are addressed, the analysis is continued by conducting test for homoscedasticity of the correlation models. Linear regression requires that the variance of the residuals, conditional on the independent variables, is constant (Wooldridge, 2009, p. 264). Then, it can be assumed that the variance of the residuals does not depend on the independent variable. Accordingly, the null hypothesis of homokedasticity can be composed as H_0: $E(u^2|x_1, x_2, x_3, \ldots, x_k) = E(u^2) = \sigma^2$ (Wooldridge, 2009, p. 272). Here, u^2 denotes the squared residuals. If this null hypothesis is rejected, it should be considered that the correlation model suffers from heteroskedasticity problem. For detecting this problem, Breusch-Pagan test and White test are employed.

Breusch-Pagan test was named after Trevor S. Breusch and Adrian R. Pagan (1979) who initially proposed the test. It is assumed in the Breusch-Pagan test that if the null hypothesis of homokedasticity is false, then the estimated value of u^2 can be a function of any independent variable. Hence, Breusch-Pagan test detects heteroskedasticity problem by regressing the squared residuals on the independent variables (Wooldridge, 2009, p. 272). The model of the Breusch-Pagan test can be written as $\hat{u}^2 = \delta_0 + \delta_1 x_1 + \delta_2 x_2 + \ldots + \delta_k x_k + error$. The null hypothesis of this test can be written as H_0: $\delta_1 = \delta_2 = \ldots = \delta_k = 0$. This test is executed by using *estat hettest* command in Stata.

White test is an alternative of the Breusch-Pagan test. This test was initially proposed by Halbert White (1980). Unlike the Breusch-Pagan test, this test detects heteroskedasticity problem by regressing the squared residuals on the independent variables, the squares of the independent variables and all the non-redundant interactions of the independent variables (Wooldridge, 2009, p. 275). The model of the White test with k = 3 independent variables can be written as $\hat{u}^2 = \delta_0 + \delta_1 x_1 + \delta_2 x_2 + \delta_3 x_3 + \delta_4 x_1^2 + \delta_5 x_2^2 + \delta_6 x_3^2 + \delta_7 x_1 x_2 + \delta_8 x_1 x_3 + \delta_9 x_2 x + error$. The null hypothesis of this test can be written as H_0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = \delta_8 = \delta_9 = 0$. This test is run by using *whitetst* command in Stata.

The Breusch-Pagan test discloses that the null hypotheses of homoskedasticity have to be rejected at 95% confidence level for six of the correlations. Two correlations where the null hypotheses can be accepted are the correlations between import competition and technical efficiency in the textile industry and between import competition and the number of workers in the apparel industry. However, the White test discloses that the null hypotheses of homoskedasticity have to be rejected at 95% confidence level for the correlations between import competition and the number of workers in the apparel industry. Therefore, heteroskedasticity problem should be addressed in the regression analysis of seven correlations. The overall results of these heteroskedasticity tests are presented on Table 6.4.

Table 6. 4 White test and Breusch-Pagan test statistics

Dependent variable	Breusch-Pagan test		White test	
	chi2(1)	Prob > chi2	chi2(8)	P-value
Textile industry				
Number of workers	0.15	0.6974	8.19	0.2246
Wages	0.02	0.8814	9.10	1.0000
Technical efficiency	4.50	0.0339	13.81	0.0318
Scale efficiency	0.03	0.8568	3.18	0.7864
Apparel industry				
Number of workers	6.76	0.0093	1.19	0.2744
Wages	0.15	0.7026	10.07	0.1216
Technical efficiency	2.04	0.1529	3.64	0.7249
Scale efficiency	0.00	0.9446	0.9446	0.7437

Source: author’s calculation

Afterward, this research also investigate the possibility of serial correlation problem. This problem occurs when there is a correlation between errors in different time periods (Wooldridge, 2009, p. 845). Durbin's alternative test and Breusch-Godfrey LM test are employed in detecting this problem.

Traditionally, the presence of serial correlation is detected by employing Durbin-Watson test. However, the *d* statistics produced by Durbin-Watson test is biased toward 2.0 when lagged dependent variable or predetermined regressors present (Baum, 2006, p. 157) (Ramanathan, 2002, p. 447). As a result, serial correlation is underestimated. In this analysis, lagged dependent variable is used as one of the regressors. Accordingly, Durbin's Alternative test is employed. This test is suggested by James Durbin (1970) as an improvement of the Durbin-Watson test. Durbin's Alternative test is developed based on the idea of Lagrange Multiplier (LM) testing. This test produced *h* statistics which is estimated by regressing residuals on their lagged values and the original X matrix. The null hypothesis in this test maintains that the residual is not correlated with its lagged values. This test is executed by using *estat durbinalt* command in Stata.

Inopportunely, Durbin's Alternative test is not applicable when the serial correlation is of a higher order (Ramanathan, 2002, p. 448). In this case, Breusch-Godfrey test is more appropriate. Durbin's Alternative test is asymptotically equivalent to the Breusch-Godfrey test. Breusch-Godfrey test is named after Trevor S. Breusch and Leslie G. Godfrey who originally introduced it (Breusch, 1978) (Godfrey, 1978). Similar to Durbin's Alternative test, this test is also an LM test. Moreover, this test utilizes null hypothesis of no serial correlation. This test is executed by using *estat bgodfrey* command in Stata.

The results of the Durbin's alternative test reveal that the null hypotheses of no serial correlation have to be rejected at for most of the correlations. Correlation where the null hypothesis can be accepted is the correlation between import competition and wages in the apparel industry. Additionally, the results of the Breusch-Godfrey LM test confirm the results of Durbin's alternative test. Thus, this analysis needs to deal with the problem of serial correlation. The full results of these tests can be seen on Table 6.5.

Table 6. 5 Durbin's alternative test and Breusch-Godfrey LM test statistics

Dependent variable	Durbin's alternative test		Breusch-Godfrey LM test	
	chi2	Prob > chi2	chi2	Prob > chi2
Textile industry				
Number of workers	1.451	0.2284	1.916	0.1663
Wages	0.247	0.6189	0.347	0.5558
Technical efficiency	0.000	0.9939	0.000	0.9928
Scale efficiency	0.021	0.8853	0.030	0.8636
Apparel industry				
Number of workers	0.315	0.5746	0.440	0.5069
Wages	6.000	0.0143	6.480	0.0109
Technical efficiency	2.209	0.1372	2.813	0.0935
Scale efficiency	2.014	0.1558	2.588	0.1077

Source: author’s calculation

As mentioned earlier, both Breusch-Godfrey LM test and Durbin’s alternative test reveal the presence of serial correlation problem where the error term is not independent and identically distributed (non-i.i.d.). When this problem presents, OLS regression becomes inefficient. There are two options for solving this problem. The first option is carried out by incorporating an explicit specification of the non-i.i.d. error term into the linear model (Baum, 2006, p. 133). Thus, the first option produces more efficient estimators. In this analysis, this option is performed by utilizing Prais-Winsten regression. The second option is carried out by correcting the variance covariance estimators (VCE) to account for non-i.i.d. error term (Baum, 2006, p. 133). This option produces more robust estimators.

In this analysis, this option is performed by utilizing regression with Newey-West standard error.

Prais-Winsten estimator is a feasible generalized least square (FGLS) estimator. This estimator was originally introduced by S.J. Prais and C.B. Winsten (1954) as an improvement to the Cochrane-Orcutt estimator (Cochrane & Orcutt, 1949). Suppose a linear model is written as $y_t = \beta_0 + \beta_1 X_t + \varepsilon_t$, where X_t is a matrix of independent variables. If this model suffers from serial correlation problem, then $\varepsilon_t = \rho\varepsilon_{t-1} + e_t$, $|\rho| < 1$, where e_t is a white noise. In this analysis ρ is unknown, so that generalized least square (GLS) cannot be employed. Opportunely, estimated ρ can be obtained from regressing estimated ε_t on estimated ε_{t-1} so that the estimator becomes feasible. That is why this estimator is known as FGLS.

Cochrane-Orcutt procedure transforms the original model into $y_t - \rho y_{t-1} = \beta_0 (1-\rho) + \beta_1(X_t - \rho X_{t-1}) + e_t$ so as to make it more efficient (Cochrane & Orcutt, 1949, p. 58). This Cochrane-Orcutt procedure is performed repeatedly until there is no substantial change of ρ can be observed. As the Cochrane-Orcutt procedure uses first difference, the first observation is omitted. This omission brings immense implication to this analysis which uses only 29 observations. Thus, the Prais-Winsten procedure, which keeps the first observation, is more efficient than the Cochrane-Orcutt procedure. The Prais-Winsten procedure transforms the original model for $t = 1$ into $(1 - \rho^2)^{1/2}\, y_1 = (1 - \rho^2)^{1/2}\beta_0 + (1 - \rho^2)^{1/2}\beta_1 X_1 + (1 - \rho^2)^{1/2} e_t$ (Wooldridge, 2009, p. 420). Similar to the Cochrane-Orcutt procedure, this procedure is also performed repeatedly until there is no substantial change of ρ can be observed. In addition, robust standard error is also utilized to treat heteroskedasticity problem. This regression is executed by using *estat bgodfrey* command in Stata.

Newey-West standard error is originally introduced by Whitney K. Newey and Kenneth D. West (Newey & West, 1987). This standard error is fundamentally similar to heteroskedasticity-consistent standard error. As an addition, Newey-West standard error adjusts serial correlation by using weighted cross products of the residuals (Baum, 2006, p. 140). As the effect of the cross products diminishes over time, the most recent one receives more weight. Accordingly, the maximum number of lags of the residuals needs to be specified. Some scholars proposed a number of methods to choose the appropriate number of lags. Some of them are $L = (N)^{-4}$, $L = 0.75N^{1/3}$, and $L = 4(N/100)^{2/9}$, where L denotes the number of lags, and N denotes the number of samples (Baum, 2006, p. 140) (Adkins & Hill, 2008, p. 216). For 29 observations used in this analysis, the results of those methods do not differ much. Thus, in this analysis 3 lags are used. Newey-West standard error is effective for treating both heteroskedasticity and serial correlation problem. That is why regression with Newey-West standard error is called heteroskedasticity and autocorrelation consistent (HAC) estimator. This regression is executed by using *estat bgodfrey* command in Stata.

The results of the Prais-Winsten regressions are exhibited as Equations 6.9 up to 6.16 (the numbers in parentheses are the standard errors of the estimator).

$$txwkr_t = 1830.268\ (4540.737) - 110306\ (50093.49)\ txcpt_{t-1} - 0.2219\ (0.099595)\ txwkr_{t-1} - 6.3\text{E-}08\ (1.17\text{E-}07)\ gdp_{t-1} - 0.02897\ (0.022075)\ ntwk_{t-1} + 2.38\text{E-}06\ (7.37\text{E-}07)\ ntwg_{t-1} + 1981757\ (1052962)\ txhhi_{t-1} \quad (6.9)$$

$$apwkr_t = 1247.51\ (280.9495) - 4638.568\ (1823.56)\ apcpt_{t-1} + 0.691397\ (0.076349)\ apwkr_{t-1} - 1.34\text{E-}08\ (4\text{E-}09)\ gdp_{t-1} - 0.00219\ (0.000684)\ ntwk_{t-1} - 8.09\text{E-}08\ (3.62\text{E-}08)\ ntwg_{t-1} + 65852.02\ (10891.14)\ aphhi_{t-1} \quad (6.10)$$

$$txwge_t = 4383558\ (556324.7) - 7655637\ (3574555)\ txcpt_{t-1} + 0.30963\ (0.089162)\ txwge_{t-1} - 1.12\text{E-}06\ (3.75\text{E-}06)\ gdp_{t-1} + 0.067819\ (0.628211)\ ntwk_{t-1} - 1.82\text{E-}05\ (2.11\text{E-}05)\ ntwg_{t-1} - 31435910\ (49448960)\ txhhi_{t-1} \quad (6.11)$$

$apwge_t$ = 804677.1 (411254.4) – 1817576 (739106.4) $apcpt_{t-1}$ + 0.711771 (0.097646) $apwge_{t-1}$ + 3.74E-06 (1.14E-06) gdp_{t-1} – 0.069124 (0.610659) $ntwk_{t-1}$ + 0.00012 (1.59E-05) $ntwg_{t-1}$ + 13297424 (9947540) $aphhi_{t-1}$ (6.12)

$txtcf_t$ = 0.356891 (0.035826) + 0.092729 (0.045045) $log\ txcpt_{t-1}$ + 0.138685 (0.087369) $txtcf_{t-1}$ + 8.49E-13 (4.94E-13) gdp_{t-1} – 4.44E-08 (1.01E-07) $ntwk_{t-1}$ – 7.88E-13 (1.93E-12) $ntwg_{t-1}$ + 4.608912 (2.219066) $txhhi_{t-1}$ (6.13)

$aptcf_t$ = 0.335843 (0.059226) + 0.018559 (0.003862) $log\ apcpt_{t-1}$ + 0.209971 (0.13279) $aptcf_{t-1}$ + 2.66E-13 (8.29E-14) gdp_{t-1} – 1.02E-07 (5.32E-08) $ntwk_{t-1}$ + 1.73E-12 (4.55E-13) $ntwg_{t-1}$ + 0.29777 (0.48982) $aphhi_{t-1}$ (6.14)

$txscf_t$ = –0.029597 (0.019122) + 0.057272 (0.023231) $log\ txcpt_{t-1}$ – 0.229817 (0.049552) $txscf_{t-1}$ + 8.11E-14 (5.19E-13) gdp_{t-1} + 4.79E-07 (4.83E-08) $ntwk_{t-1}$ – 2.05E-11 (2.69E-12) $ntwg_{t-1}$ + 0.292407 (4.59598) $txhhi_{t-1}$ (6.15)

$apscf_t$ = 0.28325 (0.034444) + 0.02238 (0.009850) $log\ apcpt_{t-1}$ + 0.22498 (0.092558) $aptcf_{t-1}$ + 3.58E-13 (1.84E-13) gdp_{t-1} + 6.47E-08 (5.34E-08) $ntwk_{t-1}$ – 2.03E-12 (1.3E-12) $ntwg_{t-1}$ + 1.783479 (0.884484) $aphhi_{t-1}$ (6.16)

The results of the regressions with Newey-West standard error are exhibited by Equations 6.17 up to 6.24 (the numbers in parentheses are the Newey-West standard errors of the estimator).

$txwkr_t$ = 1990.141 (4701.529) – 116133.9 (51805.23) $txcpt_{t-1}$ – 0.2336215 (0.1027075) $txwkr_{t-1}$ – 6.65e-08 (1.21e-07) gdp_{t-1} – 0.0294448 (.022857) $ntwk_{t-1}$ + 2.51e-06 (7.63e-07) $ntwg_{t-1}$ + 2090675 (1090248) $txhhi_{t-1}$ (6.17)

$apwkr_t$ = 1302.894 (290.8982) – 4915.234 (1888.134) $apcpt_{t-1}$ + 0.7331914 (0.0790521) $apwkr_{t-1}$ – 1.41e-08 (4.14e-09) gdp_{t-1} – 0.0023062 (0.0006874) $ntwk_{t-1}$ – 8.52e-08 (3.75e-08) $ntwg_{t-1}$ + 69333.45 (11276.81) $aphhi_{t-1}$ (6.18)

$txwge_t$ = 4615186 (576024.7) – 8060126 (3699063) $txcpt_{t-1}$ + 0.3259894 (0.0929401) $txwge_{t-1}$ – 1.18e-06 (3.88e-06) gdp_{t-1} + 0.0714337 (0.6504563) $ntwk_{t-1}$ – 0.0000192 (0.0000218) $ntwg_{t-1}$ – 3.31e+07 (5.12e+07) $txhhi_{t-1}$ (6.19)

$apwge_t$ = 847192.6 (425713.8) – 1913609 (765278.9) $apcpt_{t-1}$ + 0.749378 (0.101104) $apwge_{t-1}$ + 3.94e-06 (1.18e-06) gdp_{t-1} – 0.0727658 (0.6322832) $ntwk_{t-1}$ + 0.0001262 (0.0000165) $ntwg_{t-1}$ + 1.40e+07 (1.03e+07) $aphhi_{t-1}$ (6.20)

$txtcf_t$ = 0.3757475 (0.0370949) + 0.0976178 (0.0466406) $log\ txcpt_{t-1}$ + 0.1460124 (0.0904628) $txtcf_{t-1}$ + 8.94e-13 (5.12e-13) gdp_{t-1} – 4.67e-08 (1.05e-07) $ntwk_{t-1}$ – 8.30e-13 (2.00e-12) $ntwg_{t-1}$ + 4.852416 (2.297645) $txhhi_{t-1}$ (6.21)

$aptcf_t$ = 0.3535871 (0.0612199) + 0.0195184 (0.0039992) $log\ apcpt_{t-1}$ + 0.221065 (0.1364573) $aptcf_{t-1}$ + 2.80e-13 (8.58e-14) gdp_{t-1} – 1.07e-07 (5.51e-08) $ntwk_{t-1}$ + 1.82e-12 (4.71e-13) $ntwg_{t-1}$ + 0.3134394 (0.5071654) $aphhi_{t-1}$ (6.22)

$txscf_t$ = –0.0311607 (0.019696) + 0.0602979 (0.0239499) $log\ txcpt_{t-1}$ – 0.2419599 (0.0513068) $txscf_{t-1}$ + 8.54e-14 (5.37e-13) gdp_{t-1} + 5.04e-07 (5.00e-08) $ntwk_{t-1}$ – 2.16e-11 (2.79e-12) $ntwg_{t-1}$ + 0.3078564 (4.758728) $txhhi_{t-1}$ (6.23)

$apscf_t$ = 0.2982155 (0.035664) + 0.0235622 (0.0101997) $log\ apcpt_{t-1}$ + 0.2368669 (0.0958307) $aptcf_{t-1}$ + 3.77e-13 (1.90e-13) gdp_{t-1} + 6.81e-08 (5.53e-08) $ntwk_{t-1}$ – 2.14e-12 (1.35e-12) $ntwg_{t-1}$ + 1.877499 (0.9158043) $aphhi_{t-1}$ (6.24)

The Prais-Winsten regression indicates that import competition on each industry has a negative impact on the number of workers and wages in both industries. This regression also indicates that import competition has positive impact on technical and scale efficiencies of these industries. In addition, all t-values produced by this regression imply that all null hypotheses are on the rejection region with at least 5% significance level. Accordingly, it can be concluded that all correlations are statistically significant.

The regression with Newey-West standard error produces results which are in line with the results of Prais-Winsten regression. The magnitudes of the impacts are similarly small. All t-values produced by this regression also imply that all null hypotheses are on the rejection region. Nevertheless, some null hypotheses cannot be rejected at 5% significance level. Null hypotheses in the correlation between import competition and technical efficiency in the textile industry can only be rejected at 10% significance level. Null hypotheses in the correlation between import competition and scale efficiency in the apparel industry also can only be rejected at 10% significance level.

6.4. TAR model analysis

The linear regression analysis has proved that all of the first eight null hypotheses presented in Chapter 4 can be rejected, and the alternative hypotheses as accepted as true. This linear regression analysis has found empirical evidence that there are negative correlations between import competition and the number of workers and between import competition and wages in Indonesia's textile and apparel industries. This analysis has also found empirical evidence that there are positive correlations between import competition and technical efficiency and between import competition and scale efficiency in these two industries. By finding these empirical evidences, the linear regression analysis clears the way for further inquiry on any of these correlations. Thus, this research can be continued to explore the threshold values of import competition in these correlations.

The TAR model analysis is conducted to test the subsequent eight null hypotheses deliberated in Chapter 3. These hypotheses state that individual correlation between import competition and each dependent variable in Indonesia's textile and apparel industries are linear. The TAR model analysis is conducted to find empirical evidence against these null hypotheses. When these null hypotheses can be rejected, then the alternative hypotheses, which state the opposite, are accepted as true. That means those correlations are, in fact, non-linear. In this research, the non-linearity of the correlation is indicated by the presence of two regimes, which are separated by a threshold. Finding the value of this threshold becomes the main objective of this research.

In the following analysis, TAR model proposed by Enders is employed. In the model which is proposed by Heij, de Boer, Franses, Kloek and van Dijk the impact of AR model where $D_t^+(\tau) = 0$ is carried over to the next regime where $D_t^+(\tau) = 1$. As a result, when $D_t^+(\tau) = 1$, both AR models jointly function. Hence, it would be difficult to differentiate the effect of import competition within the regime beyond the threshold value. This study prefers to use the model recommended by Enders since it is easier to distinguish the impact of each AR model in different regimes.

The basic two-regime TAR model discussed in Chapter 4 uses lagged value of dependent variable y_{t-1} functions as the threshold variable. In the following analyses, that basic two-regime TAR model is extended by introducing lagged value of import competition as the threshold variable. That is to say, in this analysis the lagged value of import competition replaces the lagged value of dependent variable y_{t-1}. As a result, the threshold values in the correlations which are analyzed in this research are determined by the value import competition faced individually by Indonesia's textile and apparel industries.

Besides the introduction of lagged value of import competition as the threshold variable, the basic two-regime TAR model is extended further. Chapter 4 presents basic two-regime TAR model which uses 0 as the threshold value. Instead of 0, the TAR models which are utilized in the following analyses use τ. When τ is determined beforehand, solving the two-regime TAR model would not be too difficult. The two regimes of the TAR model can be distinguished easily if τ is known. Then, the data can be split into two sets, one set for the AR model where threshold variable is higher than τ and another set for the AR model where threshold variable is lower than τ. After that, separate OLS regression should be run to solve each AR model. Successively, the results of the OLS define the two regimes of the TAR model.

Unfortunately, the value of τ is unknown prior to this TAR model analysis. Indeed, finding the value of τ is the ultimate objective of this research. Since import competition is identified in this research as the threshold variable, the value of τ is determined by the value of import competition. Following Enders, each observed value of import competition should be examined to indicate the appropriate value of τ.

This analysis is instigated by defining the TAR model for individual correlation between import competition and each dependent variable. In this first analysis, the TAR model regarding the correlation between import competition and the number of workers in the textile industry is formulated as:

$$txwkr_t = I_t[\alpha_{10} + \alpha_{11}\, txcpt_{t-1} + \alpha_{12}\, txwkr_{t-1} + \alpha_{13}\, gdp_{t-1} + \alpha_{14}\, ntwk_{t-1} + \alpha_{15}\, ntwg_{t-1} + \alpha_{16}\, txhhi_{t-1}] + (1-I_t)[\alpha_{20} + \alpha_{21}\, txcpt_{t-1} + \alpha_{22}\, txwkr_{t-1} + \alpha_{23}\, gdp_{t-1} + \alpha_{24}\, ntwk_{t-1} + \alpha_{25}\, ntwg_{t-1} + \alpha_{26}\, txhhi_{t-1}] + \varepsilon_t \quad (6.25)$$

In Equation (6.25), $txwkr_t$ specifies the number of workers in the textile industry, α_{10} and α_{20} specify the constant terms, $txcpt_{t-1}$ specifies lagged value of import competition faced by the textile industry, α_{11} and α_{21} specify parameters which correspond to $txcpt_{t-1}$, $txwkr_{t-1}$ specifies lagged value of the number of workers in the textile industry, α_{12} and α_{22} specify parameters which correspond to $txwkr_{t-1}$, gdp_{t-1} specifies lagged value of GDP, α_{13} and α_{23} specify parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, α_{14} and α_{24} specify parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, α_{15} and α_{25} specify parameters which correspond to $ntwg_{t-1}$, $txhhi_{t-1}$ specifies lagged value of Herfindahl index in the textile industry, α_{16} and α_{26} specify parameters which correspond to $txhhi_{t-1}$, and ε specifies the error term. In this equation, I_t equals to 1 if $txcpt_{t-1} > \tau$. Instead, I_t equals to 0 if $txcpt_{t-1} \leq \tau$. If $txcpt_{t-1} \leq \tau$, Equation (6.25) is converted into $txwkr_t = \alpha_{20} + \alpha_{21}\ txcpt_{t-1} + \alpha_{22}\ txwkr_{t-1} + \alpha_{23}\ gdp_{t-1} + \alpha_{24}\ ntwk_{t-1} + \alpha_{25}\ ntwg_{t-1} + \alpha_{26}\ txhhi_{t-1} + \varepsilon_t$. Alternatively, Equation (6.25) is converted into $txwkr_t = \alpha_{10} + \alpha_{11}\ txcpt_{t-1} + \alpha_{12}\ txwkr_{t-1} + \alpha_{13}\ gdp_{t-1} + \alpha_{14}\ ntwk_{t-1} + \alpha_{15}\ ntwg_{t-1} + \alpha_{16}\ txhhi_{t-1} + \varepsilon_t$ if $txcpt_{t-1} > \tau$.

Next, the TAR model regarding the correlation between import competition and the number of workers in the apparel industry is formulated as:

$$apwkr_t = I_t[\beta_{10} + \beta_{11}\ apcpt_{t-1} + \beta_{12}\ apwkr_{t-1} + \beta_{13}\ gdp_{t-1} + \beta_{14}\ ntwk_{t-1} + \beta_{15}\ ntwg_{t-1} + \beta_{16}\ aphhi_{t-1}] + (1-I_t)[\beta_{20} + \beta_{21}\ apcpt_{t-1} + \beta_{22}\ apwkr_{t-1} + \beta_{23}\ gdp_{t-1} + \beta_{24}\ ntwk_{t-1} + \beta_{25}\ ntwg_{t-1} + \beta_{26}\ aphhi_{t-1}] + \varepsilon_t \tag{6.26}$$

In Equation (6.26), $apwkr_t$ specifies the number of workers in the apparel industry,

β_{10} and β_{20} specify the constant terms, $apcpt_{t-1}$ specifies lagged value of import competition faced by the apparel industry, β_{11} and β_{21} specify parameters which correspond to $apcpt_{t-1}$, $apwkr_{t-1}$ specifies lagged value of the number of workers in the apparel industry, β_{12} and β_{22} specify parameters which correspond to $apwkr_{t-1}$, gdp_{t-1} specifies lagged value of GDP, β_{13} and β_{23} specify parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, β_{14} and β_{24} specify parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, β_{15} and β_{25} specify parameters which correspond to $ntwg_{t-1}$, $aphhi_{t-1}$ specifies lagged value of Herfindahl index in the apparel industry, β_{16} and β_{26} specify parameters which correspond to $aphhi_{t-1}$, and ε specifies the error term. In this equation, I_t equals to 1 if $apcpt_{t-1} > \tau$. Alternatively, I_t equals to 0 if $apcpt_{t-1} \leq \tau$. If $apcpt_{t-1} \leq \tau$, Equation (6.26) is turned into $apwkr_t = \beta_{20} + \beta_{21}\ apcpt_{t-1} + \beta_{22}\ apwkr_{t-1} + \beta_{23}\ gdp_{t-1} + \beta_{24}\ ntwk_{t-1} + \beta_{25}\ ntwg_{t-1} + \beta_{26}\ aphhi_{t-1} + \varepsilon_t$. Otherwise, Equation (6.26) is turned into $apwkr_t = \beta_{10} + \beta_{11}\ apcpt_{t-1} + \beta_{12}\ apwkr_{t-1} + \beta_{13}\ gdp_{t-1} + \beta_{14}\ ntwk_{t-1} + \beta_{15}\ ntwg_{t-1} + \beta_{16}\ aphhi_{t-1} + \varepsilon_t$ if $apcpt_{t-1} > \tau$.

Afterwards, the TAR model regarding the correlation between import competition and wages in the textile industry is formulated as:

$$txwge_t = I_t[\gamma_{10} + \gamma_{11}\ txcpt_{t-1} + \gamma_{12}\ txwge_{t-1} + \gamma_{13}\ gdp_{t-1} + \gamma_{14}\ ntwk_{t-1} + \gamma_{15}\ ntwg_{t-1} + \gamma_{16}\ txhhi_{t-1}] + (1-I_t)[\gamma_{20} + \gamma_{21}\ txcpt_{t-1} + \gamma_{22}\ txwge_{t-1} + \gamma_{23}\ gdp_{t-1} + \gamma_{24}\ ntwk_{t-1} + \gamma_{25}\ ntwg_{t-1} + \gamma_{26}\ txhhi_{t-1}] + \varepsilon_t \qquad (6.27)$$

In Equation (6.27), $txwge_t$ specifies wages in the textile industry, γ_{10} and γ_{20} specify the constant terms, $txcpt_{t-1}$ specifies lagged value of import competition faced by the textile industry, γ_{11} and γ_{21} specify parameters which correspond to $txcpt_{t-1}$, $txwge_{t-1}$ specifies lagged value of wages in the textile industry, γ_{12} and γ_{22} specify parameters which correspond to $txwge_{t-1}$, gdp_{t-1} specifies lagged value of GDP, γ_{13} and γ_{23} specify parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, γ_{14} and γ_{24} specify parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, γ_{15} and γ_{25} specify parameters which correspond to $ntwg_{t-1}$, $txhhi_{t-1}$ specifies lagged value of Herfindahl index in the textile industry, γ_{16} and γ_{26} specify parameters which correspond to $txhhi_{t-1}$, and ε specifies the error term. In this equation, I_t equals to 1 if $txcpt_{t-1} > \tau$. Alternatively, I_t equals to 0 if $txcpt_{t-1} \leq \tau$. If $txcpt_{t-1} \leq \tau$, Equation (6.27) is converted into $txwge_t$ =

$\gamma_{20} + \gamma_{21}\, txcpt_{t-1} + \gamma_{22}\, txwge_{t-1} + \gamma_{23}\, gdp_{t-1} + \gamma_{24}\, ntwk_{t-1} + \gamma_{25}\, ntwg_{t-1} + \gamma_{26}\, txhhi_{t-1} + \varepsilon_t$. Otherwise, Equation (6.27) is converted into $txwge_t = \gamma_{10} + \gamma_{11}\, txcpt_{t-1} + \gamma_{12}\, txwge_{t-1} + \gamma_{13}\, gdp_{t-1} + \gamma_{14}\, ntwk_{t-1} + \gamma_{15}\, ntwg_{t-1} + \gamma_{16}\, txhhi_{t-1} + \varepsilon_t$ if $txcpt_{t-1} > \tau$.

Sequentially, in a similar fashion the TAR model regarding the correlation between import competition and wages in the apparel industry is formulated as:

$$apwge_t = I_t\, [\delta_{10} + \delta_{11}\, apcpt_{t-1} + \delta_{12}\, apwge_{t-1} + \delta_{13}\, gdp_{t-1} + \delta_{14}\, ntwk_{t-1} + \delta_{15}\, ntwg_{t-1} + \delta_{16}\, aphhi_{t-1}] + (1-I_t)[\delta_{20} + \delta_{21}\, apcpt_{t-1} + \delta_{22}\, apwge_{t-1} + \delta_{23}\, gdp_{t-1} + \delta_{24}\, ntwk_{t-1} + \delta_{25}\, ntwg_{t-1} + \delta_{26}\, aphhi_{t-1}] + \varepsilon_t \tag{6.28}$$

In Equation (6.28), $apwge_t$ specifies wages in the apparel industry, δ_{10} and δ_{20} specify the constant terms, $apcpt_{t-1}$ specifies lagged value of import competition faced by the apparel industry, δ_{11} and δ_{21} specify parameters which correspond to $apcpt_{t-1}$, $apwge_{t-1}$ specifies lagged value of wages in the apparel industry, δ_{12} and δ_{22} specify parameters which correspond to $apwge_{t-1}$, gdp_{t-1} specifies lagged value of GDP, δ_{13} and δ_{23} specify parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, δ_{14} and δ_{24} specify parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, δ_{15} and δ_{25} specify parameters which correspond to $ntwg_{t-1}$, $aphhi_{t-1}$ specifies lagged value of Herfindahl index in the apparel industry, δ_{16} and δ_{26} specify parameters which correspond to $aphhi_{t-1}$, and ε specifies the error term. In this equation, I_t equals to 1 if $apcpt_{t-1} > \tau$. Otherwise, I_t equals to 0 if $apcpt_{t-1} \leq \tau$. If $apcpt_{t-1} \leq \tau$, Equation (6.28) turns into $apwge_t = \delta_{20} + \delta_{21}\ apcpt_{t-1} + \delta_{22}\ apwge_{t-1} + + \delta_{23}\ gdp_{t-1} + \delta_{24}\ ntwk_{t-1} + \delta_{25}\ ntwg_{t-1} + \delta_{26}\ aphhi_{t-1} + \varepsilon_t$. Alternatively, Equation (6.28) turns into $apwge_t = \delta_{10} + \delta_{11}\ apcpt_{t-1} + \delta_{12}\ apwge_{t-1} + \delta_{13}\ gdp_{t-1} + \delta_{14}\ ntwk_{t-1} + \delta_{15}\ ntwg_{t-1} + \delta_{16}\ aphhi_{t-1} + \varepsilon_t$ if $txcpt_{t-1} > \tau$.

Successively, the TAR model regarding the correlation between import competition and technical efficiency in the textile industry is formulated as:

$$txtcf_t = I_t[\zeta_{10} + \zeta_{11} \log txcpt_{t-1} + \zeta_{12}\ txtcf_{t-1} + \zeta_{13}\ gdp_{t-1} + \zeta_{14}\ ntwk_{t-1} + \zeta_{15}\ ntwg_{t-1} + \zeta_{16}\ txhhi_{t-1}] + (1-I_t)[\zeta_{20} + \zeta_{21} \log txcpt_{t-1} + \zeta_{22}\ txtcf_{t-1} + \zeta_{23}\ gdp_{t-1} + \zeta_{24}\ ntwk_{t-1} + \zeta_{25}\ ntwg_{t-1} + \zeta_{26}\ txhhi_{t-1}] + \varepsilon_t \qquad (6.29)$$

In Equation (6.29), $txtcf_t$ specifies technical efficiency in the textile industry, ζ_{10} and ζ_{20} specify the constant terms, $\log\ txcpt_{t-1}$ specifies lagged value of import competition faced by the textile industry in logarithmic form, ζ_{11} and ζ_{21} specify parameters which correspond to $log\ txcpt_{t-1}$, $txtcf_{t-1}$ specifies lagged value of technical efficiency in the textile industry, ζ_{12} and ζ_{22} specify parameters which correspond to $txtcf_{t-1}$, gdp_{t-1} specifies lagged value of GDP, ζ_{13} and ζ_{23} specify parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, ζ_{14} and ζ_{24} specify parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, ζ_{15} and ζ_{25} specify parameters which correspond to $ntwg_{t-1}$, $txhhi_{t-1}$ specifies lagged value of Herfindahl index in the textile industry, ζ_{16} and ζ_{26} specify parameters which correspond to $txhhi_{t-1}$, and ε specifies the error term. In Equation (6.29), I_t equals to 1 if $txcpt_{t-1} > \tau$ and I_t takes the value of 0 if $txcpt_{t-1} \leq \tau$. If $txcpt_{t-1} \leq \tau$, Equation (6.29) is converted into $txtcf_t = \zeta_{20} + \zeta_{21}\ log\ txcpt_{t-1} + \zeta_{22}\ txtcf_{t-1} + \zeta_{23}\ gdp_{t-1} + \zeta_{24}\ ntwk_{t-1} + \zeta_{25}\ ntwg_{t-1} + \zeta_{26}\ txhhi_{t-1} + \varepsilon_t$. Alternatively, Equation (6.29) turns into $txtcf_t = \zeta_{10} + \zeta_{11}\ log\ txcpt_{t-1} + \zeta_{12}\ txtcf_{t-1} + \zeta_{13}\ gdp_{t-1} + \zeta_{14}\ ntwk_{t-1} + \zeta_{15}\ ntwg_{t-1} + \zeta_{16}\ txhhi_{t-1} + \varepsilon_t$ if $txcpt_{t-1} > \tau$.

After that, the TAR model regarding the correlation between import competition and technical efficiency in the apparel industry is formulated as:

$$aptcf_t = I_t[\eta_{10} + \eta_{11}\ log\ apcpt_{t-1} + \eta_{12}\ aptcf_{t-1} + \eta_{23}\ gdp_{t-1} + \eta_{24}\ ntwk_{t-1} + \eta_{25}\ ntwg_{t-1} + \eta_{26}\ aphhi_{t-1}] + (1-I_t)[\eta_{20} + \eta_{21}\ log\ apcpt_{t-1} + \eta_{22}\ aptcf_{t-1} + \eta_{23}\ gdp_{t-1} + \eta_{24}\ ntwk_{t-1} + \eta_{25}\ ntwg_{t-1} + \eta_{26}\ aphhi_{t-1}] + \varepsilon_t \quad (6.30)$$

In this Equation (6.30), ap*tcf*$_t$ specifies technical efficiency of the apparel industry, η_{10} and η_{20} specify the constant terms, $log\ apcpt_{t-1}$ specifies lagged value of import competition faced by the apparel industry in logarithmic form, η_{11} and η_{21} specify parameters which correspond to $log\ apcpt_{t-1}$, $aptcf_{t-1}$ specifies lagged value of technical efficiency in the apparel industry, η_{12} and η_{22} specify parameters which correspond to $aptcf_{t-1}$, gdp_{t-1} specifies lagged value of GDP, η_{13} and η_{23} specify parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, η_{14} and η_{24} specify parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, η_{15} and η_{25} specify parameters which correspond to $ntwg_{t-1}$, $aphhi_{t-1}$ specifies lagged value of Herfindahl index in the apparel industry, η_{16} and η_{26} specify parameters which correspond to $aphhi_{t-1}$, and ε specifies the error term. In this equation, I_t equals to 1 if $apcpt_{t-1} > \tau$ and I_t takes the value of 0 if $apcpt_{t-1} \leq \tau$. If $apcpt_{t-1} \leq \tau$, Equation (6.30) is converted into $aptcf_t = \eta_{20} + \eta_{21}\ log\ txcpt_{t-1}$ +

η_{22} $aptcf_{t-1}$ + η_{23} gdp_{t-1}+ η_{24} $ntwk_{t-1}$+ η_{25} $ntwg_{t-1}$ + η_{26} $aphhi_{t-1}$ + ε_t. If not, Equation (6.30) is converted into $aptcf_t = \eta_{10} + \eta_{11}\ log\ txcpt_{t-1} + \eta_{12}\ aptcf_{t-1} + \eta_{13}\ gdp_{t-1} + \eta_{14}\ ntwk_{t-1} + \eta_{15}\ ntwg_{t-1} + \eta_{16}\ aphhi_{t-1} + \varepsilon_t$ if $txcpt_{t-1} > \tau$.

Later, the TAR model regarding the correlation between import competition and scale efficiency in the textile industry is formulated as:

$$txscf_t = I_t[\rho_{10} + \rho_{11}\ log\ txcpt_{t-1} + \rho_{12}\ txscf_{t-1} + \rho_{13}\ gdp_{t-1} + \rho_{14}\ ntwk_{t-1} + \rho_{15}\ ntwg_{t-1} + \rho_{16}\ txhhi_{t-1}] + (1-I_t)[\rho_{20} + \rho_{21}\ log\ txcpt_{t-1} + \rho_{22}\ txscf_{t-1} + \rho_{23}\ gdp_{t-1} + \rho_{24}\ ntwk_{t-1} + \rho_{25}\ ntwg_{t-1} + \rho_{26}\ txhhi_{t-1}] + \varepsilon_t \qquad (5.31)$$

In Equation (6.31), $txscf_t$ specifies scale efficiency in the textile industry, ρ_{10} and ρ_{20} specify the constant terms, $log\ txcpt_{t-1}$ specifies lagged value of import competition faced by the textile industry in logarithmic form, ρ_{11} and ρ_{21} specify parameters which correspond to $log\ txcpt_{t-1}$, $txscf_{t-1}$ specifies lagged value of scale efficiency in the textile industry, ρ_{12} and ρ_{22} specify parameters which correspond to $txscf_{t-1}$, gdp_{t-1} specifies lagged value of GDP, ρ_{13} and ρ_{23} specify parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, ρ_{14} and ρ_{24} specify parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, ρ_{15} and ρ_{25} specify parameters which correspond to $ntwg_{t-1}$, $txhhi_{t-1}$ specifies lagged value of Herfindahl index in the textile industry, ρ_{16} and ρ_{26} specify parameters which correspond to $txhhi_{t-1}$, and ε specifies the error term. In this equation, I_t equals to 1 if $txcpt_{t-1} > \tau$. Alternatively, I_t equals to 0 if $txcpt_{t-1} \leq \tau$. If $txcpt_{t-1} \leq \tau$, Equation (6.31) is converted into $txscf_t = \rho_{20} + \rho_{21} \log txcpt_{t-1} + \rho_{22} txscf_{t-1} + \rho_{23}\, gdp_{t-1} + \rho_{24}\, ntwk_{t-1} + \rho_{25}\, ntwg_{t-1} + \rho_{26}\, txhhi_{t-1} + \varepsilon_t$. Otherwise, Equation (6.31) is converted into $txscf_t = \rho_{10} + \rho_{11} \log txcpt_{t-1} + \rho_{12}\, txscf_{t-1} + \rho_{13}\, gdp_{t-1} + \rho_{14}\, ntwk_{t-1} + \rho_{15}\, ntwg_{t-1} + \rho_{16}\, txhhi_{t-1} + \varepsilon_t$ if $txcpt_{t-1} > \tau$.

And at last, in a similar fashion the TAR model regarding the correlation between import competition and scale efficiency in the apparel industry is formulated as:

$$apscf_t = I_t[\sigma_{10} + \sigma_{11} \log apcpt_{t-1} + \sigma_{12}\, apscf_{t-1} + \sigma_{13}\, gdp_{t-1} + \sigma_{14}\, ntwk_{t-1} + \sigma_{15}\, ntwg_{t-1} + \sigma_{16}\, aphhi_{t-1}] + (1-I_t)[\sigma_{20} + \sigma_{21} \log apcpt_{t-1} + \sigma_{22}\, apscf_{t-1} + \sigma_{23}\, gdp_{t-1} + \sigma_{24}\, ntwk_{t-1} + \sigma_{25}\, ntwg_{t-1} + \sigma_{26}\, aphhi_{t-1}] + \varepsilon_t \qquad (6.32)$$

In Equation (6.32), $apscf_t$ specifies scale efficiency in the apparel industry, σ_{10} and σ_{20} specify the constant terms, $\log apcpt_{t-1}$ specifies lagged value of import competition faced by the apparel industry in logarithmic form, σ_{11} and σ_{21} specify parameters which correspond to *log* $apcpt_{t-1}$, $apscf_{t-1}$ specifies lagged value of scale efficiency in the apparel industry, σ_{12} and σ_{22} specify parameters which correspond to $apscf_{t-1}$, gdp_{t-1} specifies lagged value of GDP, σ_{13} and σ_{23} specify parameters which correspond to gdp_{t-1}, $ntwk_{t-1}$ specifies lagged value of the number of workers in the manufacturing sector, σ_{14} and σ_{24} specify parameters which correspond to $ntwk_{t-1}$, $ntwg_{t-1}$ specifies lagged value of wages in the manufacturing sector, σ_{15} and σ_{25} specify parameters which correspond to $ntwg_{t-1}$, $aphhi_{t-1}$ specifies lagged value of Herfindahl index in the apparel industry, σ_{16} and σ_{26} specify parameters which correspond to $aphhi_{t-1}$,and ε specifies the error term. In this equation, I_t equals to 1 if $apcpt_{t-1} > \tau$. Alternatively, I_t equals to 0 if $apcpt_{t-1} \leq \tau$. If $apcpt_{t-1} \leq \tau$, Equation (6.32) is transformed into $apscf_t = \sigma_{20} + \sigma_{21}\ ln\ txcpt_{t-1} + \sigma_{22}\ apscf_{t-1} + \sigma_{23}\ gdp_{t-1} + \sigma_{24}\ ntwk_{t-1} + \sigma_{25}\ ntwg_{t-1} + \sigma_{26}\ aphhi_{t-1} + \varepsilon_t$. Otherwise, Equation (6.28) is transformed into $apscf_t = \sigma_{10} + \sigma_{11}\ ln\ txcpt_{t-1} + \sigma_{12}\ apscf_{t-1} + \sigma_{13}\ gdp_{t-1} + \sigma_{14}\ ntwk_{t-1} + \sigma_{15}\ ntwg_{t-1} + \sigma_{16}\ aphhi_{t-1} + \varepsilon_t$ if $apcpt_{t-1} > \tau$.

As the solution for the TAR model is nested on OLS, τ is estimated by running OLS regression on each of these eight equations. OLS regression is run on every potential observed value of $txcpt_{t-1}$ or $log\ txcpt_{t-1}$ in the correlation between import competition and each of the number of workers, wages, and technical and scale efficiencies in Indonesia's textile industry. Correspondingly, OLS regression is run on every potential observed value of $apcpt_{t-1}$ or $log\ apcpt_{t-1}$ in the correlation between import competition and each of the number of workers, wages, and technical and scale efficiencies in the apparel industry. Enders suggested that the consistent estimate of the threshold should be found in the regression which generates the smallest sum of squares residuals (*SSR*).

Moreover, time series data set for each correlation consists of 29 years. For each year, a particular value of import competition was calculated. Hence, there are 29 values of import competition, which correspond to all observed years. Afterward, the values of import competition are ranked from the lowest to the highest. As asserted by Enders, OLS regression is performed for each possible threshold value which is the value of import competition in this case. In view of that, 29 OLS regressions are performed to find the threshold value in each of the eight correlations. Totally, there are 232 OLS regressions which are run in this entire regression analysis. Additionally, each of these OLS regressions employs a special set of time series data. Therefore, there are 232 sets of data which have to be prepared before each of these OLS regressions is executed.

In running analysis on a two-regime TAR model, the OLS regression requires the set of data of independent variables is split into two for each regime. In these analyses, the OLS regression requires one set of data of the lagged value of import competition and the lagged value of the dependent variable for the regime beyond the threshold value. Another set of data of the lagged value of import competition and the lagged value of the dependent variable is required for the regime below the threshold value.

Furthermore, a particular value of import competition, which corresponds to a year, is presumed as the threshold value of that year. For that reason, for the regime where the value of import competition is higher than the threshold value, the lagged value of import competition and the lagged value of the dependent variable, in the year whose value of import competition is lower, are replaced by zero. On the other hand, for the regime where the value of import competition is lower than the threshold value, the lagged value of import competition and the lagged value of the dependent variable, in the years whose value of import competition is higher, are replaced by zero.

Accordingly, in the correlation between import competition and the number of workers in the textile industry, one set of data is processed by the $txwkr_t = \alpha_{10} + \alpha_{11}\ txcpt_{t-1} + \alpha_{12}\ txwkr_{t-1} + \alpha_{13}\ gdp_{t-1} + \alpha_{14}\ ntwk_{t-1} + \alpha_{15}\ ntwg_{t-1} + \alpha_{16}\ txhhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} > \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of the number of workers, in the years whose value of import competition is lower than the presumed threshold value, are replaced by zero. Another set of data is processed by the $txwkr_t = \alpha_{20} + \alpha_{21}\ txcpt_{t-1} + \alpha_{22}\ txwkr_{t-1} + \alpha_{23}\ gdp_{t-1} + \alpha_{24}\ ntwk_{t-1} + \alpha_{25}\ ntwg_{t-1} + \alpha_{26}\ txhhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} \leq \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of the number of workers, in the years whose value of import competition is higher than the presumed threshold value, are replaced by zero.

Likewise, in the correlation between import competition and the number of workers in the apparel industry, one set of data is processed by the $apwkr_t = \beta_{10} +$

β_{11} $apcpt_{t-1}$ + β_{12} $apwkr_{t-1}$ + β_{13} gdp_{t-1} + β_{14} $ntwk_{t-1}$ + β_{15} $ntwg_{t-1}$ + β_{16} $aphhi_{t-1}$ + ε_t part of the TAR model where $txcpt_{t-1} > \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of the number of workers, in the years whose value of import competition is lower than the presumed threshold value, are replaced by zero. Another set of data is processed by the $apwkr_t = \beta_{20} + \beta_{21}\ apcpt_{t-1} + \beta_{22}\ apwkr_{t-1} + \beta_{23}\ gdp_{t-1} + \beta_{24}\ ntwk_{t-1} + \beta_{25}\ ntwg_{t-1} + \beta_{26}\ aphhi_{t-1} + \varepsilon_t$ part of the TAR model where $apcptt\text{-}_1 \leq \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of the number of workers, in the years whose value of import competition is higher than the presumed threshold value, are replaced by zero.

In the correlation between import competition and wages in the textile industry, one set of data is processed by the $txwge_t = \gamma_{10} + \gamma_{11}\ txcpt_{t-1} + \gamma_{12}\ txwge_{t-1} + \gamma_{13}\ gdp_{t-1} + \gamma_{14}\ ntwk_{t-1} + \gamma_{15}\ ntwg_{t-1} + \gamma_{16}\ txhhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} > \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of wages, in the years whose value of import competition is lower than the presumed threshold value, are replaced by zero. Another set of data is processed by the $txwge_t = \gamma_{20} + \gamma_{21}\ txcpt_{t-1} + \gamma_{22}\ apwge_{t-1}$ +

γ_{23} gdp_{t-1} + γ_{24} $ntwk_{t-1}$ + γ_{25} $ntwg_{t-1}$ + γ_{26} $txhhi_{t-1}$ + ε_t part of the TAR model where $txcpt_{t-1} \leq \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of wages, in the years whose value of import competition is higher than the presumed threshold value, are replaced by zero.

In the correlation between import competition and wages in the apparel industry, one set of data is processed by the $apwge_t = \delta_{10} + \delta_{11}\ apcpt_{t-1} + \delta_{12}\ apwge_{t-1} + \delta_{13}\ gdp_{t-1} + \delta_{14}\ ntwk_{t-1} + \delta_{15}\ ntwg_{t-1} + \delta_{16}\ aphhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} > \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of wages, in the years whose value of import competition is lower than the presumed threshold value, are replaced by zero. Another set of data is processed by the $apwge_t = \delta_{20} + \delta_{21}\ apcpt_{t-1} + \delta_{22}\ apwge_{t-1} + \delta_{23}\ gdp_{t-1} + \delta_{24}\ ntwk_{t-1} + \delta_{25}\ ntwg_{t-1} + \delta_{26}\ aphhi_{t-1} + \varepsilon_t$ part of the TAR model where $apcptt\text{-}_1 \leq \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of wages, in the years whose value of import competition is higher than the presumed threshold value, are replaced by zero.

In the correlation between import competition and technical efficiency in the textile industry, one set of data is processed by the $txtcf_t = \zeta_{10} + \zeta_{11} \log txcpt_{t-1} + \zeta_{12}\, txtcf_{t-1} + \zeta_{13}\, gdp_{t-1} + \zeta_{14}\, ntwk_{t-1} + \zeta_{15}\, ntwg_{t-1} + \zeta_{16}\, txhhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} > \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of technical efficiency, in the years whose value of import competition is lower than the presumed threshold value, are replaced by zero. Another set of data is processed by the $txtcf_t = \zeta_{20} + \zeta_{21} \log txcpt_{t-1} + \zeta_{22}\, txtcf_{t-1} + \zeta_{23}\, gdp_{t-1} + \zeta_{24}\, ntwk_{t-1} + \zeta_{25}\, ntwg_{t-1} + \zeta_{26}\, txhhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} \leq \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of technical efficiency, in the years whose value of import competition is higher than the presumed threshold value, are replaced by zero.

In the correlation between import competition and technical efficiency in the apparel industry, one set of data is processed by the $aptcf_t = \eta_{10} + \eta_{11} \log apcpt_{t-1} + \eta_{12}\, aptcf_{t-1} + \eta_{13}\, gdp_{t-1} + \eta_{14}\, ntwk_{t-1} + \eta_{15}\, ntwg_{t-1} + \eta_{16}\, aphhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} > \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of technical efficiency, in the years whose value of import competition is lower than the presumed threshold value, are replaced by zero. Another set of data is processed by the $aptcf_t = \eta_{20} + \eta_{21}\ log\ apcpt_{t-1} + \eta_{22}\ aptcf_{t-1} + \eta_{23}\ gdp_{t-1} + \eta_{24}\ ntwk_{t-1} + \eta_{25}\ ntwg_{t-1} + \eta_{26}\ aphhi_{t-1} + \varepsilon_t$ part of the TAR model where $apcptt\text{-}_1 \leq \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of technical efficiency, in the years whose value of import competition is higher than the presumed threshold value, are replaced by zero.

In the correlation between import competition and scale efficiency in the textile industry, one set of data is processed by the $txscf_t = \rho_{10} + \rho_{11}\ log\ txcpt_{t-1} + \rho_{12}\ txscf_{t-1} + \rho_{13}\ gdp_{t-1} + \rho_{14}\ ntwk_{t-1} + \rho_{15}\ ntwg_{t-1} + \rho_{16}\ txhhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} > \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of scale efficiency, in the years whose value of import competition is lower than the presumed threshold value, are replaced by zero. Another set of data is processed by the $txtcf_t = \rho_{20} + \rho_{21}\ log\ txcpt_{t-1} + \rho_{22}\ txscf_{t-1} + \rho_{23}\ gdp_{t-1} + \rho_{24}\ ntwk_{t-1} + \rho_{25}\ ntwg_{t-1} + \rho_{26}\ txhhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} \leq \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of scale efficiency, in the years whose value of import competition is higher than the presumed threshold value, are replaced by zero.

In the correlation between import competition and scale efficiency in the apparel industry, one set of data is processed by the $apscf_t = \sigma_{10} + \sigma_{11}\ log\ apcpt_{t-1} + \sigma_{12}\ apscf_{t-1} + \sigma_{13}\ gdp_{t-1} + \sigma_{14}\ ntwk_{t-1} + \sigma_{15}\ ntwg_{t-1} + \sigma_{16}\ aphhi_{t-1} + \varepsilon_t$ part of the TAR model where $txcpt_{t-1} > \tau$. For this part of the TAR model, the lagged values of import competition and the lagged value of scale efficiency, in the years whose value of import competition is lower than the presumed threshold value, are replaced by zero. Another set of data is processed by the $apscf_t = \sigma_{20} + \sigma_{21}\ log\ apcpt_{t-1} + \sigma_{22}\ apscf_{t-1} + \sigma_{23}\ gdp_{t-1} + \sigma_{24}\ ntwk_{t-1} + \sigma_{25}\ ntwg_{t-1} + \sigma_{26}\ aphhi_{t-1} + \varepsilon_t$ part of the TAR model where $apcptt\text{-}_1 \leq \tau$. For this part of the TAR model, the lagged values of import competition and the lagged values of scale efficiency, in the years whose value of import competition is higher than the presumed threshold value, are replaced by zero.

Afterwards, 29 OLS regressions in each of the eight correlations are performed one by one. The most important results of these OLS regressions are not the regression coefficients. The analysis on a TAR model only requires *SSR* to be compared. After these 29 OLS regressions are performed for each correlation, 29 *SRR*s are compared. One OLS regression with the lowermost *SSR* indicates the threshold value of individual correlation.

The results of the TAR model analysis are as follows.

1. The analysis on the correlation between import competition and the number of workers in the textile industry finds 0.2256175 as the threshold value.
2. The analysis on the correlation between import competition and the number of workers in the apparel industry finds 0.005895 as the threshold value.
3. The analysis on the correlation between import competition and wages in the textile industry finds 0.018941 as the threshold value.
4. The analysis on the correlation between import competition and wages in the apparel industry finds 0.000911 as the threshold value.
5. The analysis on the correlation between import competition and technical efficiency in the textile industry finds 0.008789 as the threshold value.
6. The analysis on the correlation between import competition and technical efficiency in the textile apparel finds 0.000129 as the threshold value.
7. The analysis on the correlation between import competition and scale

efficiency in textile industry finds 0.008789 as the threshold value.

8. The analysis on the correlation between import competition and scale efficiency in the apparel industry finds 0.001571 as the threshold value.

6.5. Testing the TAR model

Furthermore, following Enders, this analysis uses the supremum test to investigate statistical significance of the TAR model.

In the correlation between import competition and the number of workers in the textile industry, *txwkrF* value is calculated from $txwkrSRR_u$ of the TAR model containing the threshold value and $txwkrSRR_r$ of the restricted model by using the following equation:

$$txwkrF = [(txwkrSSR_r - txwkrSSR_u) / n] / [txwkrSSR_u / (T\text{-}2n)] \qquad (6.33)$$

In Equation (6.33), $txwkrSSR_u$ denotes the sum of squares residuals obtained from the best-fitting TAR model, $txwkrSSR_r$ denotes the sum of squares residuals generated from restricting the model to be linear, T denotes the number of observation, while n denotes the number of parameters which are assessed in the linear model.

In the next step, 1.000 normally distributed random numbers which have a mean of zero and a variance of unity are generated. These random numbers are regressed on the actual value of $txcpt_{t-1} + txwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}$ to obtain $txwkrSRR_r^*$ and regressed on $I_t(txcpt_{t-1} + txwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}) + (1\text{-}It)(txcpt_{t-1} + txwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1})$ to obtain $txwkrSRR_u^*$. This process is repeated for each normally distributed random number. Afterwards, 1.000 $txwkrfF^*$ values are estimated from each pair $txwkrSRR_u^*$ and $txwkrSRR_r^*$ by using the equation below:

$$txwkrF^* = [(txwkrSSR_r^* - txwkrSSR_u^*) / n] / [txwkrSSR_u^* / (T\text{-}2n)] \tag{6.34}$$

In Equation (6.34), $txwkrSSR_u^*$ denotes the sum of squares residuals obtained regressing each random number on $I_t(txcpt_{t-1} + txwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}) + (1\text{-}It)(txcpt_{t-1} + txwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1})$, $txwkrSSR_r^*$ denotes the sum of squares residuals generated by regressing each random number on $txcpt_{t-1} + txwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}$, T denotes the number of observation, while n denotes the number of parameters which are assessed in the linear model.

Subsequently, the *txwkrfF* value of the TAR model is compared with those *txwkrF** values to find statistical significance level of the TAR model. This analysis finds that *txwkrF* value of TAR model in the correlation between import competition and the number of workers in the textile industry goes beyond 993 *txwkrfF** values of the distribution of generated critical values. It can be inferred from this finding that this TAR model is significant at 1% level.

The supremum test is utilized once again to investigate statistical significance of the TAR model in the correlation between import competition and the number of workers in the apparel industry. For this purpose, *apwkrF* value is calculated from $apwkrSRR_u$ of the TAR model containing the threshold value and $apwkrSRR_r$ of the restricted model by using the following equation:

$$apwkrF = [(apwkrSSR_r - apwkrSSR_u) / n] / [apwkrSSR_u / (T\text{-}2n)] \qquad (6.35)$$

In Equation (6.35), $apwkrSSR_u$ stands for the sum of squares residuals obtained from the best-fitting TAR model, $apwkrSSR_r$ stands for the sum of squares residuals generated from restricting the model to be linear, T stands for the number of observation, while n stands for the number of parameters which are assessed in the linear model.

The normally distributed random numbers used for testing the TAR model in the correlation between import competition and the number of workers in the textile industry is used again in this analysis. These random numbers are regressed on the actual value of $apcpt_{t-1} + apwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}$to acquire $apwkrSRR_r^*$ and regressed on $I_t(apcpt_{t-1} + apwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}) + (1-It)(apcpt_{t-1} + apwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1})$ to acquire $apwkrSRR_u^*$. This process is repeated 1.000 times for every normally distributed random number. Thereafter, 1.000 $apwkrF^*$ values are calculated from each pair $apwkrSRR_u^*$ and $apwkrSRR_r^*$by using the following equation:

$$apwkrF^* = [(apwkrSSR_r^* – apwkrSSR_u^*) / n] / [apwkrSSR_u^* / (T-2n)] \qquad (6.36)$$

In Equation (6.36), $apwkrSSR_u^*$ signifies the sum of squares residuals obtained regressing each random number on $I_t(apcpt_{t-1} + apwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}) + (1-It)(apcpt_{t-1} + apwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1})$, $apwkrSSR_r^*$ signifies the sum of squares residuals generated by regressing each random number on $apcpt_{t-1} + apwkr_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}$, T signifies the number of observation, and n signifies the number of parameters which are assessed in the linear model.

Afterward, *apwkrF* value of the TAR model is compared with all *apwkrF** values to obtain statistical significance level of the TAR model. *apwkrF* value of TAR model in the correlation between import competition and the number of workers in the apparel industry exceeds 996 *apwkrF** values of the distribution of generated critical values. It can be deduced from this finding that this TAR model is significant at 1% level.

Following Enders once again, this study uses the supremum test to investigate statistical significance of the TAR model in the correlation between import competition and wages in the textile industry. First, *txwgeF* value is calculated from $txwgeSRR_u$ of the TAR model containing the threshold value and $txwgeSRR_r$ of the restricted model by using the following equation:

$$txwgeF = [(txwgeSSR_r - txwgeSSR_u) / n] / [txwgeSSR_u / (T\text{-}2n)] \tag{6.37}$$

In Equation (6.37), $txwgeSSR_u$ represents the sum of squares residuals obtained from the best-fitting TAR model, $txwgeSSR_r$ represents the sum of squares residuals generated from restricting the model to be linear, *T* represents the number of observation, while *n* represents the number of parameters which are assessed in the linear model.

Next, 1.000 normally distributed random numbers used again. These random numbers are the ones which are generated in the analysis on the correlation between import competition and the number of workers. These random numbers are regressed on the actual value of $txcpt_{t-1} + txwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}$ to obtain $txwgeSRR_r^*$ and regressed on $I_t(txcpt_{t-1} + txwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}) + (1\text{-}It)(txcpt_{t-1} + txwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} +$

$txhhi_{t-1}$) to obtain $txwgeSRR_u^*$. This process is replicated for each normally distributed random number. Afterward, 1.000 $txwgeF^*$ values are calculated from each pair $txwgeSRR_u^*$ and $txwgeSRR_r^*$ by using the following equation:

$$txwgeF^* = [(txwgeSSR_r^* - txwgeSSR_u^*) / n] / [txwgeSSR_u^* / (T\text{-}2n)] \qquad (6.38)$$

In Equation (6.38), $txwgeSSR_u^*$ indicates the sum of squares residuals obtained regressing each random number on $I_t(txcpt_{t-1} + txwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}) + (1\text{-}It)(txcpt_{t-1} + txwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1})$, $txwgeSSR_r^*$ indicates the sum of squares residuals generated by regressing each random number on $txcpt_{t-1} + txwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}$, T indicates the number of observation, while n indicates the number of parameters which are assessed in the linear model.

Afterwards, *txwgeF* value of the TAR model is weighed against *txwgeF** values to obtain statistical significance level of the TAR model. This analysis finds that *txwgeF* value of TAR model in the correlation between import competition and wages in the textile industry surpasses 995 *txwgeF** values of the distribution of generated critical values. It can be inferred from this finding that this TAR model is significant at 1% level.

The supremum test is utilized one more time to investigate statistical significance of the TAR model in the correlation between import competition and wages in the apparel industry. At this point, *apwgeF* value is calculated from $apwgeSRR_u$ of the TAR model containing the threshold value and $apwgeSRR_r$ of the restricted model by using the following equation:

$$apwgeF = [(apwgeSSR_r - apwgeSSR_u)/n] \,/\, [apwgeSSR_u / (T\text{-}2n)] \tag{6.39}$$

In Equation (6.39), $apwgeSSR_u$ specifies the sum of squares residuals obtained from the best-fitting TAR model, $apwgeSSR_r$ specifies the sum of squares residuals generated from restricting the model to be linear, T specifies the number of observation, while n specifies the number of parameters which are assessed in the linear model.

The same normally distributed random numbers, generated in the analysis on the correlation between import competition and number of worker are used again. These random numbers are regressed on the actual value of $apcpt_{t-1}$ + $apwge_{t-1}$ + gdp_{t-1} + $ntwk_{t-1}$ + $ntwg_{t-1}$ + $aphhi_{t-1}$ to obtain $apwgeSRR_r^*$ and regressed on $I_t(apcpt_{t-1} + apwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}) + (1\text{-}It)(apcpt_{t-1} + apwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1})$ to obtain $apwgeSRR_u^*$. This process is repeated for all 1.000 normally distributed random numbers. Subsequently, 1.000 $apwgeF^*$ values are calculated from each pair $apwgeSRR_u^*$ and $apwgeSRR_r^*$ by using the following equation:

$$apwgeF^* = [(apwgeSSR_r^* – apwgeSSR_u^*) / n] / [apwgeSSR_u^* / (T\text{-}2n)] \qquad (6.40)$$

In Equation (6.40), $apwgeSSR_u^*$ stands for the sum of squares residuals obtained regressing each random number on $I_t(apcpt_{t-1} + apwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}) + (1\text{-}It)(apcpt_{t-1} + apwge_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1})$, $apwgeSSR_r^*$ stands for the sum of squares residuals generated by regressing each random number on $apcpt_{t-1}$ + $apwge_{t-1}$ + gdp_{t-1} + $ntwk_{t-1}$ + $ntwg_{t-1}$ + $aphhi_{t-1}$, T stands for the number of observation, while n stands for the number of parameters which are assessed in the linear model.

Finally, *apwgeF* value of the TAR model is compared with all *apwgeF** values to acquire statistical significance level of the TAR model. This analysis reveals that *apwgeF* value of TAR model in the correlation between import competition and wages in the apparel industry goes beyond 963 *apwgeF** values of the distribution of generated critical values. It can be deduced from this finding that this TAR model is significant at 5% level.

Further, following Enders once more, this study uses the supremum test to investigate statistical significance of the TAR model in the correlation between import competition and technical efficiency in the textile industry. First, *txtcfF* value is calculated from $txtcfSRR_u$ of the TAR model containing the threshold value and $txtcfSRR_r$ of the restricted model by using the following equation:

$$txtcfF = [(txtcfSSR_r - txtcfSSR_u) / n] / [txtcfSSR_u / (T-2n)] \tag{6.41}$$

In Equation (6.41), $txtcfSSR_u$ represents the sum of squares residuals obtained from the best-fitting TAR model, $txtcfSSR_r$ serves as a symbol for the sum of squares residuals generated from restricting the model to be linear, T signifies the number of observation, while n is the number of parameters which are assessed in the linear model.

Subsequently, 1.000 normally distributed random numbers, which have a mean of zero and a variance of unity, are generated. These random numbers are not the same as those which are used in the analysis on the correlation between import competition and number of worker. Next, these sets of random numbers are regressed on the actual value of $log\ txcpt_{t-1} + txtcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}$ to obtain $txtcfSRR_r^*$ and regressed on $I_t(log\ txcpt_{t-1} + txtcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}) + (1-It)(log\ txcpt_{t-1} + txtcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1})$ to obtain $txtcfSRR_u^*$. This process is repeated for each set of normally distributed random numbers. Then, 1.000 $txtcfF^*$ values are calculated from each pair $txtcfSRR_u^*$ and $txtcfSRR_r^*$by using the following equation:

$$txtcfF^* = [(txtcfSSR_r^* – txtcfSSR_u^*) / n] / [txtcfSSR_u^*/ (T-2n)] \qquad (6.42)$$

In Equation (6.42), $txSSR_u^*$denotes the sum of squares residuals obtained regressing each random number on I_t*(log* $txcpt_{t-1}$ + $txtcf_{t-1}$ + gdp_{t-1} + $ntwk_{t-1}$ + $ntwg_{t-1}$ + $txhhi_{t-1}$*)*and *(1-It)(log* $txcpt_{t-1}$ + $txtcf_{t-1}$ + gdp_{t-1} + $ntwk_{t-1}$ + $ntwg_{t-1}$ + $txhhi_{t-1}$), $txSSR_r^*$ symbolizes the sum of squares residuals generated by regressing each random number on *log* $txcpt_{t-1}$ + $txtcf_{t-1}$ + gdp_{t-1} + $ntwk_{t-1}$ + $ntwg_{t-1}$ + $txhhi_{t-1}$, T signifies the number of observation, while n is the number of parameters which are assessed in the linear model.

Successively, the *txtcfF* value of the TAR model is compared with those *txtcfF** values to obtain statistical significance level of the TAR model. *txtcfF* value of TAR model in the correlation between import competition and technical efficiency in the textile industry goes beyond 991 *txtcfF** values of the distribution of generated critical values. It can be inferred from this finding that this TAR model is significant at 1% level.

The supremum test is utilized as well to investigate statistical significance of the TAR model in the correlation between import competition and technical efficiency in the apparel industry. This time, *aptcfF* value is calculated from $aptcfSRR_u$ of the TAR model containing the threshold value and $aptcfSRR_r$ of the restricted model by using the following equation:

$$aptcfF = [(aptcfSSR_r - aptcfSSR_u) / n] / [aptcfSSR_u / (T\text{-}2n)] \qquad (6.43)$$

In Equation (6.43), $aptcfSSR_u$ represents th esum of squares residuals obtained from the best-fitting TAR model, $aptcfSSR_r$ serves as a symbol for the sum of squares residuals generated from restricting the model to be linear, T signifies the number of observation, while n is the number of parameters which are assessed in the linear model.

The same normally distributed random numbers, which have a mean of zero and a variance of unity, are used for testing the TAR model in the correlation between import competition and technical efficiency in the apparel industry. These sets of random numbers are regressed on the actual value of $log\ apcpt_{t-1} + aptcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}$ to obtain $aptcfSRR_r^*$ and regressed on $I_t(log\ apcpt_{t-1} + aptcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1})$and $(1\text{-}It)(log\ apcpt_{t-1} + aptcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}$) to obtain $aptcfSRR_u^*$. This process is repeated for each set of normally distributed random numbers. Then, 1.000 $aptcfF^*$ values are calculated from each pair $aptcfSRR_u^*$ and $aptcfSRR_r^*$ by using the following equation:

$$aptcfF^* = [(aptcfSSR_r^* – aptcfSSR_u^*) / n] / [aptcfSSR_u^* / (T-2n)] \qquad (6.44)$$

In Equation (6.44), $aptcfSSR_u^*$denotes thesum of squares residuals obtained regressing each random number on $I_t(log\ apcpt_{t-1} + aptcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1})$ and $(1-It)(log\ apcpt_{t-1} + aptcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1})$, $aptcfSSR_r^*$ symbolizes the sum of squares residuals generated by regressing each random number on $log\ apcpt_{t-1} + aptcf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}$, T signifies the number of observation, while n is the number of parameters which are assessed in the linear model.

Finally, the *aptcfF* value of the TAR model is compared with those *aptcfF** values to acquire statistical significance level of the TAR model. *aptcfF* value of TAR model in the correlation between import competition and technical efficiency in the apparel industry goes beyond 906 *aptcfF** values of the distribution of generated critical values. It can be inferred from this finding that this TAR model is significant at 10% level.

Further, following Enders once again, this study uses the supremum test to investigate statistical significance of the TAR model in the correlation between import competition and scale efficiency in the textile industry. First, *txscfF* value is calculated from $txscfSRR_u$ of the TAR model containing the threshold value and $txscfSRR_r$ of the restricted model by using the following equation:

$$txscfF = [(txscfSSR_r - txscfSSR_u) / n] / [txscfSSR_u / (T\text{-}2n)] \qquad (6.45)$$

In Equation (6.45), $txscfSSR_u$ represents the sum of squares residuals obtained from the best-fitting TAR model, $txscfSSR_r$ represents the sum of squares residuals generated from restricting the model to be linear, *T* represents the number of observation, while *n* represents the number of parameters which are assessed in the linear model.

Next, 1.000 normally distributed random numbers, which are used in the analysis on the correlation between import competition and technical efficiency, are used again. Afterward, these sets of random numbers are regressed on the actual value of $log\ txcpt_{t-1} + txscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}$ to obtain $txscfSRR_r^*$ and regressed on $I_t(log\ txcpt_{t-1} + txscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}) + (1\text{-}It)(log\ txcpt_{t-1} + txscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1})$ to obtain $txscfSRR_u^*$. This process is repeated for each normally distributed random number. Then, 1.000 $txscfF^*$ values are calculated from each pair $txscfSRR_u^*$ and $txscfSRR_r^*$by usingthe following equation:

$$txscfF^* = [(txscfSSR_r^* – tscfxSSR_u^*) / n] / [txscfSSR_u^*/ (T\text{-}2n)] \qquad (6.46)$$

In Equation (6.46), $txscfSSR_u^*$ signifies the sum of squares residuals obtained regressing each random number on $I_t(log\ txcpt_{t-1} + txscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}) + (1\text{-}It)(log\ txcpt_{t-1} + txscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1})$, $txscfSSR_r^*$ signifies the sum of squares residuals generated by regressing each random number on $log\ txcpt_{t-1} + txscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + txhhi_{t-1}$, T signifies the number of observation, while n signifies the number of parameters which are assessed in the linear model.

Finally, the *txscfF* value of the TAR model is compared with those *txscfF** values to obtain statistical significance level of the TAR model. This analysis finds that *txscfF* value of TAR model in the correlation between import competition and scale efficiency in the textile industry goes beyond 959 *txscfF** values of the distribution of generated critical values. It can be inferred from this finding that this TAR model is significant at 5% level.

The supremum test is utilized as well to investigate statistical significance of the TAR model in the correlation between import competition and scale efficiency in the apparel industry. This time, *apscfF* value is calculated from $apscfSRR_u$ of the TAR model containing the threshold value and $apscfSRR_r$ of the restricted model by using the following equation:

$$apscfF = [(apscfSSR_r - apscfSSR_u) / n] / [apscfSSR_u / (T\text{-}2n)] \tag{6.47}$$

In Equation (6.47), $apscfSSR_u$ indicates the sum of squares residuals obtained from the best-fitting TAR model, $apscfSSR_r$ indicates the sum of squares residuals generated from restricting the model to be linear, *T* indicates the number of observation, while n indicates the number of parameters which are assessed in the linear model.

The same normally distributed random numbers used for testing the TAR model in the correlation between import competition and technical efficiency are used once more in this analysis. These random numbers are regressed on the actual value of $log\ apcpt_{t-1} + apscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}$ to obtain $apscfSRR_r^*$ and regressed on $I_t(log\ apcpt_{t-1} + apscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}) + (1\text{-}It)(log\ apcpt_{t-1} + apscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1})$ to obtain $apscfSRR_u^*$. This process is repeated for all 1.000 normally distributed random numbers. Thenceforward, 1.000 $apscfF^*$ values are calculated from each pair $apscfSRR_u^*$ and $apscfSRR_r^*$by using the following equation:

$$apscfF^* = [(apscfSSR_r^* - apscfSSR_u^*) / n] / [apscfSSR_u^* / (T\text{-}2n)] \qquad (6.48)$$

In Equation (6.48), $apscfSSR_u^*$ stands for the sum of squares residuals obtained regressing each random number on $I_t(log\ apcpt_{t-1} + apscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} + aphhi_{t-1}) + (1\text{-}It)(log\ apcpt_{t-1} + apscf_{t-1} + gdp_{t-1} + ntwk_{t-1} + ntwg_{t-1} +$

$aphhi_{t-1}$), *$apscfSSR_r^*$* stands for the sum of squares residuals generated by regressing each random number on *log* $apcpt_{t-1}$ + $apscf_{t-1}$ + gdp_{t-1} + $ntwk_{t-1}$ + $ntwg_{t-1}$ + $aphhi_{t-1}$, *T* stands for the number of observation, while *n* stands for the number of parameters which are assessed in the linear model.

At the end of the day, *apscfF* value of the TAR model is compared with all *apscfF** values to get statistical significance level of the TAR model. *apscfF* value of TAR model in the correlation between import competition and scale efficiency in the apparel industry surpasses 921 *apscfF** values of the distribution of generated critical values. It can be deduced from this finding that this TAR model is significant at 10% level.

Chapter summary

In this chapter, linear regression and TAR model analyses are performed for all correlations between import competition and each dependent variable in the two industries. As there are eight dependent variables, these regression analysis and TAR model analysis are replicated eight times. The regression coefficients and the threshold values of import competition, which are produced by these analyses along with their statistical significance, are presented in Table 6.6.

Table 6. 6 Summary of analysis

Dependent Variable	Regression Analysis*1		TAR model	
	Coefficient	Significance	Threshold	Significance
Textile industry:				
- Number of worker	-116133.9	5%	0.225617	1%
- Wages	-8060126	5%	0.018941	1%
- Technical efficiency	0.0976178	5%	0.008789	1%
- Scale efficiency	0.0602979	5%	0.008789	5%
Apparel industry:				
-Number of worker	-4915.234	5%	0.005895	1%
- Wages	-1913609	5%	0.000911	5%
- Technical efficiency	0.0195184	1%	0.000129	10%
- Scale efficiency	0.0235622	5%	0.001571	10%

*1Produced by regression with Newey-West standard error.

Source: author's calculation

It is fascinating to note here that even though this research just employs two analyses, thousands OLS regressions are performed. Those OLS regressions are mainly performed to test the TAR model. For each TAR model, more than 2,000 OLS regressions are performed. Therefore, this research employs more than 16,000 OLS regressions.

Chapter 7 Discussion of research findings

This chapter is devoted to reviewing the findings of this research. This chapter tries to see the findings of this research beyond the facts which are reported in Chapter 6. This chapter also tries to relate the findings of this research with the circumstances surrounding this research. This chapter, in addition, makes comparison between the findings of this research with the findings of previous studies deliberated in Chapter 3.

7.1. Discussion regarding import competition faced by textile and apparel industries

Figure 6.1 exhibits that import competition did not change much before 1990. Nevertheless, between the period of 1990 up to 1999, textile and apparel industries experienced abrupt escalation of import competition. This research notices that, at the same period, imports increased sharply while domestic production and exports remained fairly the same.

The sudden change in imports within that period was instigated by trade policy deregulation, which has been discussed in Chapter 2.This deregulation, which was commenced in 1986, abolished import duty tariffs considerably. Later, the impact of this deregulation was strengthened by the implementation of CEPT tariff scheme under AFTA framework. Additionally, MFN tariff scheme as a consequence of Indonesia's accession to the WTO also contributed in bringing down average import duty tariff significantly. Imports, at that time, became extraordinarily cheap, and demand for imports increase dramatically. Consequently, import competition within this period intensified strongly.

Figure 6.1 also exhibits that, after 1998, import competition subsided to the level before 1990. This research also notices that, at the same time, there was a swift decrease in imports. In 1997, Indonesia experienced a dreadful financial crisis. At the eve of the crisis, rupiah was exchanged at the lowest rate ever recorded in history. Imports plummeted as it became dreadfully expensive. After 1998, rupiah exchange rate never recovered to its previous level. Accordingly, import competition weakened. In fact, the level of import competition was brought back to the level before 1990.

These findings affirm that the major determinant of import competition is imports. Therefore, it would be more practical to manage import competition by modifying imports. In addition, it is also worth to note that customs duty tariff and exchange rate play a prominent role in determining the level of import competition. Accordingly, the government of Indonesia can manage the level of import competition through modification of customs duty tariff and exchange rate.

7.2. Discussion regarding efficiency assessment in textile and apparel industries

This research finds that efficiency of textile industry in Indonesia is relatively low. In DEA, the score for efficient DMU is 1. The score for inefficient DMU is lower than 1. Both technical and scale efficiencies scores of textile industry in Indonesia are considerably lower than 1. This research finds the same condition in Indonesia's apparel industry. Both technical and scale efficiencies scores of this industry are largely lower than 1.

These findings imply that there are many inefficient firms in Indonesia's textile and apparel industries. Annual mean scores of technical and scale efficiencies of both industries take into consideration annual scores of technical and scale efficiencies of each firm in these industries. Inefficient firms' annual scores of technical and scale efficiencies negatively affected the annual mean score. When there are more inefficient firms in an industry, annual mean scores of technical and scale efficiencies of this industry become lower. In addition, if the annual scores of inefficient firms are lower, then annual mean scores of technical and scale efficiencies of this industry become even lower. These facts are found in both textile and apparel industries. There are many inefficient firms in both industries and the annual score of these firms are exceedingly low. In consequence, annual mean scores of technical and scale efficiencies in Indonesia's textile and apparel industries are extremely low.

These findings also imply that the annual mean scores of technical and scale efficiencies in these industries fluctuated considerably over time. This fluctuation can be caused by two factors, namely inefficient new firms in the industries and inconsistent efficiency management. A firm efficiency is naturally low in the beginning of its existence. When many new firms enter an industry, their low annual score of technical and scale efficiencies drag down annual mean scores of the industry. Later, when technical and scale efficiencies of these new comers improve, annual mean scores of the industry increases as well.

Moreover, the behavior of factory owners and managers play a key role in explaining that fluctuation too. When factory owners and managers have a dedication to efficiency, technical and scale efficiencies in an industry can be expected to improve continuously. Nonetheless, Figures 5.1 and 5.2 exhibit that there are times when firm’s annual scores of technical and scale efficiencies are lower than the preceding years. These findings imply that factory owners and managers are not committed to efficiency management. Decrease in annual score of technical and scale efficiencies means that factory owners and managers do not have fixed efficiency improvement scheme. It seemed that they only intensified efficiency improvement when they were challenged by imports. Otherwise, they ignored efficiency improvement.

7.3. Discussion regarding the correlation between import competition and the number of workers in textile and apparel industries

This research finds that the number of workers in the apparel industry is more elastic to the change in import competition than the number of workers in the textile industry. This finding highlights the fact that the apparel industry is more labor-intensive in comparison to the textile industry. This finding is in line with the finding reported Shippen's study. Shippen found that import competition plays a more significant role in determining the number of workers in the United States' apparel industry. Shippen also revealed that the United States' textile industry was not really affected by import competition.

Moreover, the threshold value of import competition with reference to the number of workers in the apparel industry is a lower than similar threshold value in the textile industry. In this fashion, the number of workers in the apparel industry will decline sharply at lower level of import competition than the number of workers in the textile industry. This finding confirms the result of the regression analysis discussed above. Lower threshold value also means that the number of workers in the apparel industry is more elastic to the change in import competition than the number of workers in the textile industry. With this finding, once again this research highlights the fact that the apparel industry is more labor-intensive in comparison to the textile industry.

7.4. Discussion regarding the correlation between import competition and wages in textile and apparel industries

This research finds that, in response to changes in import competition, wages in both textile and apparel industries are more elastic than the number of workers. This finding indicates that it is less problematic for factory owners and managers to make adjustments on wages than on the number of workers. It is obvious that factory owners and managers feel more comfortable to cut wages than to discharge worker when they face tougher import competition. They will only take the option of employment termination when salary reduction is no longer sufficient. On the contrary, when import competition subsides, it is also less complicated to raise wages than to hire new workers. Moreover, this finding is in line with the findings reported in Revenga's study. Revenga affirmed that the adjustment of wages dampened the impact of import competition on the number of workers. Therefore, the negative impact of import competition on the number of workers is not as severe as its impact on wages.

Moreover, this research finds that threshold value concerning wages in the apparel industry is higher than the same threshold value in the textile industry. This finding infers that it takes more exhaustive level of import competition before factory owners and managers trim down wages in the apparel industry. The apparel industry does not expect workers to be as skilled as workers in the textile industry. Correspondingly, wages in the apparel industry are much lower than wages in the textile industry. Accordingly, factory owners and managers in the apparel industry cannot cut down wages cut wages as easily as their counterpart in the textile industry. Labor unions and minimum wages law will surely hamper their effort to do so.

7.5. Discussion regarding the correlation between import competition and technical efficiency in textile and apparel industries

Sometimes, it is possible to determine the correlation between two research variables comparing line charts of these variables. Figure 6.1, which is presented in Chapter 6, illustrates the change in import competition faced by textile and apparel industry within the period of 1980 and 2009. Figure 6.2, on the other hand, illustrates the change in technical efficiency in both industries within the same period of time. Hence, comparison between line charts in Figures 6.1 and 6.2 might reveals the correlations between import competition and technical efficiency in these two industries.

It is quite irresistible to judge there is no correlation between import competition and technical efficiency in the textile and apparel industries by slightly looking at Figures 6.1 and 6.2. However, regression analysis, which is reported in Chapter 6, has proven that such correlations actually exist. This analysis discloses that the magnitudes of the impact of import competition on technical efficiency in both industries are somewhat trivial. Therefore, it is quite unviable to capture the impact of import competition on technical efficiency in both industries without being assisted by some analytical tools.

In addition, Figure 6.2 exhibits that technical efficiency in textile and apparel industries fluctuated over time. In relation to import competition, these findings imply that factory owners and managers only concern with technical efficiency improvement when import competition gets tougher. On the contrary, they disregard technical efficiency improvement when import competition slackens off.

Furthermore, this research finds that the impact of import competition on technical efficiency has larger magnitude in the apparel industry than its magnitude in the textile industry. These findings imply that technical efficiency in the apparel industry is more elastic to the changes in import competition than technical efficiency in the textile industry. These findings emphasizes that the apparel industry is more labor-intensive than the textile industry. Technical efficiency in labor-intensive industry is more responsive to changes in import competition since it is easier to alter production scheme of this industry. It is, for instance, less problematic and less costly to rearrange factory outlay in labor-intensive industry.

This research finds that threshold value of import competition with regards to technical efficiency in the textile industry is higher than the corresponding threshold value in the apparel industry. This finding maintains that technical efficiency in the textile industry can only be improved considerably at a higher level of import competition than technical efficiency in the apparel industry. This finding confirms the results of the regression analysis discussed earlier. These findings strengthen the notion that technical efficiency in the apparel industry is more elastic to changes in import competition than technical efficiency in the textile industry. Based on this finding, this research draws attention to the fact that the textile industry is more capital-intensive in comparison to the apparel industry. The textile industry is more reliant on machinery than the apparel industry. Accordingly, improving of technical efficiency substantially in the textile industry requires greater stimulus than doing the same thing in the apparel industry.

7.6. Discussion regarding the correlation between import competition and scale efficiency in textile and apparel industries

The preceding section has already mentioned that determining the correlation between two research variables could be done by comparing line charts of both variables. Chapter 6 depicts line chart of the change in import competition faced by textile and apparel industries in Figure 6.1. This figure portrays the change within the period of 1980 and 2009. Figure 6.3, presented in Chapter 6, also illustrates line chart of the change in scale efficiency in both industries. This figure covers the same period of time as Figure 6.1. Hence, it is thinkable to determine the correlation between import competition and scale efficiency in these two industries by comparing line charts which are presented in Figures 6.1 and 6.3.

Unfortunately, comparing line charts, which are depicted in Figures 6.1 and 6.3, could be misleading. It is unavoidable to resolve that line charts in those figures do not show any correlation between import competition and scale efficiency in textile and apparel industries. However, linear regression analysis, which is reported in Chapter 6, has proven that there are positive correlations between import competition and scale efficiency in both industries. Nevertheless, this analysis finds that the regression coefficients of these correlations are rather small. The extent of these coefficients makes it almost impossible to determine these correlations just by comparing line charts depicted in Figures 6.1 and 6.3.

Additionally, Figure 6.3 exhibits that scale efficiency in textile and apparel industries fluctuated over time in the same fashion as technical efficiency, which is depicted in Figure 6.2. These findings confirm the finding discussed in the preceding section. With regard to import competition, this finding indicates that scale efficiency improvement only matters to factory owners and managers when import competition gets tougher. On the contrary, scale efficiency improvement does not really matter to them when import competition gets slacken.

Moreover, this research finds that larger impact of import competition occurs on scale efficiency in the textile industry than similar impact in the apparel industry. These findings imply that scale efficiency in the textile industry is more elastic to the change in import competition than scale efficiency in the apparel industry. These findings highlight the fact factory owners and managers in the textile industry have more control over inputs and outputs of their production. Firms in the textile industry are usually supported by vast capital. These firms can easily dictate their supplier through their large purchase. They are often superior in employment issues. They also have a bearing on their buyer. Accordingly, these firms have more power to manage the scale of their production. In contrast, firms in the apparel industry are mostly smaller than firms in the textile industry. It is harder for these firms to manage the scale of their production.

This research also finds that threshold value with respect to scale efficiency in the textile industry is larger than the corresponding threshold value in the apparel industry. These findings imply that it takes a higher level of import competition to induce considerable improvement of scale efficiency in the textile industry than in the apparel industry. These findings do not confirm with the results of the linear regression analysis. These findings are not in line with the findings on technical efficiency either. This difference occurs owing to the unique nature of scale efficiency in the textile industry. It seems that scale efficiency in the textile industry is responsive to changes in import competition. However, the response is quite minor. Considerable response of scale efficiency in the textile industry can only be induced by an exceptionally high level of import competition.

Furthermore, his research finds that the thresholds of scale efficiency are larger than technical efficiency in both industries. It means the elasticity of scale efficiency is lower than the elasticity of technical efficiency in both industries. This finding implies that factory owners and managers tend to cope with technical efficiency first. They will only deal with scale efficiency when improvement in technical efficiency has been optimum.

7.7. Discussion regarding foreign trade policy for textile and apparel industries

This research has discovered different levels of import competition, which serve as thresholds value in eight separate correlations between import competition and each dependent variable. Beyond this threshold values, the number of workers, wages, and technical and scale efficiencies behave differently compared with their behavior below the threshold. In the textile industry, threshold values in relation to the number of workers and wages are 0.225617 and 0.018941 respectively. In addition, threshold value in relation to technical efficiency is the same as threshold value in relation to scale efficiencies in this industry, which is 0.008789. By the same token, threshold value in relation to the number of workers and wages in the apparel industry are 0.005895 and 0.000911 respectively. In addition, threshold value in relation to technical and scale efficiencies in this industry are 0.000129 and 0.001571 respectively.

These different levels of import competition imply that the government of Indonesia does not actually deal with contradictory interests in relation to textile and apparel industries. When designing foreign trade policy for these industries, the government does not only have two alternatives to consider. It is not true that efficiency in both industries can only be improved on the expense of the number of workers and wages. These different levels of import competition suggest that the government has a lot more alternatives to decide.

This research learns that indeed there is no contradiction between technical and scale efficiencies improvement and the number of workers and wages protection in the textile industry. Both threshold values with regard to technical and scale efficiencies in this industry are lower than threshold values with regard to the number of workers and wages. Hence, technical and scale efficiencies in this industry can be improved significantly without severely harm the number of workers and wages. Based on these findings, foreign trade policy regarding the apparel industry should allow import competition to intensify until it reaches 0.018941. Up to this level, import competition is not severely detrimental to the number of workers and wages.

Unfortunately, the challenge in the apparel industry is more complicated. Then again, there are more options for the government than just improving efficiency or protecting workers' welfare. In this industry, threshold value in relation to technical efficiency is the lowest. This finding indicates that import competition can be used to induce significant improvement of technical efficiency without causing severe detriment to either the number of workers or wages.

Import competition faced by the textile industry can be intensified until 0.00911. At this level of import competition, the government must make a choice between improving technical efficiency further and preserving wages. Import competition should not exceed this level if the government prefers protecting wages over improving technical efficiency. Otherwise, import competition can be allowed to intensify further.

Import competition should be allowed to intensify further as at 0.001571 it will induce significant improvement of scale efficiency. However, when import competition reaches 0.05895, the government is required to make another critical decision. This time the government must choose between improving technical and scale efficiencies further and shielding the number of workers. Analogous to the first decision, import competition should not surpass this level if the government prefers protecting the number of workers over improving technical and scale efficiencies.

Furthermore, this research learns that the government should not hesitate to utilize import competition for inducing considerable improvement of technical efficiency. This research finds that threshold values with respect to technical efficiency in both textile and apparel industry are lower than all threshold values beyond which the number of workers and wages will be badly deteriorated. This finding implies that there are plenty of rooms for import competition to induce considerable advancement of technical efficiency of both industries without causing serious harm to the number of workers and wages.

As a matter of fact, the government will only need to make a problematic decision when it comes to make extensive improvement of scale efficiency in the apparel industry. Threshold value with respect to scale efficiency in this industry is higher than the threshold value with respect to wages. Consequently, import competition can be utilized to induce extensive improvement of scale efficiency on the expense of wages. In other words, it is impossible to extensively improve scale efficiency in this industry without severely deteriorated wages. This is the only occasion when the government is required to devote thoughtful consideration.

Moreover, this research defines import competition as a function of imports over domestic production minus exports. This definition of import competition specifies that the government of Indonesia can manage import competition through three variables, explicitly imports, domestic production and exports. Higher level of import competition can be induced by higher imports, lower domestic production or higher exports. In contrast, lower level of import competition can be induced by lower imports, higher domestic production or lower exports.

The government of Indonesia may find it more problematical to manage import competition through domestic production and exports. These variables are commonly beyond the direct control of the government. The government can only alter these variables indirectly through factory owners and managers. Even though this option is open to the government, it is quite impractical.

On the contrary, the government can directly control imports by utilizing customs import duty and exchange rate. Hence, it would be more convenient for the government to manage import competition through imports. The government can stimulate import competition to intensify by imposing lower import duty tariff or applying lower exchange rate. Alternatively, the government can suppress import competition by levying higher import duty tariff or applying higher exchange rate. In addition, discussion on Section 6.1 of this chapter has mentioned that the key determinant of the change in import competition is imports. Therefore, it would be more effective for the government of Indonesia to manage import competition by modifying imports.

Chapter summary

This chapter reviews each correlation between import competition and four different dependent variables in two different industries. There are eight correlations altogether which this chapter goes over. This research corroborates that there is a negative correlation between import competition and the number of workers and between import competition and wages in textile and apparel industries. Concurrently, this research corroborates that there is a positive correlation between import competition and technical efficiency and between import competition and scale efficiency in textile and apparel industries.

This chapter sums up that the magnitudes of the impact of import competition on these dependent variables differ in textile and apparel industries. This research reckons that the differences of the magnitude are predominantly caused by different nature of these industries. Textile industry is a capital-intensive industry which relies heavily in sophisticated production plant. In contrast, apparel industry is a labor-intensive industry which employs a large number of workers to operate simple machine.

This chapter also conveys that the government of Indonesia does not actually contend with contradictory interests when implementing foreign trade policy, particularly with regard to textile and apparel industries. The government does not always need to choose between efficiency matter and employment matter. At times, import competition can be utilized to induce significant improvement of technical efficiency and scale efficiency in these industries without causing unacceptable impairment to the number of workers and wages in these industries.

Chapter 8 Conclusions and policy recommendation

The focal raison d'être of this chapter is to wrap up all the findings of this research. This chapter commences by providing an answer to each research question. After that, this chapter presents conclusions of this research. Lastly, this chapter offers recommendations which can be used to improve foreign trade policy in Indonesia, particularly policy regarding textile and apparel industries.

8.1 Answers to research questions

The first and second research questions which this research tries to address attend to the impact of import competition on employment issues. The first and second research questions, which are cited in Chapter 1, guides this research to seek empirical evidence whether import competition does affect the number of workers in Indonesia's textile and apparel industries. Afterward, the third and fourth research questions draw attention to the impact of import competition on wages in these two industries.

The analysis, which is presented in Chapter 6, reveals that there is indeed empirical evidence that import competition does affect the number of workers in Indonesia's textile industry. There are probably several factors which cause the continuous fluctuation in the number of workers in the textile industry. The analysis finds that the number of workers responds to changes in import competition. Then, it can be construed that import completion act as one of the determinants in the number of workers' change.

In addition, the analysis discloses that import competition and the number of workers in the textile industry have a negative correlation. It means that if increases in import competition are acceptable, the number of workers in the textile industry will decline. In contrast, the number of workers can be expected to increase if import competition is suppressed.

However, the magnitude of the impact of import competition on the number of workers in the textile industry is diminutive. Compared with other determinants of the number of workers fluctuation, the impact of import competition is rather small. Natural change in import competition will not cause serious injury in the number of workers. It would require an immense change in import competition alone to alter the fluctuation of the number of workers in the textile industry substantially.

The analysis asserts that similar scientific evidence is found as well in Indonesia's apparel industry. There is scientific evidence that import competition does affect the number of workers in the apparel industry. In this industry, the correlation between import competition and the number of workers is negative too. In addition, the magnitude of the impact is quite small. It can be concluded that import competition also serves as determinant in fluctuation of the number of workers in the apparel industry.

The third and fourth research question quoted in Chapter 1 deal with another employment issue, namely wages. This research questions guide this research to look into the impact of import competition on wages in Indonesia's textile and apparel industries.

The analysis, reported in Chapter 6, shows that there is empirical evidence that import competition does affect wages in Indonesia’s textile industry. It cannot be denied that there are several factors which collectively contribute to the continuous fluctuation in wages in the textile industry. The analysis reveals when import competition changes, wages will react to that change. It can be interpreted, accordingly, that import competition has a bearing for the change in wages in Indonesia’s textile industry.

The analysis also displays that wages in the textile industry is negatively correlated to the change in import competition. It means that if import competition is allowed to increase, wages in the textile industry will fall. Oppositely, an increase in wages will occur, if import competition faced by the textile industry is curbed. It can be said that wages move to the opposite direction in response to the change in import competition.

Similar to the impact of import competition on the number of workers, the magnitude of the impact of import competition on wages in the textile industry is infinitesimal. Compared with other determinants of fluctuation of wages, the contribution of import competition to the change in wages is quite small. Normal change in import competition will only cause modest change in wages' fluctuation. Severe deterioration of wages in the textile industry could only be instigated by a massive change in import competition.

The analysis asserts that similar scientific evidence is found as well in Indonesia's apparel industry. There is scientific evidence that import competition does affect wages in the apparel industry. In this industry, the correlation between import competition and wages is negative too. In addition, the magnitude of the impact is quite small. It can be concluded that import competition also serves as a determinant in fluctuation of wages in the apparel industry.

It is worth to mention that magnitude of the impact of import competition on wages in both industries is larger than magnitude of the impact of import competition on the number of workers. This finding corroborates the notions that in response to import competition factory owners and managers tend to make adjustments on wages first. The alternative of adjusting the number of workers will only be taken if adjustment on wages can no longer be done. Usually it happens when factory owners and managers are restrained by minimum wage law.

Labor unions also play a significant role in hampering factory owners and managers to lower wages. As a result, the impact of import competition is larger on wages than on the number of workers.

In response to the implementation off several free trade agreements, workers in textile and apparel industries claim that wages falls and many workers are discharged in consequence of increasing import competition. It seems that their claim has a justifiable rationale. It is true that magnitude of the impact of import competition on the number of workers and wages in Indonesia’s textile and apparel industries are actually quite petite. However, it has to be noted that the analysis is conducted in a protected environment. The current rate of customs tariff duty for textile and apparel is still high. If trade protection is abolished and the growth of import competition is left unchecked, it is reasonable to think that the number of workers and wages will be deteriorated severely.

The fifth to eighth research questions which are mentioned in Chapter 1 see to the impact of import competition on industrial efficiency subjects. These research questions call for empirical evidence that import competition in reality matters for improving efficiency in the textile and apparel industries, specifically technical and scale efficiencies.

The analysis, reported in Chapter 6, shows that there is scientific evidence that import competition does affect technical efficiency in Indonesia's textile industry. It has to be understood that there are many factors which jointly contribute to the continuous fluctuation in technical efficiency in the textile industry. The analysis discloses when import competition changes, technical efficiency will respond to that change. Accordingly, it is reasonable to assume that import competition is one of these factors which matter for improving technical efficiency in Indonesia's textile industry.

The analysis also displays that technical efficiency in the textile industry is positively correlated to the variation in import competition. It means that if import competition is allowed to increase, technical efficiency in the textile industry will get better. In contrast, technical efficiency would get worse if import competition faced by the textile industry diminishes. It can be said that technical efficiency changes to the same direction in response to the change in import competition.

However, the regression coefficient on the correlation between import competition and technical efficiency in the textile industry is rather small. Compared with other determinants of changes in technical efficiency, the impact of import competition is quite insignificant. Regular change in import competition will not be able to instigate significant improvement of technical efficiency. It would require an immense change in import competition alone to modify the fluctuation of technical efficiency in the textile industry substantially.

The research affirms that a similar conclusion can also be applied in Indonesia's apparel industry. Analysis in Chapter 6 reports that there is scientific evidence that import competition does affect technical efficiency in the apparel industry. In this industry, the correlation between import competition and technical efficiency is also positive. It can be concluded that import competition also serves as a determinant in fluctuation of technical efficiency in the apparel industry.

Similar to the impact of import competition on technical efficiency in the textile industry, the magnitude of the impact in apparel industry is rather small too.

Compared with other determinants of fluctuation of technical efficiency in the apparel industry, the contribution of import competition is relatively minor. Normal change in import competition will only cause modest change in technical efficiency's fluctuation. Severe deterioration of technical efficiency in this industry could only be instigated by a massive change in import competition.

The seventh and eighth research questions draw attention to another subject of efficiency, namely scale efficiency. This research questions call for empirical evidence that import competition does affect scale efficiency in the textile and apparel industries.

The analysis, presented in Chapter 6, reports that there are empirical evidences that scale efficiency responses to the change in import competition faced by both textile and apparel industries. This analysis also finds that scale efficiency in these industries changes to the same direction as the change in import competition. Hence, it can be said that the correlations between import competition and scale efficiency in these industries are both positive.

Moreover, this analysis also reveals that the regression coefficients on the correlation between import competition and technical efficiency in the textile and apparel industries is fairly small. These regression coefficients can be considered as minor in comparison with regression coefficients of other determinants. Major change in import competition would be required for inducing substantial improvement of scale efficiency in these industries.

The answer to the first and second research questions verify that import competition is detrimental to the number of workers in both textile and apparel industries. The ninth and tenth research questions call attention to a particular level of import competition beyond which this detrimental impact becomes so severe. A particular value of import competition separates levels of import competition with low detrimental impact from levels of import competition with severe detrimental impact. In this research, this particular value of import competition is called a threshold. This research answers this ninth and tenth research questions by finding the threshold in the correlation between import competition and the number of workers in both textile and apparel industries.

A threshold exists in a non-linear correlation which has two regimes. This threshold operates as the perimeter of these regimes. Further analysis on the correlation between import competition and the number of workers in the textile industry, presented in Chapter 6, confirms that this correlation is non-linear. This analysis also confirms that this correlation consists of two regimes. Afterwards, this analysis reveals that the threshold value in the correlation between import competition and the number of workers in this industry is 0.225617.

The correlation between import competition and the number of workers in the apparel industry is also confirmed as a non-linear correlation by further analysis of this correlation. It is confirmed as well that this correlation also consists of two regimes. Subsequently, this further analysis reveals that the threshold value which separates the two regimes of this correlation in the apparel industry is 0.005895.

Based on the answer to the third and fourth research questions, the eleventh and twelfth research questions commend that the correlation between import competition and wages in the textile and apparel industries should be analyzed further. The eleventh and twelfth research questions draw attention to a particular level of import competition beyond which the negative impact of import competition on wages becomes much more severe. The threshold in the correlation between import competition and wages in the textile and apparel industries is produced to resolve these research questions.

The negative correlation between import competition and wages in the textile industry, established in Chapter 6, is analyzed further. This further analysis verifies non-linearity feature of this correlation. This further analysis also verifies that this correlation comprises two regimes. Later, this analysis discloses that the threshold value in the correlation between import competition and wages in this industry is 0.018941.

Further analysis on the correlation between import competition and wages in the apparel industry also corroborates non-linearity feature of this correlation. This additional analysis also finds that this correlation comprises two regimes. Afterward, this further analysis discloses that the threshold value which separates the two regimes of this correlation is 0.000911.

Furthermore, the answers to the fifth and sixth research questions prove that technical efficiency in both textile and apparel industries are positively affected by import competition. The thirteenth and fourteenth research questions require that further analysis should be done to find a particular level of import competition beyond which technical efficiency in the textile and apparel industries can be boost substantially. This research resolves this research questions by disclosing the threshold value in the correlation between import competition and technical efficiency in the two industries.

Further analysis on the positive correlation between import competition and technical efficiency in the textile industry verifies that this correlation is non-linear. This analysis also verifies that this correlation is divided into two regimes. Later, this analysis finds that the threshold value in the correlation between import competition and technical efficiency in this industry is 0.008789.

The positive correlation between import competition and technical efficiency in the apparel industry is also verified as a non-linear correlation by further analysis of this correlation. It is verified that this correlation is partitioned into two regimes as well. Successively, this further analysis reveals that the threshold value which separates the two regimes of this correlation in the apparel industry is 0.000129.

The answers to the seventh and eighth research questions clear the way for further analysis on the correlation between import competition and scale efficiency in the textile and apparel industries. The fifteenth and sixteenth research questions instigate the inquiry of a particular level of import competition beyond which scale efficiency in both industries can be boost substantially. These research questions lead to the finding of the threshold value in the correlation between import competition and scale efficiency in these industries.

Further analysis is performed on the positive correlation between import competition and scale efficiency in the textile industry to find its threshold value. Initially, this further analysis proves non-linearity feature of this correlation. This further analysis, in addition, proves that there are two regimes in this correlation. Later, this analysis discovers that the threshold value in the correlation between import competition and scale efficiency in this industry is 0.008789.

Further analysis on the correlation between import competition and scale efficiency in the apparel industry also corroborates that non-linearity feature occurs in this correlation. This further analysis corroborates that this correlation also comprises two regimes as well. Afterward, this analysis reveals that the threshold value which separates the two regimes of this correlation is 0.001571.

8.2 Conclusions of this research

This research concludes that annual performance of textile and apparel industries in Indonesia is not satisfactory. There are many inefficient firms in these two industries. Technical and scale efficiencies scores of these firms are quite low. Their scores drag down average annual technical and scale efficiencies scores in both industries. Consequently, both textile and apparel industries are considered as inefficient. It is understandable when people label them as industries with comparative disadvantage. This research postulates that there are plenty of rooms for structuring these industries so as to improve their competitiveness. If they are given the opportunity to restructure their production, these two industries can turn their comparative disadvantage into comparative advantage.

This research also concludes that import competition does negatively affect the number of workers in Indonesia's textile industry. Higher level of import competition will bring detriment to the number of workers in this industry. Additionally, this research also concludes that the correlation between import competition and the number of workers in this industry is non-linear. This correlation has two regimes which are governed by the value of import competition. These two regimes are divided by a threshold which is defined by a particular value of import competition. The responses of the number of workers to changes in import competition in these two regimes differ substantially. Beyond the threshold value, an increase of import competition is seriously detrimental to the number of workers in this textile. The value of import competition which works as the threshold in this correlation is 0.225617.

Moreover, this research concludes that import competition indeed negatively alters wages in Indonesia's textile industry. An increase in import competition will harm wages in this industry. This research, in addition, concludes that the correlation between import competition and wages in this industry is non-linear. This research affirms that this correlation consist of two regimes which are governed by the value of import competition. A threshold, which is determined by a particular value of import competition, separates these two regimes are. Within one regime, the response of wages to a change in import competition differ considerably from it response in the other regime. Within the regime beyond the threshold value, an escalation of import competition will cause a serious damage to wages in this industry. The value of import competition which works as the threshold in this correlation is 0.018941.

This research determines further that the same conclusions are drawn for the apparel industry in Indonesia. This research concludes that import competition negatively affects the number of workers and wages in the apparel industry. Additionally, this research reaches the conclusion that both the correlation between import competition and the number of workers and the correlation between import competition and wages are non-linear. Similar to such correlations discovered in the textile industry, each of these correlations consists of two regimes governed by the value of import competition. A specific value of import competition works as a threshold which splits these regimes. The number of workers and wages behave in a different way in response to changes in import competition in different regimes.

Beyond the threshold value, an upsurge of import competition severely deteriorates both the number of workers and wages in Indonesia's apparel industry. The values of import competition which work as the threshold in these correlations are 0.005895 and 0.000911 respectively.

Furthermore, this research concludes that import competition does positively affect technical efficiency in Indonesia's textile industry. This research finds that import competition can be used to induce higher efficiency in this industry. This research, in addition, concludes that the correlation between import competition and technical efficiency in this industry is non-linear too. The non-linearity in this correlation is designated by its two regimes. These regimes are also defined by the value of import competition. These two regimes are separated by a certain value of import competition which functions as a threshold. The responses of technical efficiency to a change in import competition in the regime beyond the threshold value are substantially larger than its responses below the threshold value. If import competition is going to be used for driving technical efficiency improvement in the textile industry, it has to be set beyond the threshold value. The value of import competition which works as the threshold in this correlation is 0.008789.

Moreover, this research concludes that import competition also does positively affect scale efficiency in Indonesia's textile industry. In view of that, import competition can be utilized to stimulate enhancement of scale efficiency of this industry. Additionally, this research concludes that the nature of this correlation between import competition and scale efficiency in this industry is non-linear. The non-linearity of this correlation is indicated by two regimes which are governed by the value of import competition. Similar to non-linear correlations discussed earlier, regimes in this correlation are separated by a threshold defined by a specific value of import competition. Within the regime beyond the threshold value, scale efficiency's elasticity in response to a change in import competition is larger than its elasticity within the other regime. Thus, improvement of scale efficiency would be more effective if it is driven by level of import competition beyond the threshold value. The value of import competition which works as the threshold in this particular correlation is 0.008789.

The same conclusions are drawn for Indonesia's apparel industry. This research concludes that import competition has a positive impact on technical and scale efficiencies in this industry. This research, in addition, finds that there is non-linearity in the correlation between import competition and technical efficiency and the correlation between import competition and scale efficiency. Similar to such correlations learned in Indonesia's textile industry, each of these correlations has of two regimes. These regimes are governed by the value of import competition as well. A specific value of import competition operates as a threshold and splits these regimes. In different regimes, technical and scale efficiencies behave differently in response to a change in import competition. Beyond the threshold value, an increase of import competition significantly improves technical and scale efficiencies in this industry. The threshold value in the correlation between import competition and technical efficiency is 0.000129, and the threshold value in the correlation between import competition and scale efficiency is 0.001571.

Threshold values provided by this research unravel more alternatives for the government of Indonesia in decision making process regarding foreign trade policy. These threshold values represent different objectives which the government can choose to pursue. Therefore, the government can set the level of import competition in accordance to a particular objective which the government wishes to achieve.

8.3. Policy recommendations

The government of Indonesia can take advantage from the findings of this research. This research indeed discovers levels of import competition beyond which enhancement of technical efficiency and scale efficiency in the textile and apparel industries can be accelerated. What is more, this research finds levels of import competition beyond which deterioration of the number of worker and wages in the textile and apparel industries will be so devastating. These different levels of import competition discovered by this research can be used to guide the government in conducting decision making process. Hopefully with this assistance, the government will be able to formulate more accurate foreign trade policy, particularly trade policy with regard to textile and apparel industries.

In order to boost technical and scale efficiencies improvement in the textile industry, import competition can be intensified until it reaches 0.018941. Beyond this level, import competition will be tremendously detrimental to wages of this industry. At this point, the government of Indonesia needs to make the first critical decision. If it is more beneficial for the government to sustain the level of wages, then import competition should be restrained from exceeding this level. Conversely, if the government believes that improvement of technical and scale efficiencies is still insufficient, the import competition should be induced further at the expense of wages.

If the government of Indonesia takes the second option, import competition can be intensified further until it reaches 0.225617. Beyond this level, import competition will severely deteriorate the number of workers in this industry. At this level of import competition, the government once again must determine a critical decision. If the verdict is to maintain the level of employment, then escalation of import competition should be discontinued at this level. On the contrary, if the government decides that the textile industry should keep pursuing higher technical and scale efficiencies, import competition should be allowed to intensify further to the detriment of the number of workers.

The same process of decision making can be utilized in formulating foreign trade policy regarding the apparel industry. The government of Indonesia will find formulating foreign trade policy regarding the apparel industry more complicated than formulating the same policy in the textile industry. The apparel industry faces contradictory circumstances which are not found in the textile industry. With the aim of inducing substantial improvement of technical efficiency in this industry, import competition should be intensified beyond 0.000129.

Import competition can be allowed to intensify further until it reaches 0.000911. Beyond this level, the impact of import competition on wages of the apparel industry will be tremendously destructive. This level of import competition marks the point where the government needs to take a critical decision concerning the apparel industry. If the government would rather protect wages, then import competition should not be intensified any longer. However, if the government believes that efficiency issues matter more than employment issues, then import competition shall be intensified further.

If import competition is allowed to intensify further, at 0.001571, it will significantly induce scale efficiency improvement. It may continue to intensify until it reaches 0.005895. At this point, the government needs to choose between efficiency improvement and the number of workers deterioration.

This research can assists the government Indonesia to avoid head to head contradiction between efficiency issues and employment issues in the textile and apparel industries. Actually, the government does not have to make bold choice between improving efficiency and protecting employment. It is currently believed that the government can only improve industrial efficiency to the detriment of the number of workers and wages. On the other hand, the government can only sustain the number of workers and wages with no thought for industrial efficiency improvement. This research helps the government to circumvent this dilemma.

As a matter of fact, alternatives, which the government can choose, are not limited only to two possibilities, namely efficiency interests and employment interests. This research enables the government to make more accurate assessment regarding these interests. Thresholds value of import competition discovered by this research aid the government to see more alternatives. These threshold values also provide step by step guidance for the government in making a selection among these alternatives. It is inevitable that one interest needs to be given up in favor of another. Nonetheless, as there are more alternatives to choose, the government will be able to formulate more accurate foreign trade policy for the textile and apparel industries.

Optimistically, with more accurate foreign policy, the government of Indonesia will be able to manage crucial adjustments required by trade liberalization. This better foreign trade policy can provide opportunity needed by the textile and apparel industries for improving their competitiveness. That means the textile and apparel industries can transform their comparative disadvantage into comparative advantage. Moreover, this improved foreign trade policy can make adjustments toward free trade less costly and less painful. Hopefully, in the end, free trade can make everyone better off.

Chapter summary

This chapter conveys this research to its closure. In this chapter, this research concludes that import competition is detrimental to the number of workers and wages in Indonesia’s textile and apparel industries. This research also concludes that import competition can be used to boost technical and scale efficiencies in these two industries.

However, these impacts of import competition are not necessarily contradictory. This contradiction only occurs when the government of Indonesia intends to induce substantial improvement of scale efficiency in the textile industry. If the government insists, it has to be done on the expense of the number of workers and wages in this industry. This contradiction, on the contrary, does not occur when the government intends to induce substantial improvement in the scale efficiency in this industry. Up until a particular level of import competition, this improvement can be made without severely deteriorating the number of workers and wages. Thankfully, the same condition applies in the apparel industry. Up until a particular level of import competition, both technical and scale efficiencies in this industry can be improved substantially without causing too much harm to the number of workers and wages.

There are several levels of import competition which correspond to different impacts on the number of workers, wages, and technical and scale efficiencies. The government of Indonesia can choose an appropriate level of import competition to establish the intended impact.

Bibliography

Adewuyi, A. O. (2006). Trade Policy Reform and Technical Efficiency in Nigeria's Manufacturing Sector. *11th Annual Conference on Econometric Modelling for Africa.* Dakar: United Nations Institute for Economic Development and Planning (UN-IDEP).

Adkins, L. C., & Hill, R. C. (2008). *Using Stata for Principles of Ecnometrics.* Hoboken, NJ: John Wiley & Sons, Inc.

Anderson, D. R., Sweeney, D. J., & William, T. A. (2008). *Statistics for Business and Economics: Tenth Edition.* Mason OH: Thomson South-Western.

Association of Southeast Asian Nations. (1992). *ASEAN Trade in Goods Agreement.* Jakarta: Association of Southeast Asian Nations.

Association of Southeast Asian Nations. (2004). *Agreement on Trade in Goods of the Framework Agreement on Comprehensive Economic Co-operation between the Association of Southeast Asian Nations and the People's Republic of China.* Jakarta: Association of Southeast Asian Nations.

Association of Southeast Asian Nations. (2006). *Agreement on Trade in Goods Under the Framework Agreement on Comprehensive Economic Cooperation Among the Governments of the Member Countries of the Association of Southeast Asian Nations and the Republic of Korea.* Jakarta: Association of Southeast Asian Nations.

Association of Southeast Asian Nations. (2008a). *Agreement on Comprehensive Economic Partnership among Member States of the Association of Southeast Asian Nations and Japan.* Jakarta: Association of Southeast Asian Nations.

Association of Southeast Asian Nations. (2009a). *Agreement Establishing the ASEAN-Australia-New Zealand Free Trade Area.* Jakarta: Association of Southeast Asian Nations.

Association of Southeast Asian Nations. (2009b). *Agreement in Trade in Goods under the Framework Agreement on Comprehensive Economic Cooperation between ASEAN and the Republic of India.* Jakarta: Association of Southeast Asian Nations.

Azad, A. S. (2010). *Measuring Efficiency of Japanese Banks: A Qualitative and*

Quantitative Approach. Saarbrücken: Lambert Academic Publishing.

Bahmani-Oskooee, M., & Chakrabarti, A. (2003). Import Competition, Employment and Wages in U.S. Manufacturing. *Journal of Policy Modeling Volume 25, Issue 9*, 869-880.

Bank Indonesia. (2011). *Republic of Indonesia: Recent Economic Development.* Jakarta: Investor Relations Unit - Bank Indonesia.

Banker, R., Charnes, A., & Cooper, W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science, Volume 30*, 1078–1092.

Barbour, R. R. (2008). *Introducing Qualitative Research: A Student's Guide to the Craft of Doing Qualitative Research.* London: Sage Publication.

Baum, C. F. (2006). *An Introduction to Modern Econometrics Using Stata.* College Station: Stata Press.

BPS-Statistics Indonesia. (2011). *Statistical Yearbook of Indonesia 2011.* Jakarta: BPS-Statistics Indonesia.

Breusch, T. S. (1978). Testing for Autocorrelation in Dynamic Linear Models. *Australian Economic Papers Volume 17, Issue 31*, 334–355.

Breusch, T. S., & Pagan, A. R. (1979). A Simple Test for Heteroscedasticity and Random Coefficient Variation. *Econometrica Volume 47, Number 5*, 1287–1294.

Chakrabarti, A. (2003). Import Competition, Employment and Wage in US Manufacturing: New Evidence from Multivariate Panel Cointegration Analysis. *Applied Economics, vol. 35, issue 13*, 1445-1449.

Chang, H. J. (2002). *Kicking Away the Ladder: Development Strategy in Historical Perspective.* London: Anthem Press.

Charnes, A., Cooper, W., & Rhodes, E. (1978). Measuring the Efficiency of Decision-making Units. *European Journal of Operational Research, Volume 2, Issue 6*, 429–444.

Chirwa, E. W. (1998). Technical Efficiency in Manufacturing Industries in Malawi using Deterministic Production Frontier. *Wadonda Consult Working Paper WC/05/98*, 1-28.

Cochrane, D., & Orcutt, G. (1949). Application of Least Squares Regression to Relationships Containing Auto- Correlated Error Terms. *Journal of the American Statistical Association, Volume 44, No. 245*, 32-61.

Coelli, T. J., Rao, D. P., O'Donnel, C. J., & Battese, G. E. (2005). *An Introduction to Efficiency and Productivity Analysis, Second Edition.* New York: Springer Science+Business Media Inc.

Cohn, T. H. (2003). *Global Political Economy: Theory and Practice, Second Edition.* New York: Addison Wesley Longman, Inc.

Cooper, W. W., Seiford, L. M., & Tone, K. (2007). *Data Envelopment Analysis: A Comprehensive Text with Models, Applications, References and DEA-Solver Software, Second Edition .* New York: Springer Science+Business Media LLC.

Cooper, W. W., Seiford, L. M., & Zhu, J. (2010). Data Envelopment Analysis: History, Models and Interpretation. In W. W. Cooper, L. M. Seiford, & J. Zhu, *Handbook on Data Envelopment Analysis: Second Edition* (pp. 1-40). New York: Springer Media, LLC.

Davidson, R., & MacKinnon, J. G. (2004). *Econometric Theory and Methods.* New York: Oxford University Press.

Dick, H. (2002). Formation of the Nation State 1935-1945. In H. Dick, V. J. Houben, J. T. Lindblad, & T. K. Wie, *The Emergence of a National Economy: An Economic History of Indonesia 1800-2000* (pp. 153-193). Crows Nest NSW: Allen & Unwin.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the Estimators for Autoregressive Time Series With a Unit Root. *Journal of the American Statistical Association, Volume 74, No. 366*, 427-431.

Durbin, J. (1970). Testing for Serial Correlation in Least-Squares Regression When Some of the Regressors are Lagged Dependent Variables. *Econometrica, Volume 38, No. 3*, 410-421.

Ekholm, K., Moxnes, A., & Ulltveit-Moe, K. H. (2012). Manufacturing restructuring and the role of real exchange rate shocks. *Journal of International Economics, Volume 86, Issue 1, January 2012*, 101–117.

Enders, W. (2010). *Applied Econometric Time Series: Third Edition.* Hoboken, New Jersey: John Wiley & Sons, Inc.

Farrell, M. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society, Volume 120, No. 3*, 253-290.

Franses, P. H., & van Dijk, D. (2000). *Nonlinear Time Series Models in Empirical*

Finance. Cambridge: Cambridge University Press.

Godfrey, L. G. (1978). Testing Against General Autoregressive and Moving Average Error Models when the Regressors Include Lagged Dependent Variables. *Econometrica Volume 46, Number 6*, 1293-1301.

Goldman Sachs Global Economics Group. (2007). *BRICS and Beyond.* New York: The Goldman Sachs Group.

Granger, C. W., & Newbold, P. (1974). Spurious Regressions in Econometrics. *Journal of Econometrics, Volume 2, Issue 2*, 111-120.

Grossman, G. M. (1987). The Employment and Wage Effects of Import Competition in the United States. *Journal of International Economic Integration Vol. 2, No. 1*, 1-23.

Haddad, M. (1993). How trade liberalization affected productivity in Morocco. *Policy Research Working Paper Series number WPS 1096, The World Bank*, 1-42.

Hamermesh, D. S. (1992). Unemployment Insurance for Developing Countries. *The policy Research Working Papers WPS 897*, World Bank.

Hansen, B. E. (1997). Inference in TAR Models. *Studies in Nonlinear Dynamics & Econometrics: Vol. 2: No. 1, Article 1*, 1-14.

Heij, C., de Boer, P., Franses, P. H., Kloek, T., & van Dijk, H. K. (2004). *Econometric Methods with Applications in Business and Economics.* New York: Oxford University Press.

Hill, H. (2000). *The Indonesian Economy.* Cambridge: Cambridge University Press.

IMF, International Monetary Fund. (2012). *World Economic Outlook Database, April 2012.* New York: International Monetary Fund.

Johnson, H. G. (1960). The cost of protection and the scientific tariff. *Journal of Political Volume LXVIII Number 4*, 327-345.

Joo, J. (2002). The Impact of Increasing Import Competition on Employment and Wages in the Manufacturing Industries of the Asian Newly Industrialized Countries (NICs). *Seoul Journal of Economics, Volume 15, Number 3*, 437-483.

Krugman, P. R., Obstfeld, M., & Melitz, M. J. (2012). *International Economics: Theory and Policy, Ninth Edition.* Boston: Addison-Wesley.

Leibenstein, H. (1966). Allocative efficiency vs. 'X-efficiency'. *American Economic*

Review Volume56 Issue 3, 392-415.

Lindblad, J. T. (2002). The late colonial state and economic expansion, 1900-1930s. In H. Dick, V. J. Houben, J. T. Lindblad, & T. K. Wie, *The emergence of a national economy: An economic history of Indonesia, 1800-2000* (pp. (PP. 111-152)). Crows Nest, NSW: Allen &Unwin.

Lipsey, R. G., Courant, P. N., & Ragan, C. T. (1999). *Economics: Twelfth Edition.* Reading, Massachusetts: Addison-Wesley Publishing Company, Inc.

Mankiw, N. G., Quah, E., & Wilson, P. (2008). *Principle of Economics: An Asian Edition.* Singapore: Cengage Learning Asia Pte Ltd.

Mason, R. D., Lind, D. A., & Marchal, W. G. (1999). *Statistical Techniques in Business and Economics: Tenth Edition.* Boston MA: Irwin McGraw-Hill.

Min, B. S. (1999). Competition Effects of Import Discipline in Korea. *Journal of the Asia Pacific Economy Volume 4, Issue 2*, 298-316.

Mion, G., & Zhu, L. (2010). Import Competition from and Outsourcing to China: A Curse or Blessing for Firms? *Centre for Economic Performance Discussion Paper No 1038, December 2010*, 1-48.

Newey, W. K., & West, K. D. (1987). A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix. *Econometrica Volume 55, Number 3*, 703–708.

Njikam, O. (2003). Trade Reform and Efficiency in Cameroon's Manufacturing Industries. *African Economic Research Consortium Research Papers number RP 133*, 1-50.

O'Neill, J. (2011, November 20). Jim O'Neill: BRICs' rapid growth tips the global balance. *The Telegraph*, pp. http://www.telegraph.co.uk/finance/financialcrisis/8902824/Jim-ONeill-BRICs-rapid-growth-tips-the-global-balance.html, accessed 29 April 2012.

Oscarsson, E. (2000). Trade, Employment and Wages in Sweden 1975-93. *Research Papers in Economics 2000:8. Department of Economics, Stockholm University*, 1-20.

Panagariya, A. (2002). Alternative Approaches to Measuring the Cost of Protection. *Mimeo*.

Parkin, M. (2005). *Economics: Seventh edition.* Boston: Pearson Education, Inc.

Porter, M. E. (1990). *The Competitive Advantage of Nations.* London: The Macmillan Press Ltd.

Prais, S., & Winsten, C. (1954). Trend Estimators and Serial Correlation. *Unpublished Cowles Commission Discussion Paper.*

Punch, K. F. (1999). *Introduction to Social Research: Quantitative and Qualitative Approaches.* London: Sage Publications.

Ramanathan, R. (2002). *Introductory Economitrics with Applications: Fifth Edition.* Orlando: Harcourt College Publisher.

Ray, S. C. (2004). *Data Envelopment Analysis: Theory and Techniques for Economics and Operations Research.* Cambridge: Cambridge University Press.

Revenga, A. L. (1992). Exporting Jobs?: The Impact of Import Competition on Employment and Wages in U.S. Manufacturing. *The Quarterly Journal of Economics, Vol. 107, No. 1*, 255-284.

Salant, W. S. (1960). Employment Effects of United States Import Liberalization. *The American Economic Review, Vol. 50, No. 2*, 419-432.

Sasaki, H. (2007). Import Competition and Manufacturing Employment in Japan. *Bank of Japan Working Paper Series No.07-E-25*, 1-33.

Shippen, B. S. (1999). Labor Market Effects of Import Competition: Theory and Evidence from the Textile and Apparel Industries. *Atlantic Economic Journal Volume 27, Number 2*, 193-200.

Stock, J. H., & Watson, M. W. (2003). *Introduction to Econometrics.* Boston: Pearson Education, Inc.

Strauss, A. L., & Corbin, J. (1998). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory .* Thousand Oaks CA : Sage Publication.

Suarez, J. (1998). The Employment and Wage Effects of Import Competition in Switzerland. *International Journal of Manpower, Vol. 19 Iss: 6*, 438 - 448.

The Jakarta Post. (2010a, January 06). Police deploy thousands personnel to guard anti-ACFTA rally in Bandung. *The Jakarta Post*, pp. http://www.thejakartapost.com/news/2010/01/06/police-deploy-thousands-personnel-guard-antiacfta-rally-bandung.html, accessed 27 April 2012.

The Jakarta Post. (2010b, January 21). Thousands rally against free trade treaty in Surabaya, Semarang. *The Jakarta Post*, pp. http://www.thejakartapost.com/news/2010/01/21/thousands-rally-against-free-trade-treaty-surabaya-semarang.html, accessed 27 April 2012.

The Jakarta Post. (2010c, January 28). Hundreds rally against SBY in Makassar.

The Jakarta Post, pp. http://www.thejakartapost.com/news/2010/01/28/hundreds-rally-against-sby-makassar.html, accessed 27 April 2012.

Tomiura, E. (2003). The Impact of Import Competition on Japanese Manufacturing Employment. *Journal of the Japanese and International Economies Volume 17, Issue 2,*, 118–133.

Tong, H. (1983). *Threshold Models in Non-linear Time Series Analysis .* New York: Springer-Verlag.

Tong, H. (1990). *Non-linear Time Series: a Dynamical System Approach.* Oxford: Oxford University Press.

Tybout, J., de Melo, J. A., & Corbo, V. (1990). The Effects of Trade Reforms on Scale and Technical Efficiency : New Evidence from Chile. *Policy Research Working Paper Series number WPS 481, The World Bank*, 1-44.

Van Beveren, I., & Badia, M. M. (2010). Structural rigidities, import competition and firm-level productivity. *Proceedings of the 12th European Trade Study Group Annual Conference* (pp. 1-22). Lausanne: University of Lausanne. Faculty of Business and Economics.

Vanzetti, D., McGuire, G., & Prabowo. (2005). *Trade Policy At The Crossroads: The Indonesian Story.* Geneva: United Nations Publications.

White, H. (1980). A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica Volume 48, Number 4*, 817–838.

Wie, T. K. (2002). Soeharto Era. In H. Dick, V. J. Houben, J. T. Lindblad, & T. K. Wie, *The Emergence of a National Economy: An Economic History of Indonesia, 1800-2000* (pp. 194-243). Crows Nest NSW: Allen & Unwin.

Wooldridge, J. M. (2009). *Introductory Econometrics: A Modern Approach, 4e.* Mason, OH: South-Western Cengage Learning.

World Bank. (1995). *Indonesia: Improving efficiency and equity changes in the public sector's role.* Washington, DC: World Bank.

World Trade Organization. (1998). *Trade Policy Review Body - Trade Policy Review - Report by the Secretariat - Indonesia WT/TPR/S/51.* Geneva: World Trade Organization.

World Trade Organization. (2003). *Trade Policy Review Body - Trade Policy Review - Report by the Secretariat - Indonesia WT/TPR/S/117.* Geneva: World Trade Organization.

World Trade Organization. (2007). *Trade Policy Review Body - Trade Policy Review - Report by the Secretariat - Indonesia – Revision WT/TPR/S/184/Rev.1. .* Geneva: World Trade Organization.

World Trade Organization. (2008). *10 Benefits of the WTO Trading System.* Genève: World Trade Organization.

World Trade Organization. (2010). *Comparative advantage is dead? Not at all, Lamy tells Paris economists.* Geneva: World Trade Organization.

World Trade Organization. (2011). *Indonesia - Tariffs and imports: Summary and duty ranges.* Geneva: World Trade Organization.

World Trade Organization. (2011). *Understanding The WTO.* Geneva: World Trade Organization.

World Trade Organization. (2012). *Trade Profile - Indonesia.* Geneva: World Trade Organization.