

ANALYSIS OF THE IMPACT OF MACROECONOMIC POLICIES ON TEXTILE INDUSTRY AND ITS PRODUCTS IN INDONESIA

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Abstract

Textile and textile's product play an important role in the Indonesian economy. During the last five years, however, the share of these industries and commodities to gross domestic product tend to decrease. The objectives of this study are to analyze factors affecting Indonesian textile and textile's product, and the prospect of Indonesian textile and textile's product in the future. Results of the study show that domestic textile production was affected by world cotton price and wage rate, while the domestic garment production was affected by wage rate in the garment sector. Indonesia's textile export to world market was influenced by domestic textile price, and Indonesia's export garment was influenced by exchange rate (Rp/US\$). Indonesian textile demand was affected by wage rate while domestic garment demand was affected by income per capita of Indonesia. In general, the prospect of Indonesian textile and textile's product seems not too good. In fact, Indonesian textile and textile's product had depended on high import cotton, investment, and exchange rate.

JEL Classification Number: C53, E60, F43, and F4.

Keyword: export, open economy, forecasting, simulation, textile and textile's product.

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I. INTRODUCTION

The industry of textiles and products of textile (TPT) offers an important opportunity for a country to start the industrialization of its economy. This industry plays an important role in increasing export orientation in Asian countries, as in Hong Kong, Singapore, Taiwan, South Korea, Malaysia, China, Indonesia, Thailand, and Vietnam². In addition, the number of population of the Association of Southeast Asian Nations (ASEAN) country has reached approximately 597 million people³ and the implementation of the ASEAN Single Window (ASW) with 0 percent import duty (with the exception of Laos, Cambodia, and Myanmar which the implementation starts in 2012) provide a grand opportunity for the textile market (Sunarno, 2008)⁴.

Textiles and clothing sector is a key sector in Pakistan, Vietnam, Thailand, Sri Lanka, and Indonesia. In 2010 textile export growth in Vietnam reached US\$ 11.2 billion⁵. In Indonesia, the performance of textile products also contributes to economic growth in Indonesia. Textile industry has a 2.18 percent contribution to Gross Domestic Product (GDP) and 8.01 percent to manufacturing industry in 2010 (CBS, 2008). Even the non-oil export commodities which provide the largest contribution for more than 20 years are the textile products. This increase is not independent from the government policy in the early development of this industry.

Textile industry⁶ is also the largest contributor to the foreign exchange earnings of Indonesia. In 2009, the textile industry contributed 12.72 percent in foreign exchange earnings on exports of industrial products, excluding oil and gas, and 9.58 percent to total non-oil exports, although 85 percent of cotton, as the raw materials, is imported. That amount increased sharply from only US\$ 559 million in 1985 (CBS, 2010). Besides having a large contribution in the GDP and foreign exchange, the industry also employs many workers, both who work directly or indirectly.

The importance of textiles and clothing can be seen from its role as one of the basic human needs, other than food and shelter. Therefore, the consumption of clothing will tend to increase aligned with population growth rate (Figure 1). The potential market for Indonesian textile commodities is relatively large because the needs of the urban fabric of society are not only the dress, but also the needs of non-apparel. In 2005 the Indonesian textile consumption

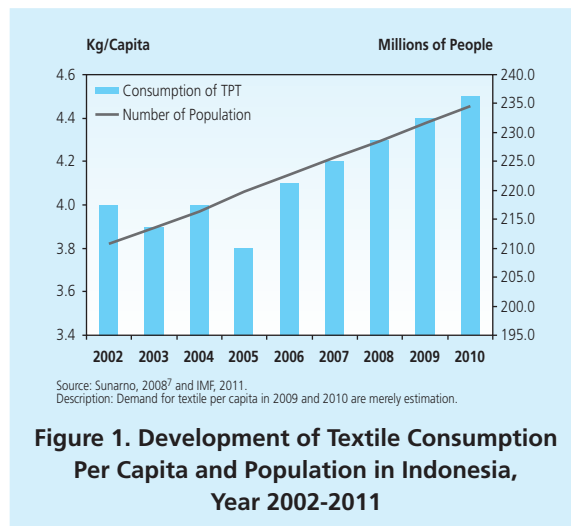
2 **UNCTAD**. TNCs and the Removal of Textiles and Clothing Quotas. Geneva: United Nations Conference on Trade and Development, 2005, page 3.

3 **PRB**. World Population Data Sheet 2009. Washington DC: Population Reference Bureau and USAID, 2009, page. 8.

4 **Susanna Sunarno**. ASEAN, Basis Produksi TPT Dunia. IndonesianTextile.com. Serial Online. 2008. http://indonesia-textile.com/index.php?option=com_content&task=view&id=73&Itemid=50. Accessed on March 17, 2010.

5 **VBN**. Vietnam Textile and Garment Export Cross \$ 11.2 Billion in 2010. Vitenam Business News. SerialOnline, 2011. <http://vietnambusiness.asia/vietnam-textile-and-garment-exports-cross-11-2b-in-2010/>. Accessed on January 10, 2011

6 Exports of industrial products of apparel and other textiles



decreased significantly compared to 2004. This is because on January 1, 2005, the quota system was terminated and adapted to the provisions of the General Agreement on Tariffs and Trade (GATT). This agreement was commenced from the Uruguay Round at April 15, 1994 in Marrakesh that issued the Agreement on Textile and Clothing (ATC) to set the import quota system.

On the other hand the changes in quota system would have positive impact for the textile industry development through fairer trade and mark a new era of world textile trade. The discriminative textile quota system was abolished and the textile products market share is getting larger through international competition and opportunities for the development of textile industry will be even greater. Indonesia is one among the biggest textile producers in the world. In 2000 the Indonesian textile exports reached US\$ 8.2 billion (Rp 74.9 trillion) and was ranked 10th among the world textile producers. In 2003, Indonesian textile exports only scored US\$ 7.03 billion, which drops the ranking to 17th place. But in 2004, this sector could increase foreign exchange earnings up to US\$ 7.6 billion. According Thuborn (2010)⁸ in the year 2007 the total value of Indonesian textile exports amounted to US\$ 9.73 billion, which was ranked 12nd for the textile exports and 8th for the garment exports.

The above figures indicate that the Indonesian textile industry has the potential and good growth opportunities. This is supported by the ability of the textile industry in contributing

7 **Susanna Sunarno.** Amankan Pasar Dalam Negeri. [www.indonesiatextile.com](http://indonesiatextile.com/index.php?option=com_content&task=view&id=76&Itemid=50). Serial Online, 2008. http://indonesiatextile.com/index.php?option=com_content&task=view&id=76&Itemid=50, Accessed on March 17, 2010.

8 **John Thoburn.** The Impact of World Recession on the Textile and Garment Industries of Asia. Working Paper No. 17. Vienna: United Nations Industrial Development Organization, 2010, page. 31.

to GDP, foreign exchange earnings, and at the same time to employment. Besides the textile industry has a big opportunity, where the demand for textile products will increase along with population growth. Nevertheless, the potential and opportunities for the development of the textile industry is not without obstacles. Constraints faced by the textile industry might disrupt or reduce its contribution to the Indonesian economic development.

Globalization, which is marked by the end of the quota system in 2005, has encouraged more open world trade in textiles and clothing and changed the market map from the side of importer management supply. These changes in world textile trade raise the opportunity and at the same time the threat to the Indonesian textile industry. Opportunity that is brought is that the market share of countries that had been protected by the quota system will be opened. While the threat will be the intense competition among countries in the world textile producers, such as China, India, United States and the European Union. The issues of non-tariff barriers, such as transshipment and dumping influence the flow of textiles and clothing trade penetration from developing countries to developed countries.

While competition in the world market is increasing, the conditions in the domestic textile industry are relatively poor. One of the circumstances that aggravate the prospects of textile industry development in Indonesia is the non-conducive investment climate, while this industry requires large investments to revitalize their deteriorating machines and technology. This non-conducive investment situation is caused by, among others, the lack of legal certainty, wide spreading corruption, cumbersome bureaucratic on labor issues, and taxation.

In 1997, the monetary crisis that hit East Asian countries, including Indonesia, caused the rupiah to depreciate. This should have made Indonesia's textile products to be more competitive for consumers abroad, because the price of Indonesian textile products became cheaper. But in reality the value of textile exports decreased to US\$ 1.3 billion in 1997 (CIC, 2001).

With all various problems mentioned above, would the textile industry be still able to survive or grow? It is therefore important to analyze the factors that influence the prospect of Indonesian textile industry in the future. The purpose of this study is to: (1) analyze the factors that influence the development of Indonesian textile industry, and (2) analyze the prospects for the development of Indonesian textile industry in the future. The results are expected to provide inputs for policy formulation that is will be supportive for the development of Indonesian textile industry.

The next section of this paper explains the theory and empirical literatures on textile industry, while the third explain the methodology applied. The result and analysis will be explained on fourth section and conclusion will be the last section.

II. THEORY

2.1. Trade Theory

Basically some of the factors that drive the emergence of a country's international trade with the others countries come from the desire to expand the marketing of export commodities, to increase foreign exchange for development activities, differences in supply and demand between countries, as well as the differences in the relative cost of producing certain commodities (Gonarsyah, 1987) .

In Figure 2 it is explained how trade can occur between two countries (Indonesia and China) and between the two commodities (garments and rice). Trade occurs because of differences in slope that indicates the relative price ratio between rice and garments. The assumptions that are used include, i.e. there are only two countries that conduct the trading, the presence of constant opportunity costs, and that each country is trying to achieve the highest level of welfare (the tangent point between the indifference curves and barter lines).

Before the trade takes place (autarky), the domestic exchange ratio is different in the two countries. It also shows the differences in comparative advantage, where the garment is relatively cheaper in Indonesia than in China. When the trading started between the two countries, the ratio of international exchange (terms of trade) underlies between the two domestic ratios, for

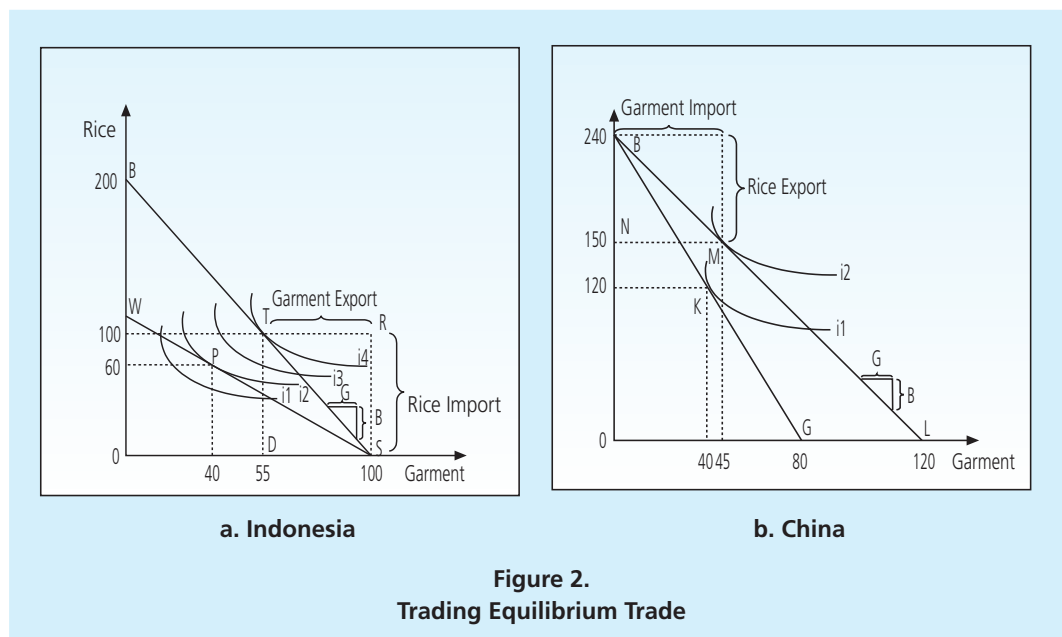


Figure 2.
Trading Equilibrium Trade

Source : Dunn and Mutti, 2004.

Description : SB and SL is the barter line; point T and M is the point where price ratio is equal to the marginal rate of substitution, and i_1-i_2 is the indifference curve.

example 1 garment: 1 rice, and 3 garments: 3 rice. The international exchange rate will be balanced depends on the willingness of each country to offer its export and import commodities in the relative price of purchase.

At the final equilibrium position, Indonesia will produce at point S and consume at point T, in which Indonesia produces garments of OS (100 million tons), domestic consumption of OD (55 million tons), and exports amounted to SD (45 million tons) to be exchanged for rice imports at DT (90 million tons). TRS triangle is a trading triangle. TR represents the export of garments, RS represents the import of rice, and the TS slope represents the relative price of the garment. China will also profit the trade from importing garments and exporting rice, where the gain in total trade can be seen in Table 1. So without trade, China's rice consumption only amounted to 120 million tons and garment's amounted to 40 million tons. After making the trade with Indonesia, China's rice exports increased by NB (90 million tons) and Chinese garment imports increased by NM (45 million tons).

Table 1. Production and Consumption Before and After the Trading (million tons)								
Country/ Region	Rice				Garment			
	Production (1)	Export (2)	Import (3)	Consumption (4) = (1)-(2)+(3)	Production (1)	Export (2)	Import (3)	Consumption (4) = (1)-(2)+(3)
Before Trading								
China	120	-	-	120	40	-	-	40
Indonesia	60	-	-	60	40	-	-	40
Worldwide	180	-	-	180	80	-	-	80
After Trading								
China	240	90	0	150	0	0	45	45
Indonesia	0	0	90	90	100	45	0	55
Worldwide	240			240	100			100
Gain from Trading								
China				+30				+5
Indonesia				+30				+15
Worldwide				+60				+20

Source: Dunn and Mutti, 2004.

2.2. Construction of Economic Model of Indonesian Textile and Textile Products

Based on the corporation theory, input demand is derived from the production function of each company with the assumption that producers maximize profits within the constraints

of technology and market (output and input price) (Varian, 1978 in Sinaga, 1989). Another assumption is that each company faces a perfectly competitive market, both in input and output markets, so that each company is a price taker.

The derivation of input demand and output supply will require the terms First Order Necessary Condition (FONC) and Second Order sufficient Condition (SOSC) in maximizing the profit (Henderson and Quandt, 1980). It is assumed that the production function can be derived (twice differentiable), demand for the company against certain input condition requires the input productivity (marginal product) that worth the price. Textile commodities are a derived demand from commodity garments. Therefore variables contained in the domestic textile demand equation look different from the usual demand for final goods.

In this study, it also assumed that there is only one type of textile and garment traded. Therefore, textiles and garments are considered as a same commodity which is then converted in units of the same weight (tons). This conversion factor is using the general calculation which is applied by the API. Meanwhile, the domestic composite price variable for textile and garment industries is based on data published by API and the foreign variable is using the proxy of export prices of textile and garment in the world.

In addition, Indonesia is categorized as a small open economy. This classification is based on economic behavior, in which Indonesia cannot influence the world prices or world prices variable as exogenous variables (Krantz, 2006). According to Houck, 1986 that small importer countries face a flat excess supply and are unable to influence the world prices. Therefore the assumption used is that a small country behaves as a price taker, both in the input and output markets. Additionally, transportation costs are zero and there are no trading barriers. This condition is constructed in the model by positioning of textile and garment world prices variable as exogenous variable in the equation of production, exports, and import of domestic textile and garment.

Economic relations between variables in the model are formulated on the basis of microeconomic theory, macroeconomic theory, international trade theory, and research results related. Estimation parameters sign becomes another form of the hypothesis which is later followed as the basis to determine the method of analysis and appropriate data processing. The connection between Indonesia and the world's textile industry is the reason why this model is constructed with a dynamic model in the form of simultaneous equations. The dynamic nature of the aspects of supply, demand, domestic as well as world prices is also accommodated with the previous year's variables into the model. Diagram 1 presents a simple relationship between endogenous and exogenous variables in blocks of textile and garment market in Indonesia and the world. The equations are divided into four blocks, namely (1) Indonesian

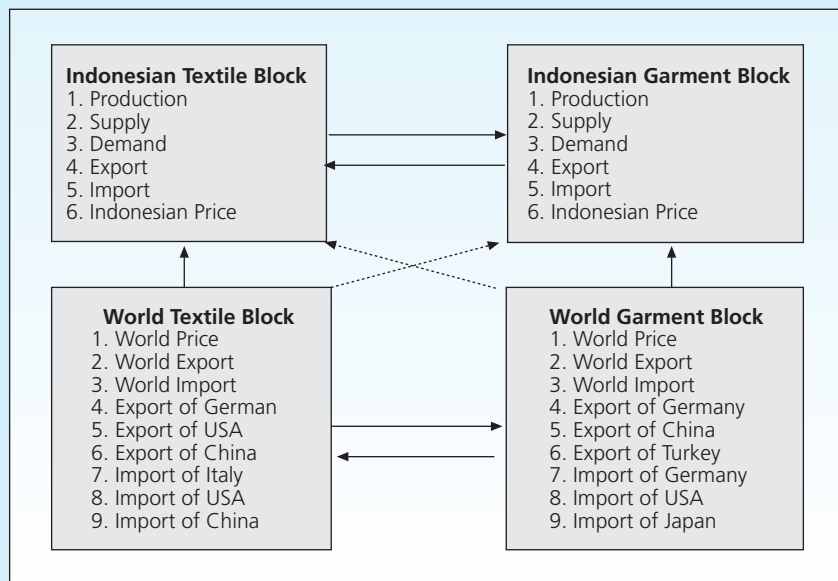


Diagram 1.
**Linkages between Block in Economic Model of Textiles and
 Textile Products of Indonesia**

textile market block, (2) Indonesian garment markets block, (3) world textile market block, and (4) world garment market block.

Based on the relationship between variables in the block, the compiled equations consist of endogenous and exogenous variables. Determination of these variables is based on theoretical framework, empirical studies, and also the conditions in the field. The selected variables are variables that are considered influential and mainly adapted to the availability of data. Textile industry is composed of the subsectors of fibers, yarns, fabrics, apparel, and other textiles. Not all these sub-sectors would be made explicit in economic models. Sub-sectors of fibers, yarns, and fabrics will be included in the textile group, while apparel and other textiles products belong to the garment group. This division is due to data availability. Operational model developed in this study attempted to capture all economic phenomena in the textile industry, both in Indonesia and the world market. This operational model comprises 24 behavior equations and 6 identity equations, however, only 12 behavioral equations and 6 identity equations would be further discussed as they are related directly to the textile industry in the country. The behavior of textile and garment exports of Germany, United States, China Italy, Turkey, and Japan would not be explained. The equations are presented as follows:

1. Domestic textile production

$$PTD_t = a_0 + a_1HTDR_{t-1} + a_2HCWR_{t-1} + a_3(IRR_t-IRR_{t-1}) + a_4UTKTR_{t-1} + a_5BBMR_{t-1} + a_6T + a_7PTD_{t-1} + U_1 \dots\dots\dots (1)$$

The estimation parameter sign expected in the equation is:

$$a_1, a_6 > 0; a_2, a_3, a_4, a_5 < 0 \text{ and } 0 < a_7 < 1.$$

2. Indonesian textile export

$$XTI_t = b_0 + b_1HTWR_t + b_2(HTDR_t-HTDR_{t-1}) + b_3PTD_{t-1} + b_4ERIR_{t-1} + b_5DKG + b_6T + b_7XTI_{t-1} + U_2 \dots\dots\dots (2)$$

The estimation parameter sign expected in the equation is:

$$b_1, b_3, b_4 > 0; b_2 < 0 \text{ and } 0 < b_5 < 1.$$

3. Domestic textile supply

$$STD_t = PTD_t + MTI_t - XTI_t \dots\dots\dots (3)$$

4. Domestic textile demand

$$DTD_t = c_0 + c_1(HTWR_{t-1}/HTDR_t) + c_2HGDR_{t-1} + c_3UTKTR_{t-1} + c_4BBM_{t-1} + c_5(IRR_t-IRR_{t-1}) + c_6T + c_7DTD_{t-1} + U_3 \dots\dots\dots (4)$$

The estimation parameter sign expected in the equation is:

$$c_1, c_2, c_3, c_4, c_5 < 0; c_6 > 0 \text{ and } 0 < c_7 < 1.$$

5. Indonesian textile import

$$MTI_t = d_0 + d_1HMTIR_{t-1} + d_2(HTWR_t/HCWR_t) + d_3TFT_{t-1} + d_4ERIR_{t-1} + d_5(GDPIR_t/GDPIR_{t-1}) + d_6POPI_{t-1} + d_7T + d_8MTI_{t-1} + U_4 \dots\dots\dots (5)$$

The estimation parameter sign expected in the equation is:

$$d_1, d_2, d_3, d_4, d_7 < 0; d_5, d_6 > 0, \text{ and } 0 < d_8 < 1.$$

6. Domestic textile price

$$HTDR_t = e_0 + e_1 STD_{t-1} + e_2(HGDR_t - HGDR_{t-1}) + e_3(HTWR_{t-1}/HCWR_{t-1}) + e_4 HTDR_{t-1} + U_5 \dots \dots \dots (6)$$

The estimation parameter sign expected in the equation is:

$$e_1 < 0; e_2, e_3 > 0 \text{ and } 0 < e_4 < 1.$$

7. World textile price

$$HTWR_t = f_0 + f_1 XTW_t + f_2 MTW_{t-1} + f_3 HTWR_{t-1} + U_6 \dots \dots \dots (7)$$

The estimation parameter sign expected in the equation is:

$$f_1 < 0; f_2 > 0 \text{ and } 0 < f_3 < 1.$$

8. World textile export

$$XTW_t = XTI_t + XTG_t + XTA_t + XTC_t + XTR_t \dots \dots \dots (8)$$

9. World textile import

$$MTW_t = MTI_t + MTL_t + MTA_t + MTC_t + MTR_t \dots \dots \dots (9)$$

10. Domestic garment production

$$PGD_t = g_0 + g_1(HGWR_{t-1}/HGDR_{t-1}) + g_2(HTDR_t - HTDR_{t-1}) + g_3 HCWR_{t-1} + g_4(IRR_t - IRR_{t-1}) + g_5 UTKGR_{t-1} + g_6 BBMR_t + g_7 T + g_8 PGD_{t-1} + U_7 \dots \dots \dots (10)$$

The estimation parameter sign expected in the equation is:

$$g_1, g_7 > 0; g_2, g_3, g_4, g_5, g_6 < 0 \text{ and } 0 < g_8 < 1.$$

11. Indonesian garment export

$$XGI_t = h_0 + h_1 HGWR_t + h_2(HTWR_t/HGDR_{t-1}) + h_3 PGD_t + h_4 ERIR_{t-1} + h_5 DKG + h_6 T + h_7 XGI_{t-1} + U_8 \dots \dots \dots (11)$$

The estimation parameter sign expected in the equation is:

$$h_2, h_5 < 0, h_1, h_3, h_4, h_6 > 0 \text{ and } 0 < h_7 < 1.$$

12. Domestic garment supply

$$SGD_t = PGD_t + MGI_t - XGI_t \dots\dots\dots (12)$$

13. Domestic garment supply

$$DGD_t = i_0 + i_1(HGWR_t/HTWR_{t-1}) + i_2(HGDR_t*ERIR_t) + i_3(GDPIR_t/POPI_t) + i_4(MGI_t-MGB_{t-1}) + i_5DGD_{t-1} + U_9 \dots\dots\dots (13)$$

The estimation parameter sign expected in the equation is:

$$i_1, i_2, i_4 < 0; i_3 > 0 \text{ and } 0 < i_5 < 1.$$

14. Indonesian garment import

$$MGI_t = j_0 + j_1HMGIR_t + j_2(HGWR_t-HGWR_{t-1}) + j_3TFG_t + j_4PGD_{t-1} + j_5ERIR_t + j_6(GDPIR_t/POPI_t) + j_7MGI_{t-1} + U_{10} \dots\dots\dots (14)$$

The estimation parameter sign expected in the equation is:

$$j_1, j_2, j_3, j_4, j_5 < 0; j_6 > 0 \text{ and } 0 < j_7 < 1.$$

15. Domestic garment price

$$HGDR_t = k_0 + k_1(DGD_t/DGD_{t-1}) + k_2(HTWR_t-HTWR_{t-1}) + k_3(HTWR_t-HTWR_{t-1}) + k_4(HGWR_{t-1}/HTWR_t) + k_5T k_6HGDR_{t-1} + U_{11} \dots\dots\dots (15)$$

The estimation parameter sign expected in the equation is:

$$k_1, k_2, k_3, k_4 > 0; k_5 < 0 \text{ and } 0 < k_6 < 1.$$

16. World garment price

$$HGWR_t = l_0 + l_1XGW_t + l_2MGW_{t-1} + l_3HGWR_{t-1} + U_{12} \dots\dots\dots (16)$$

The estimation parameter sign expected in the equation is:

$$I_1 < 0; I_2 > 0 \text{ and } 0 < I_3 < 1.$$

17. World garment export

$$XGW_t = XGI_t + XGG_t + XGC_t + XGT_t + XGR_t \dots\dots\dots (17)$$

18. World garment import

$$MGW_t = MGI_t + MGG_t + MGA_t + MGJ_t + MGR_t \dots\dots\dots (18)$$

2.3. Empirical Review on Textile and Textile Products

2.3.1. Empirical Review on Textile and Textile Products in Indonesia

The study by Pracoyo (1995) is related to the export of textile industries which used the time series data of 1983-1992 and estimation methods Two Stage Least Squares (2SLS). Pracoyo adopted the model of export supply and demand which had been carried out by Muscatelli, Srinivasan, and Vines (1992). The result showed that Indonesian textile export supply is influenced by the textile price, raw material costs, wages, rates, and technology. While the textile export demand side is influenced by the textile price, world textile prices, the price of substitute goods (the world price of wool), other countries' revenues, and consumer tastes. It is also concluded that (1) tariff reduction will encourage a more competitive world trade. Tariff reduction by 30 percent would encourage a more competitive world trade, (2) granting wage by 1 percent would reduce the quantity supplied by 4.5 per cent. This occurs because wages belongs to the component cost in production, and (3) changes in technology, which is demonstrated by the trend variable, encourage more efficient textile production.

The research using Ordinary Least Squares (OLS) estimation methods was conducted by Wintala (1999). The conclusion that can be drawn from his analysis of the factors that influence the Indonesian textile exports to the United States, Britain, and Japan in 1978-1997, is that the trend of Indonesian textile exports to the United States, Britain, and Japan is positive and statistically significant. Devaluation of the rupiah, the rising foreign exchange reserves, population increase, and clothing price index tend to increase the export volume of Indonesian textiles.

Istojo (2002) analyzed the structure of the Indonesian textile industry on the World Trade Organization (WTO) in 2005. The method used is the description of the industry characteristics, the five forces model, driving forces, and key success factors. The result is that that the textile

industry is a highly dependent to suppliers and buyers as well as intense competition among companies in the Indonesian textile industry. Implementation of the WTO in 2005 intensifies the competition and struggle for markets at home and abroad. The implementation of the WTO will also alter the structure of the textile industry into mass customization which tend to the non-price factors and is fully supported by the principle of quick response and just in time stock. It is also noticed that textile companies must be able to do a lot of manufacturing innovation that will increase product differentiation.

Agustineu (2004) studied the factors that affect the output of textile industry in West Java using the Cobb Douglas model, in year 1980-2001. The result is that the capital, raw materials, and fuel give a positive influence to the increase of the output of textile industry in West Java. Labor factor causes the opposite effect with the factors aforementioned. The textile industry in West Java is in the Increasing returns to scale condition.

2.3.2. Study Review on World Textile and Textile Products

Mlachila and Yongzheng (2004) used the General Trade Analysis Project (GTAP) to analyze the end of the textile quotas with a case study in Bangladesh. There are three factors that affect the performance of textile and apparel exports of Bangladesh in the 1990s, which are low wages, net flows of foreign direct investment (FDI), and quotas imposed in the competitor countries. Bangladesh faced serious problems with competitiveness after quota system ended, because of the weak infrastructure and a variety of macro-climate that was not supportive. The simulation results showed that Bangladesh exports would decline after the abolition of quotas and this would affect the Balance of Payment (BOP).

WTO (2004) utilized the GTAP to describe the condition of the global textile industry after the end of the ATC. China and India are two countries that will dominate the textile market of the European Union, United States, and Canada after the quota system ended. Even China is expected to take up to 50% share of world textile market. In addition, vertical specialization in the textile supply chain is very important, and the countries with a geographical proximity will benefit much from bilateral agreements and lower rate. The important findings for Indonesian textile industry are the change of textile market share in EU and US markets. In the EU market Indonesia will gain an increase of market share by 1 percent (from 4 percent to 5 percent) for the garment market after quotas expire. As for the textile markets, Indonesia will experience a stagnancy (from 3 percent to 3 percent). In contrary in the U.S. market, textile Indonesia will be stagnant (from 3 percent to 3 percent). The decline occurred for garment commodity in the U.S. market (from 4 percent to 2 percent).

The various research studies on the textile industry, in general give an overview of the textile export growth and the factors that influence it, both at national and international levels. Also, many studies make predictions on the development of post-quota textile industry in 2005. However, there are still parts that have not been elaborated in depth by previous researchers. The linkage between the Indonesian market and world markets plays an important role in reviewing the development of Indonesian textile industry. Aggregate and descriptive research of textile industry tends to lead to a non-specific conclusion, while the micro-scale research will also result in conclusions that cannot be generalized. Therefore, on this occasion the development of the textile industry will analyzed holistically, both the textile and garment industry, by linking the textile industry simultaneously through economic variables, including monetary and fiscal policy.

III. METHODOLOGY

The main analytical tool used is the time series econometric, which is useful to analyze the factors through sign and size of estimation parameter of each behavior equation and prospects for the development of Indonesian textile industry through forecasting simulation. Besides, all structural equation have undergone a model specification by trial and error so that in the end it will generate the equations that are based on the necessity and sufficiency terms in arranging simultaneous equations without neglecting the basic assumptions of regression equation (multicollinearity, homoscedasticity, and autocorrelation).

3.1. Analysis Procedure

According to the order condition, equation can be identified if the number of variables included in the equation is greater than or equal to the sum of all the endogenous variables minus one. Formula identification of structural models according to the order condition (Koutsoyiannis, 1978) is as follows:

$$(K - M) > (G - 1) \dots\dots\dots (19)$$

where:

- K = Total variable in the model (endogenous and predetermined variables).
- M = Number of endogenous and exogenous variables in one equation.
- G = Total equation in the model.

If an equation in the model shows the condition $(K - M) > (G - 1)$ then the equation is *over identified*, if $(K - M) = (G - 1)$ then the equation is *exactly Identified*, and if $(K - M) < (G - 1)$ then the equation is *under identified*. There are 30 equations in structural model of this study, consisting of 24 behavioral equations and 6 identity equations. There are 24 endogenous variables (G) and 80 predetermined variables. The total number of variables included in the model (K) is 104. According to the formula of model identification with the criteria order condition, then each equation is *over-identified*.

If the equation in the structural model is all over identified then this equation can be predicted by using the Limited Information Maximum Likelihood (LIML), Full Information Maximum Likelihood (FIML), Two Stage Least Squares (2SLS) or Three Stage Least Squares (3SLS). The method used in this study to predict the structural estimation parameters is 2SLS. 2SLS method is established with the assumption that (1) the requirement must meet the assumption of zero stochastic disturbance, constant variance and covariance equal to zero, (2) specification of the structural model is exactly precise as far as the predetermined variables, (3) the number of observation samples is greater than the amount of predetermined variables in the model, and (4) explanatory variables do not experience a perfect collinearity. By considering these assumptions, the DW (Durbin Watson) statistic is not valid to predict the structural equations of the simultaneous equations model, especially in the presence of time-different endogenous variables.

The data processing to estimate the economic model is done by using the computer software program SAS, version 6.12. To test the explanatory variables, the F statistical test is simultaneously conducted, while to test the individual explanatory variables, the t statistical test is used.

Validation of an economic model aims at analyzing on how far a model can represent the reality. The statistical criteria used for the validation of economic model estimation are the Root Means Square Error (RMSE), Root Means Square Error Percent (RMSPE), and Theil's Inequality Coefficient (U-Theil).

RMSPE statistic is used to measure how far the values of the endogenous variables from the estimation deviate from the actual flow values in the relative size (percent); while value-Theil U statistic is to determine the ability of the model in analyzing the forecasting simulation. Theil U-value ranges between 1 and 0. If the U-Theil = 0 then the estimation model is perfect, if the U-Theil = 1 then the estimation model is naive. To view the closeness of the direction (slope) between the actual and simulated results, we observe the coefficient

of determination (R^2). Basically, the smaller the value of RMSPE and U-Theil and the greater the value of the coefficient of determination, the better the estimation model.

The policies that are simulated, for the forecasting (ex-ante) year 2007-2012, are the decline in interest rates in Indonesia, the adjustment of the exchange rate of Rupiah/US\$, the increase in textile industry production cost through wages and fuel prices, the increase of Indonesia's GDP, the increase of Indonesia's population, the increase of US GDP, the increase of China's GDP, and the elimination of textile tariffs, along with its combinations.

3.2. Source and Type of Data

The type of data used in the econometric model is secondary time series data of 1980-2006. The data is extracted from official publications, such as the Indonesian Textile Association (Asosiasi Pertekstilan Indonesia/API), the Central Statistics Agency (Bapan Pusat Statistik/BPS), United Nations Conference on Trade and Development (UNCTAD), United Nation (UN), International Monetary Fund (IMF), WTO, Ministry of Commerce, Ministry of Industry, Jakarta daily publications, and internet.

All the data in rupiah unit are deflated using the Consumer Price Index (CPI) of Indonesia in 2000 (2000=100) and the variables in US\$ unit are deflated using CPI proxy United States in 2000 (2000=100). This is done to eliminate the effects of inflation.

IV. RESULT AND ANALYSIS

4.1. The Economic Model Structure of Indonesian Textile and Textile Products

a. Indonesian Textile Productions

The performance of Indonesian textile production in the level of 98 can be explained by the lag of Indonesian textile prices, the lag of world cotton prices, the interest rates, the lag of textile workers wage, the lag of fuel prices, the time trend, and the lag Indonesian textile production. All estimation parameters are in line with expectations and all variables statistically give a significant effect.

The lagging estimation parameter coefficient of Indonesian textile prices is positive at the level of 0.514. This means if there is a price lag increase of Indonesian textiles at 10 US\$ per ton, the Indonesian textile production will rise by 5140 thousand tons, ceteris paribus. The improvement Indonesia's textile production that is in line with the increase of textile prices in

Indonesia indicates that the price of Indonesian textiles is an economic signal for textile manufacturers in producing textiles in Indonesian market.

The main raw materials of textiles are textile fibers which has an irreplaceable advantage compared to the non-cotton materials, one of which is easy to absorb sweat and its hygroscopic characteristic. Therefore, the world cotton price changes affect the dynamic of Indonesian textiles production. According Istojó (2002) Indonesian textile industry is very dependent on suppliers and buyers. More than 85 percent of cotton for the Indonesian textile industry is imported from Australia, United States, China, India, Pakistan, Tanzania, and others. This is because cotton has not been maximally cultivated in the country. In this study, Indonesian textile production is also influenced significantly by the lag of the world cotton price in the opposite direction. If the lagging world price of cotton increase by 10 US. \$ Per ton, it will lower the Indonesian textile production by 354.812 tons, *ceteris paribus*. In the short term and long term, Indonesian textile production is very responsive to lag of world cotton prices.

Bank interest rate bank is proxied with bank interest rate for investment activities. Interest rates contributed negatively to Indonesian textile production. If the bank raised interest rates through monetary policy by 1 percent, *ceteris paribus*, then it would lower the Indonesian textile production by 2.410 thousand tons. This condition reduces incentives for manufacturers, thereby reducing the production of textiles in Indonesia up to 0.053 percent and 0.772 percent, respectively in short and long term.

Textile industry employs many workers that the wage labor became one of the important components of production costs in the sustainability of the production process. Wage labor in the textile sector has a significant effect on Indonesian textile production in a negative direction. If the amount of wage labor in the textile sector is increased by Rp. 1.000.000 per capita per year, it will decrease the production of textiles to 0.110 thousand tons of Indonesia, *ceteris paribus*. The response of Indonesian textile production to wage labor is inelastic in the short term and elastic in the long term. As examined by Pracoyo (1995) that the wage labor is statistically significant in affecting Indonesian textile production.

In addition to labor costs, fuel prices (especially diesel and fuel oil) also contribute to the costs of production in the textile sector. A fuel price is negatively related to the production of textiles of Indonesia and its effect is statistically significant. If the fuel price increases by Rp.10 per liter, it will lower the Indonesian textile production as much as 1.444 thousand tons, *ceteris paribus*. In the short and long term, the Indonesian textile production is less responsive to fuel prices.

Time showed an increasing tendency of Indonesian textile production amounting to 51.830 thousand tons. It is strongly related to the garment industry which is in desperate need of the textile industry output as raw material. Indonesian textile production lag can also become basic information for manufacturers to produce in the next year. If the lag of textile production increases by 1.000 tons, then in the following year the product will increase by 0.720 thousand tons, *ceteris paribus*.

b. Indonesian Textile Export

Indonesian textile exports equation has a high determination coefficient (0.961) which indicates the high ability of explanatory variables in explaining the behavior of Indonesian textile exports. All explanatory variables have estimation parameter sign according to expectations. However, not all variables have a significant effect on the Indonesian textile exports. The variables with significant effect are the change in the price of Indonesian textiles, world textile trade integration dummy, and lag of textile export.

The increasing Indonesian textile price will be an incentive for manufacturers to start producing. If the change in Indonesian textiles prices rises by US\$ 10 per ton, it will lower the Indonesian textile exports up to 5854 thousand tons, *ceteris paribus*. In the short term, the response of Indonesian textile exports to changes in the price of Indonesian textiles is inelastic and the elastic in the long term.

The world textile trade had a significant change from the 1950s until 2005. The integration phase of textile trade in accordance with the GATT began in 1995 until 2005. The process reduced the number and types of textile import quotas from importing countries, such as the United States, Canada, the European Union, Finland, Norway and Turkey. These conditions caused an impact on Indonesian textile exports. In this study the textile trade integration dummy significantly affect Indonesian textile exports. The process of integration of textile trade for 10 years cut the Indonesian textile exports up to 134.367 thousand tons.

The lag of Indonesian textile exports also significantly influence Indonesian textile exports in the following year. This shows that Indonesian textile exports may not be quick enough to adjust back to equilibrium level, or in other words, Indonesian textile exports is relatively unstable.

c. Indonesian Textile Supply

The Indonesian textile total supply is the sum of textile production, textile imports, and textile exports of Indonesia. Based on this identity relationship, any change in the textile

production, textile imports, and textile exports caused by the government intervention, among others, through the instruments of monetary and fiscal policies, will affect the amount of textiles that are available in Indonesia market. The magnitude of change in Indonesian textiles supply depends on the elasticity of the textile production, textile imports, and also textile exports of Indonesia, both directly and indirectly.

d. Indonesian Textile Price

The value of determination coefficient of the Indonesian textiles price equation is 0.833. This indicates the high ability of explanatory variables in explaining the price behavior of Indonesian textiles. The estimation parameter sign in the structural equation has also been in line with the expectations, and the variables which significantly affected the price of Indonesian textiles are the changes in Indonesian garment prices, and the lag of Indonesian textile price.

The changes in the price of Indonesian garment significantly affect the price of Indonesian textiles in a positive manner. If changes in Indonesia's garment prices rise by US\$ 100 per ton, it will stimulate the Indonesian textile price to increase by US\$ 0.819 per ton, *ceteris paribus*. The response in the short and long term is the inelastic; this shows that Indonesian textile prices are less responsive toward the price changes in Indonesia's garment.

In addition to changes in Indonesia's garment prices, the lag of Indonesian textiles price is also very significant. This indicates that the price of Indonesian textiles requires a slower adjustment to reach the equilibrium level, or in other words the price of Indonesian textiles is relatively unstable. If the lag of Indonesian textile prices increases by US\$ 10 per ton, it will increase the price of Indonesian textiles next year amounting to US\$ 6.889 per ton, *ceteris paribus*.

e. Indonesian Textile Demand

Indonesian textile demand equation has a quite high determination coefficient at 0.819. This situation illustrates the high ability of explanatory variables in explaining the behavior of demand for Indonesian textiles. Demand for Indonesian textiles is explained by changes in textile price of Indonesia, lag of Indonesia's garment prices, lag of wage labor, changes in interest rates, time trends, and the lag of demand for Indonesian textiles. All estimation parameter sign meet the expectations. The lag of Indonesia's garment prices, lag of wage labor in the textile industry, and lag of demand for Indonesian textile significantly affect the demand for Indonesian textiles.

The lag of Indonesia's garment prices has the opposite relationship with the demand for Indonesian textiles. If the lag garment prices rises by US\$ 10 per ton, the Indonesian textile demand would decrease by 0.270 thousand tons, *ceteris paribus*. In addition, Indonesian textile demand is less responsive to the lag of price changes of Indonesian garment, either in the short and long term. The demand for Indonesian textiles is a reflection of demand for textiles by textile industry itself and in the end the output of textile industry will be used as the input by the garment industry.

The lag of wage labor in the textile sector contributes in affecting the change of demand for Indonesian textiles. If the lag of wage labor rises by 1 percent, it will lower demand for Indonesian textiles by 0.715 percent in the short term and 1.856 percent in the long term. Textile demand is a derived demand for the garment industry. The information about the lag of demand for Indonesian textiles plays an important role to estimate the demand for Indonesian textiles in the following year. If the lag of demand for Indonesian textiles increases by 1000 tons, there will be a tendency to increase the demand for Indonesian textiles in the following year as much as 0.615 thousand tons, *ceteris paribus*.

f. The Indonesian Textile Import

Based on the estimation result, only the lag of Indonesian textile imports significantly influence Indonesian textile imports for the following year. This shows that Indonesian textile imports require a relatively slower time to adjust back to equilibrium levels.

g. Indonesian Garment Production

The performance of Indonesian garment production can be explained as much as 0.939 by its explanatory variables. The variable estimation parameters sign in the structural equation have also been in line with expectations. Variables that are significantly influential are the lag of garment labor wages, time trends, and garment production lag.

Similar to the textile industry, garment industry also employs many workers. There are several parts in the garment production process, such as sewing, which cannot be entirely replaced by machine. The high employment of labor will affect the cost of production. Lag of garment workers wage in this study is very different statistically. If there is an increase of garment workers' wages' lag by Rp. 1 million per capita per year, it will reduce the Indonesia's garment production as much as 0.055 thousand tons, *ceteris paribus*. In the short term, the Indonesian garment production is less responsive, compared to the long term.

Besides the garment workers' wages lag, the time trend is also very real influential on Indonesian garment production. Garment is a product which is strongly associated with fashion trends and dynamically changes according to the development of time. Based on time trends, Indonesia's garment production increased by 26,869 thousand tons. Also the garment production lag becomes information to produce the garment the following year. If the lag of Indonesian garment production increases by 1,000 tons, the Indonesian garment production the following year will increase by 0.453 thousand tons, *ceteris paribus*.

h. Indonesian Garment Export

The performance of Indonesian garment exports at 0.952 can be explained by its explanatory variables. The variable estimation parameter sign in the structural equation has also been in line with expectations. Indonesia's garment exports is explained by the ratio of the world garment price lag with the world textile prices, the price of Indonesian garment products, ratio of Indonesian garment production with Indonesian garment production lag, lag of rupiah exchange rate against the US\$, the world textile trade integration dummy, and lag of Indonesian garment exports. From these six variables, only the lag of exchange rate of rupiah against the US dollar and the lag of Indonesian garment exports give a significant effect.

Exportation of garments is associated with the exchange rate of rupiah against the US\$. The depreciated rupiah will increase the competitiveness of Indonesian garment products. The lag of rupiah exchange rate against the US\$ significantly change the short-term elasticity by 0.310 and the long-term by 1.353. This means that if the lag of the rupiah exchange rate against US\$ is depreciated by 10 percent, the Indonesian garment exports will increase by 3.10 percent in short term and 13.530 percent in long-term or elastic, *ceteris paribus*.

The coefficient of lag of Indonesia's garment exports has a positive estimation parameter outcome at 0.771. This means that if the lag Indonesia's garment exports increases by 1000 tons, then Indonesia's garment exports the following year will increase by 0.771 thousand tons, *ceteris paribus*.

i. Indonesian Garment Supply

The total supply of Indonesian garment products is the identity equations from Indonesian garment production, imports, and exports. The magnitude of changes in Indonesian garment supply depends on the elasticity of the Indonesia garment production, imports and also exports, either directly or indirectly.

j. Indonesian Garment Price

Indonesian garment price equation has a high determination coefficient value at 0.889. This demonstrates the high capability of explanatory variables in explaining the behavior of Indonesia's garment prices. The variable estimation parameter sign has also been in line with the expectations. Indonesia's garment prices can be simultaneously explained by the ratio of demand for Indonesian garment with Indonesian garment production lag, lag of world garment prices, world textile price changes, and lag of the Indonesian garment price.

The only variable that is significantly influential is the lag of Indonesian garment price. The information of price lag becomes important to set prices in the following year. Lag of Indonesian garment prices brings a highly significant effect whose coefficient is positive at 0.861. This means that if the lag of Indonesia's garment prices rises by 1 000 tons, then Indonesia's garment prices will increase by 0.8261 thousand tons at the following year, *ceteris paribus*.

k. Indonesian Garment Demand

The performance of Indonesian garment demand is explained simultaneously by the world garment price, the textile price changes in Indonesia, Indonesia's GDP per capita, the changes in secondhand garments imports of Indonesia, the world textile trade integration dummy, and the lag of demand for Indonesian garment. There are three of these five variables that significantly influence the change in demand for Indonesian garment.

Price is an important factor affecting the dynamics of the demand, which is aligned with the results of this research. Indonesia's garment prices bring statistically significant effect in a negative manner. Meanwhile, based on its elasticity, the short-term elasticity would be at 0.387 percent and at 0.553 percent for the long term. This can be interpreted in particular, that any increase in the price of Indonesian garment products as much as US\$ 10 per ton, it will lower the demand for Indonesian garment by 3,870 thousand tons in the short term and by 5,530 thousand tons in the long run, *ceteris paribus*.

GDP per capita of Indonesia give a noteworthy effect in a unidirectional relationship with changes in demand for Indonesian garment. If Indonesia's GDP per capita increased by Rp. 1 billion, it will stimulate an increase of demand for Indonesian garment products by 0.011 thousand tons, *ceteris paribus*. The response of Indonesian garment demand to Indonesia's GDP per capita is inelastic, both in the short and long term.

The textile import quota policies are considered discriminative. Traditional markets, such as those in the United States, Canada, the European Union, Finland, Norway and Turkey limit the amount of imports coming from Indonesia. Based on the results of the study, it is noted that when the world textile trade integration is applied, it will increase the demand for Indonesian garment products by 66,548 thousand tons, *ceteris paribus*. Also the lag of demand for Indonesian garment also significantly affects the demand for Indonesian garment the following year. If the lag of demand for Indonesian garment products increases by 1,000 tons, it will raise the demand for Indonesian garment the following year by 0.300 thousand tons, *ceteris paribus*.

I. Indonesian Import Garment

Indonesian garment imports are described by the Indonesian garment import prices (in rupiah), the changes in world garment prices, the lag of garment import tariffs, the lag of Indonesian garment production, the lag of Indonesian total population, Indonesia's GDP ratio to the lag of Indonesia's GDP, and the lag of Indonesian garment imports. Among these variables, the ones with significant effect are the change of world garment prices, the lag of garment import tariffs, the lag of Indonesian garment production, and the lag of Indonesian garment imports.

The coefficient of estimation parameter in the world garment price change is at 0.006 toward the opposite direction. This means that with an increase of the world garment prices by U.S. \$ 10 per ton, the Indonesian garment imports will decrease by 0.064 thousand tons, *ceteris paribus*. Meanwhile the response of Indonesian garment imports, both in the short and long term, is inelastic.

The lag of garment import tariffs is affecting Indonesian garment imports toward the opposite direction. This means an increase of lag garment import tariff by 1 percent, will lower the Indonesian garment imports by 2,119 thousand tons, *ceteris paribus*. In both the short and long term, the Indonesian garment imports are elastic to the lag of garment import tariffs.

The Indonesian garment imports are also influenced by the lag of Indonesian garment production. Shall the lag of Indonesian garment production increase by 1000 tons, the Indonesian garment imports will decrease by 0.221 thousand tons, *ceteris paribus*. The response of Indonesian garment import to the lag of Indonesian garment production is elastic, both in the short and long term.

The other variable that is also statistically significant is the lag of Indonesian garment imports. The coefficient of lag of Indonesia's garment imports is positive at 0.615. This means

that if the lag of Indonesian garment imports increase by 1000 tons, the Indonesian garment imports the following year will increase by 0.615 thousand tons, *ceteris paribus*.

4.2. Economic Model Validation of Indonesian Textile and Textile Products

From the 30 equations that form the model, 27 equations have the RMSPE value below 50 percent, and 1 equation has RMSPE value between 50 to 100 percent, and 2 RMSPE equations have a value above 100 percent. This means that the predicted value can well follow the historical trend data. Meanwhile based on the U-Theil, 29 equations have a U-Theil value below 0.20, and there is an equation which has a U-Theil value above 0.20. This means that the simulation model follow the actual data quite well. Based on all the above criteria, then the constructed economic model has a sufficient and valid forecasting ability to perform simulations of macroeconomic policy alternatives via forecasting simulation (*ex-ante*).

Table 2.
The Impact of Macroeconomic Policies toward the Change of Endogenous Variable
Average Value Year 2007-2012

Endogenous Variables	The Change by Simulation (%)					
	1	2	3	4	5	6
Indonesian Textile Production (PTD _t)	0.0000	0.1936	-25.4114	-0.2904	-25.4114	12.8267
Indonesian Garment Production (PGD _t)	-0.0049	-0.0018	-12.6301	0.0013	-12.6298	1.5850
Indonesian Textile Demand (DTD _t)	0.0000	-0.2822	-73.4549	0.3763	-73.4562	0.8467
Indonesian Garment Demand (DGD _t)	0.0002	0.1286	-0.2371	-0.0917	3.2676	3.4647
Indonesian Textile Supply (STD _t)	0.0567	-11.9239	-34.3066	12.4333	-34.1153	29.7464
Indonesian Garment Supply (SGD _t)	0.0002	-63.9076	-18.7352	21.9497	-18.5225	22.4123
Indonesian Textiles Price (HTDR _t)	0.0000	0.5344	1.8036	-0.6012	1.7368	-1.5364
Indonesian Garment Price (HGDR _t)	0.0000	-0.7217	1.2831	0.4812	1.4435	0.3208
Indonesian Textile Exports (XTI _t)	0.0000	6.0591	-8.9655	0.1478	-8.9655	4.9261
Indonesian Textile Imports (MTI _t)	-0.0021	0.1675	0.5522	13.7351	0.7630	13.5237
World Textile Price (HTWR _t)	-0.0580	-2.2042	2.9582	2.0302	2.9582	2.2622
World Garment Price (HGWR _t)	0.0000	-11.5351	2.4718	0.2168	2.4718	-18.6904
Indonesian Garment Exports (XGI _t)	-0.0032	21.6763	-4.7985	-0.0237	-4.8009	1.5617
Indonesian Garment Imports (MGI _t)	0.0789	-5.1755	125.1513	179.8909	126.8318	172.2973
World Textile Exports (XTW _t)	0.0000	0.1970	-0.2845	0.0031	-0.2845	0.8880
World Textile Imports (MTW _t)	0.0000	0.0304	-0.0138	0.3367	-0.0083	2.1058
World Garment Exports (XGW _t)	0.0000	0.3160	-0.0683	-0.0020	-0.0683	0.6573
World Garment Imports (MGW _t)	0.0000	0.0072	0.0018	0.0045	0.0018	0.0573

Description :

Simulation 1 : The bank interest rate falls by 5 percent.

Simulation 2 : Adjustment of rupiah exchange rate = Rp. 9 000/US \$.

Simulation 3 : Wages of textile and garments labor rise respectively by 14.5 percent and 15 percent.

Simulation 4 : Liberalization of trade.

Simulation 5 : Combination 4, Indonesia's GDP increases by 8 percent, and Indonesia's population increases by 1.1 percent.

Simulation 6 : Combination 3, 5, Indonesia's GDP increases by 8 percent, Indonesia's population increases by 1.1 percent, GDP of USA increases by 3.1 percent, and China's GDP increases by 8.5 percent.

4.3. Simulation Result

Table 2 presents the results of simulation of macroeconomic policies on the development of textile industry in Indonesia.

a. Reduction of Bank Interest Rate

The policy to lower the bank interest rates by 5 percent is one of the monetary policies that can increase the production of Indonesian textiles. The textile industry is a capital-intensive industry compared with the garment industry. However, a mere 5 percent of bank interest rate cut is not used by textile manufacturers in Indonesia to increase textile production. This does not bring any change to the Indonesian textile exports. Meanwhile, an Indonesian textile import has declined by 0.002 percent. In total the Indonesian textiles supply increased by 0.057 percent. While the decline in Indonesian textile supply does not change the price volatility of Indonesian textiles therefore Indonesian textile demand was also unchanged.

The Indonesia's garment prices that did not change, as the output price for the garment industry, contribute in reducing the Indonesian garment production by 0.005 percent. A decline in garment production will then encourage the reduction in Indonesia's garment exports by to 0.003 percent. On the other hand garment imports increase by 0.079 percent. In total, the Indonesian garment supply slightly increases by 0.0002 percent. A decrease in bank rate by 5 percent will less likely motivate the people to save. This makes the demand of garments increase by 0.0002 percent.

b. Adjustment of Exchange Rate at Rp. 9,000 to US\$

The exchange rate that relatively does not fluctuate will assist manufacturers in calculating and determining the production costs and business risks. Therefore monetary policy is able to improve the exports of Indonesian textile and garment, respectively by 6.059 percent and 21.676 percent. At the same time this will also increase textile imports by 0.167 percent and reduce garments imports by 5.175 percent. The total supply of Indonesian textiles and garments decreased, respectively by 11.924 percent and 63.908 percent.

This declining supply of Indonesian textile will cause textile price to increase by 0.534 percent, so the demand for Indonesian textiles will decline by 0.282 percent. Indonesian textile price increases in turn will make the Indonesian garment production decreasing by 0.002 percent.

The exchange rate adjustment policies also increase the Indonesian garment exports by to 21,676 percent. Indonesian garment prices decline by 0.722 percent will stimulate even more the increase in exportation, reduce the Indonesian garment products by to 5.175 percent, and increase demand for Indonesian garment by 0.129 percent. Additionally the other impact is the decline in Indonesia's garment production by 0.002 percent. In total, Indonesian garment supply decrease by 63.908 percent.

c. Increase of Labor Wage in Textile and Garment Industry

Textile and garment industry employs many workers, especially the female ones. The policy to increase labor wages in both sectors respectively 14.5 percent and 15 percent will push down the textile and garment production. Indonesian textile production decreases by 25.411 percent. Indonesian textile exports will be suppressed by 8.965 percent and Indonesian textile imports will increase by 0.552 percent. In total, Indonesian textile supply decreases by 34.307 percent.

The decline of Indonesian textile supply will raise the Indonesian textiles price by 1.804 percent. The following impact is the decline of demand for Indonesian textiles by 73.455 percent. The increase of Indonesian textile price will lower the Indonesian garment production by 12.630 percent. Indonesia's garment exports at the following step will also experience a decline by 4.798 percent. Indonesian garment imports will increase by 125.151 percent, so that in total; Indonesian garment supply will decline by 18.735 percent.

Besides Indonesian garment prices rises by 1.283 percent, as an indirect result of the increase of wage labor. Ultimately this will create the demand for Indonesian garments to decline by 0.237 percent.

d. Liberalization of Textile and Textile Products Trade

Liberalization of trade with the tariff reduction to zero percent as a form of the trading policy, eventually gives an impact to the increase of Indonesian textile imports by 13,735 percent. The decline of domestic textile production amounted to 0.290 percent will further increase the imports. The increase of Indonesian textile imports will increase the Indonesian textile supply by 12.433 percent. It turns out that the increase in the textile supply push down the Indonesian textile price by 0.601 percent, in which the demand for Indonesian textiles increases by 0.376 percent. The Indonesian textile prices, which also fall, are responded by Indonesian textile exports which increase by 0.148 percent.

Garment import tariff reduction to zero percent will increase Indonesian garment imports by 179.891 percent, so that in total the Indonesian garment supply increases by 21.950 percent. On the other hand, an Indonesian garment price, which increases by 0.481 percent, causes the demand Indonesian garment to decrease by 0.092 percent. The increasing price of Indonesian garment is an incentive for Indonesian garment manufacturers to increase production, amounting to 0.001 percent. In addition, the rising Indonesian garment prices also encourage the increase of exports by 0.024 percent of future

e. The Increase of Labor Wage in Textile and Garment Sector, the Increase of GDP of Indonesia and the Increase of Total Population of Indonesia

The combination of the increased labor wage policy in the textile and garment sector, the increase of Indonesian GDP by 8 percent, and the demographic policies through the increased population by 1.1 percent, makes the Indonesian textile production declines by 25.411 percent, which subsequently encourages the decline in Indonesian textile exports by 8.965 percent. In addition, Indonesian textile imports increase by 0.763 percent. In total the Indonesian textile supply decreases by 34.115 percent. The decline of textile supply will increase the price of Indonesian textiles by 1.737 percent. In turn, these circumstances cause the demand for Indonesian textiles to decline by 73.456 percent.

The growth of Indonesian GDP and population naturally encourage the increase of demand for Indonesian garment by 3.268 percent. This situation put Indonesian garment prices to improve by 1.443 percent. And also, due to the dominating labor wage in the garment sector in the production costs, the garment industry output price will also increase.

The increase of the Indonesian textile prices as the garment industry input prices can reduce the production of Indonesian garment products by 12.630 percent. Meanwhile, Indonesian garment exports show a decline of 4.801 percent. This is because the increasing domestic garment prices turn out to be appealing for Indonesian garment manufacturer to work on the Indonesian market. Additionally, Indonesian garment imports rise by 126.832 percent. In total Indonesian garment supply decreases by 18.522 percent

f. The Increase of Fuel Price, the Liberalization of Textile and Textile Products, the Increase of GDP of Indonesia, USA and China, and the Increase of Indonesian Population

The fuel price increase policy by 8.5 percent, the trading liberalization, the Indonesian

GDP increase by 8 percent, the increase in Indonesian population by 1.1 Percent, the increase of GDP of the USA and China by respectively 3.1 percent and 8.5 percent are able to raise the Indonesian textile production, correspondingly 12.827 percent and 1.585 percent. Therefore, Indonesian textile exports will also increase by 4.926 percent as well as the Indonesian textile imports by 13.524 percent. So in total the Indonesian textile supplier will increase by 29.746 percent. This situation causes the Indonesian textile price to decrease by 1.536 percent, so that the demand for domestic textiles increases by 0.847 percent.

The increase in GDP and population of Indonesia will drive the increase of demand for Indonesian garments by 3.465 percent, so the Indonesian garment prices shall increase by 0.321 percent. Indonesian garment exportation still shows an increase of 1.562 percent as well as the importation of Indonesian garments at 172.297 percent. In total, the Indonesian garment supply increases by 22.412 percent.

The increase of GDP of the United States and China would increase the textile imports of USA by 1.341 percent and of China by 5746 percent. Therefore, the total world textile imports will increase by 2.106 percent, which in turns the world textile prices will increase by 2.262 percent. This price increase will have an impact to the Indonesian garment price increase. As for garment products, the increase in GDP of the United States will encourage the increase of world total garment imports by 0.057 percent. At the end of the increasing world garment imports have not been able to increase the world garment prices. This is because the world total exports increase higher than the imports. The world garment price reduction by 18.690 percent will have an impact on Indonesian textile price declines and the increase of Indonesian garment prices.

4.4. Discussion

The increase in production of textile and garment industry is generally associated with the increase in employment. While exports of textile and garment industries are associated with the acquisition of foreign exchange needed to support the Indonesia's economic development. Policies that can reduce the production as well as the exports in textile and garment industry are the policy of the labor wages increase in textile and garment sectors respectively by 14.5 percent and 15 percent (simulation 3), the trading liberalization, and the increase in Indonesia's GDP and population (simulation 5). One of the production cost components that plays a major role in the sustainability of the textile and garment production is the labor. Labors that are required, particularly in the garment industry, are that workers with certain skills without having to possess a high level of education. Therefore, the increase of

employment in the textile industry can ultimately reduce the number of unemployed in the community that in fact occurs as a result of the certain limitations to pursue higher education. The policies to increase the labor costs which is conducted by the government regulation, such as the increase of regional minimum wage, will eventually stimulate a reduction in production and exports, and a rationalization of manpower. Liberalization of trade in textiles and garments which is marked by the elimination of tariffs to zero percent actually tends to increase the volume of Indonesian textile and garment imports. However on the other side, the Indonesian textile exports still show an increase, but not with the Indonesian garment exports. This happens due to the increasing competition among the world's textile producers, such as China South Asian countries.

The policies that are only capable to increase production and export in one sector are the policy of interest rates increase (simulation 1). This policy reduces the production and export of Indonesian garment and makes the textile production and export stagnant. Textile industry is one of the high-risk industries, so that the banks are less interested in providing investment credit. In general, banks only provide short-term loan or credit (90 percent) and medium term (10 percent) to the textile industry, while the restructuring of the textile industry machinery requires a long-term loan between 10 to 15 years. The textile industry is more capital intensive than the garment industry, so that the restructuring problem is more frequent in the textile industry. The outdated machinery and technologies may affect the productivity of the textile industry.

The policies that are still capable to increase the production and exports in both sectors are shown in the simulation 2, which is the monetary policy through the adjustment of the Rupiah against US\$, and simulation 6, which is a combination of wage policy, liberalization, and increase of GDP of Indonesia and some developed countries. Since Indonesia adopts the floating exchange rate regime, the rupiah exchange rate value fluctuates over time. Nevertheless, the Bank Indonesia still can intervene to stabilize it using the monetary policy instrument. A stable rupiah will help exporters and importers in calculating and predicting the costs and as well as future profits.

V. CONCLUSION

The factors that influence the development of Indonesian textile and textile products industry is as follows:

1. Indonesian textile production is influenced in a negative manner by the lag of world cotton price and the lag change in labor of the textile sector. Indonesian garment production is

influenced by the lag of labor wage in the garment sector.

2. Indonesian textile exports to the world markets are elastic in the long run towards the changes of Indonesian textile prices. Meanwhile, Indonesian garment exports in the world markets are affected by the lag of exchange rate against US\$.
3. The demand for Indonesian textiles has an elastic response to the lag of labor wage of the textile sector, and the demand for Indonesian garment is influenced in a positive direction by the income per capita of Indonesian population of Indonesia.

Based on the conducted policy simulations, it can be concluded that:

1. The policies that can increase the production and exports in textile and garment industry are (1) the single policy through the adjustment of the rupiah exchange rate against US\$ and (2) the combination of policies to raise the wages, trade liberalization policies, and the increase of GDP of Indonesian some other developed countries as a potential form of the world textile market.
2. The policies that reduce the production and export in the textile and garment industry are (1) the single policy through the increase of labor wage in the textile and garment industry and (2) the combination of the increase of the labor wage in the textile and garment industry, the increase in GDP of Indonesia, and the demographic policies through Indonesia's population growth.

Overall from the estimation result, of this parameter coefficient and the policy simulations, shows an increase in the interest rates for investment activities, fuel, and also the labor wage in the textile and garment sector, which at the same time can reduce the domestic production of textiles and garments in the future. World cotton prices also affect the decline in Indonesian textile and garment exports. Meanwhile the exchange rate adjustment will encourage an increase of Indonesian textiles and garments exports in the period of 2007 to 2012.

This conclusion provides some implications as follows:

1. The increasing production of the Indonesian textile industry may encourage further employment. Therefore economic incentives are necessary, among which is the reduction of banking interest rates for investment.
2. The increasing Indonesian textile exports may improve the revenue of the country. The increasing exports of textiles and clothing can be triggered by the exchange rate adjustments at Rp 9000/US\$. The relatively stable exchange rate of Rp/US\$ would help textile manufacturers in calculating the cost of raw materials and profits.
3. The development of cotton plantation, as one of the main raw material, needs to be realized. A very high dependence on cotton imports can threaten the Indonesian textile competitiveness in the world markets.

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Appendix

Table 1.
Notes of the Endogenous and Exogenous Variables employed in the model

PTD_t	: The domestic textil production at the year t (1 000 ton)
PTD_{t-1}	: The domestic textil production at the year t-1 (1 000 ton)
PGD_t	: The domestic garment production at the year t (1000 ton)
PGD_{t-1}	: The domestic garment production at the year t-1 (1000 ton)
$HTDR_t$: Real price of domestic textil at the year t (USD/ton)
$HTDR_{t-1}$: Real price of domestic textil at the year t-1 (USD/ton)
$HCWR_{t-1}$: Real price of the world cotton at the year t-1 (<i>cent/pound</i>)
$HTWR_t$: Real price of the world textile at the year t (USD/ton)
$HTWR_{t-1}$: Real price of the world textile at the year t-1 (USD/ton)
$HMTIR_{t-1}$: Indonesian textile import price at the year t-1 (USD/ton)
$HGDR_t$: Real price of domestic garment at the year t (USD/ton)
$HGDR_{t-1}$: Real price of domestic garment at the year t-1 (USD/ton)
$HGWR_t$: Real price of world garment at the year t (USD/ton)
$HGWR_{t-1}$: Real price of world garment at the year t-1 (USD/ton)
$HMGIR_t$: Real price of Indonesian garment imports at the year t (USD/ton)
IRR_t	: Bank real exchange rate at the year t (%/tahun)
IRR_{t-1}	: Bank real exchange rate at the year t-1 (%/tahun)
$UTKTR_{t-1}$: Real wage of textile industry labors at the year t-1 (Rp juta)
$UTKGR_{t-1}$: Real wage of industrial labors at the year t-1 (1 000 Rp)
$BBMR_t$: Real fuel price at the year t (Rp/liter)
$BBMR_{t-1}$: Real fuel price at the year t-1 (Rp/liter)
T	: Time trend
XTI_t	: Indonesian textile exports at the year t (1 000 ton)
XTI_{t-1}	: Indonesian textile exports at the year t-1 (1 000 ton)
XGI_t	: Indonesian garment exports at the year t (1 000 ton)
XGI_{t-1}	: Indonesian garment exports at the year t t-1(1 000 ton)
$ERIR_t$: Real IDR exchange rate against USD at the year t (Rp/USD)
$ERIR_{t-1}$: Real IDR exchange rate against USD at the year t-1 (Rp/USD)
DKG	: Integration dummy of world textile trading
STD_t	: Domestic textile supply at the year t (1 000 ton)
SGD_t	: Domestic garment supply at the year t (1 000 ton)
MTI_t	: Indonesian textile imports at the year t (1 000 ton)
MTI_{t-1}	: Indonesian textile imports at the year t-1 (1000 ton)
MGI_t	: Indonesian garment imports at the year t (1 000 ton)

Table 1.
Notes of the Endogenous and Exogenous Variables employed in the model

MGI _{t-1}	: Indonesian garment imports at the year t-1 (1 000 ton)
DTD _t	: Domestic textile demand at the year t (1 000 ton)
DTD _{t-1}	: Domestic textile demand at the year t-1 (1000 ton)
DGD _t	: Domestic garment demand at the year t (1000 ton)
DGD _{t-1}	: Domestic garment demand at the year t-1 (1 000 ton)
TFT _{t-1}	: Textile import tariff at the year t-1 (%/year)
TFG _t	: Garment import tariff at the year t (%/year)
GDPIR _t	: Real GDP of Indonesia at the year t (Rp 1000)
GDPIR _{t-1}	: Real GDP of Indonesia at the year t-1 (Rp 1000)
POPI _t	: Population of Indonesia at the year t (million people)
POP _{t-1}	: Population of Indonesia at the year t-1 (million people)
MGB _t	: Second-hand garment import at the year t (1 000 ton)
MGB _{t-1}	: Second-hand garment import at the year t-1 (1 000 ton)
XTW _t	: World textile exports at the year t (USD/ton)
MTW _t	: World textile imports at the year t (1 000 ton)
MTW _{t-1}	: World textile imports at the year t-1 (USD/ton)
XTG _t	: Textile exports of Germany at the year t (1 000 ton)
XTA _t	: Textile exports of the USA at the year t (1 000 ton)
XTC _t	: Textile exports of China at the year t (1 000 ton)
XTR _t	: Remaining of world textile exports at the year t (1 000 ton)
MTL _t	: Textile imports of Italy at the year t (1 000 ton)
MTA _t	: Textile imports of the USA at the year t (1 000 ton)
MTC _t	: Textile imports of China at the year t (1 000 ton)
XGW _t	: World garment exports at the year t (1 000 ton)
MGW _{t-1}	: World garment imports at the year t-1 (1 000 ton)
XGW _t	: World garment exports at the year t (1 000 ton)
MGW _t	: World garment imports at the year t (1 000 ton)
MGW _{t-1}	: World garment imports at the year t-1 (1 000 ton)
XGC _t	: Garment exports of China at the year t (1 000 ton)
XGT _t	: Garment exports of Turkey at the year t (1 000 ton)
XGR _t	: Remaining of world garment exports at the year t (1 000 ton)
MGG _t	: Garment imports of Germany at the year t (1 000 ton)
MGA _t	: Garment imports of the USA at the year t (1 000 ton)
MGJ _t	: Garment imports of Japan at the year t (1 000 ton)
MGR _t	: Remaining of world garment imports at the year t (1 000 ton)