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ASEAN ECONOMIC INTEGRATION AND SKILL DIFFERENTIALS IN THE INDONESIAN LABOUR MARKET

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ABSTRACT

This study concerns with labour market in Indonesia, an labour-abundant country, considering the impact of trade liberalization on inequalities. It focuses on the transmission of ASEAN intra-trade on inequalities through the changing of the relative price of skilled and unskilled labour. This study relies on manufacturing survey data collecting information of more than 24 thousand firms classified under 13 sectors of Harmonized System (HS). The estimation shows that international trade has contribution on wage differentials in the Indonesian labour market. Lower tariffs are associated with widen wage differentials between skilled and unskilled workers in the Indonesian manufacturing industries.

Keywords: *Trade Liberalization, Labor Market, Skill Inequalities, Indonesia*

JEL classification: *F15, J2, J3*

1. INTRODUCTION

Studies in emerging economies in South American reveal that liberalization has contributed to widen the wages inequality through an increase of skill premium of skilled labour. A study by Mehta and Mohr (2012) presents evidence that trade liberalization has driven skill premium for skilled labour in Mexico particularly due to increase of demand for skilled workers within industry (within sectors).However, Pavcnik, Blom et al. (2004) do not find significant contribution of trade liberalization on wage distribution in Brazil between 1988 and 1994. In the case of developed countries, a study by Betrán and Pons (2004) concludes that trade liberalization in the late 1800s and early 1990s contributed to widen inequalities in developed countries of USA, France, the UK, Italy and Spain.

Furthermore, a study by Ripoll (2005) underlines the role of the initial conditions of skill and physical capital in determining the impact of trade liberalization on wages distribution.Aligned with Ripoll (2005), a study byMamoon and Murshed (2013) highlights the importance of human capital stock in explaining the impact of globalization and trade liberalization on wages distribution. A country with higher stock of human capital has capability to supply skilled labour to meet an increasing demand of skilled workers due to technological change. Meanwhile, trade liberalization for countries with abundant unskilled labour is worsened the wages distribution favoring skilled labour because lack of skilled labour to meet an increasing demand.

The labor forces in developing countries are dominated by unskilled labour with few basic educations. Therefore, it is challengingfor those countries to reap the benefit from market openness and integration. Liberalization causes technological change that increases demand for skilled labour. Whereas, a lack of investment in education suppresses country's capability to meet an increasing demand of skilled labour.

In order to benefit from liberalization, developing countries should start to open the economies with other developing countries that have similar level of human capital stock. Mamoon and Murshed (2013) reveal that countries in the worlds are in the different level of technical ladder. Developed countries possess high technical capability while developing countries are in the early stage of developing their technical competency. Thus, a regional cooperation such as ASEAN (Association of South East Asian Nations) among emerging economies is recommended in the early of liberalizationbecause it enables developing countries investing in human capital to increase their technical capability.

The Southeast Asian countries strengthen the economic relationship by establishing the ASEAN Economic Community (AEC). Under AEC scheme, ASEAN member countries agreed to enhance trade, movement of capital and labour by elimination tariffs and non-tariffs barriers. Since 2000, ASEAN countries have reduced the import tariffs subsequently to zero by 2015. Free flow of input and goods will facilitate ASEAN goal to establish the single production base and single market in Asian region.

Indonesia as a member country of ASEAN gains benefit from tariff removal. The export volume from Indonesia to ASEAN countries increased substantially. Asian countries are the major trading partner for Indonesia. More than sixty per cent of Indonesia's products are exported to the Asian countries. Among the trading partners in Asia, ASEAN countries play a prominent role in the Indonesian export. The export to the ASEAN countries is almost 16 billion US Dollar in 2005 or 18 per cent from total Indonesia export. The export to ASEAN countries increases into 40 billion US Dollar in 2012. Further, export to ASEAN countries is getting more important as it comprises of more than 20 per cent of total Indonesia export. While, the proportion of Indonesia export to USA and Europe are lower.

Despite an increase in the proportion of skilled workers, Indonesia labour market is dominated by unskilled labours. Unskilled workers with education background up to primary school are about half of the labour force (Badan Pusat Statistik 2000 - 2013). If we use the degree of education as a measure of skilled level, Indonesian workers are relatively low-skilled. The data of Indonesian survey of labour (SAKERNAS) shows that 49 per cent of workers in 2012 have a very low education. They only had primary school certificates, or unable to complete the primary school or not even attended school. On the other hand, the proportion of skilled workers which completed tertiary degree was only 9 per cent from total workers in 2012.

Table 1
Indonesia Workers Education Background

Education degree	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Never attended school	7%	5%	6%	6%	5%	5%	5%	6%	5%	5%	5%
Not completed primary school	16%	13%	13%	13%	13%	13%	13%	19%	17%	15%	15%
Completed primary school	38%	38%	37%	37%	37%	38%	36%	28%	29%	29%	29%
Junior High School – General	15%	19%	18%	18%	18%	19%	19%	18%	19%	19%	18%
Junior High School – Specialized	1%	1%	1%	1%	1%	na	na	na	na	na	na
Unskilled	**77%**	**76%**	**77%**	**76%**	**74%**	**74%**	**73%**	**72%**	**69%**	**68%**	**66%**
High school – General	11%	13%	12%	12%	14%	13%	14%	14%	15%	16%	16%
High School – Specialized	7%	6%	6%	7%	7%	6%	7%	8%	8%	8%	9%
Diploma I/II	1%	1%	1%	1%	1%	na	na	na	na	na	na
Diploma III	1%	1%	1%	1%	1%	3%	3%	3%	3%	3%	3%
University	3%	3%	3%	3%	4%	4%	4%	4%	5%	5%	6%
Skilled	**23%**	**24%**	**23%**	**24%**	**26%**	**26%**	**27%**	**28%**	**31%**	**32%**	**34%**

Source: Sakernas Data, Badan Pusat Statistik (BPS)

1.1 Trade Liberalization

The Heckscher-Ohlin (H-O) theory is a prominent literature examining the impact of international trade on skill premium. The H-O model originally assumes that country is either labour abundant or capital-endowment economy. Further, the model assumes that trade is feasible between countries with different specialization either countries focusing on technology-intensive or labour-intensive manufacture. In addition, the model assumes that the resources both capital and labour, are immobile meaning that labour and capital are not freely move among countries. According to simple H-O model, trade between two countries results a price convergence both for factors and final goods.

Trade will enable capital-endowed country to purchase labour-intensive goods with lower price, so increasing the relative value of capital-intensive goods produced locally. Meanwhile, labour-abundant country will be able to export their products. A higher production translates to higher demand of labour. Thus, trade will improve the price of labour relatively to capital in the labour-abundant country.

By using H-O model to explain the impact international trade between the labour abundant and the labour scarce (capital endowed) countries, an increase in trade in labour-abundant countries specialized in labour-intensive goods, increases demand for labour. Thus, an increase demand will push the wages up and so the inequality rate decreases. In contrary, international trade in countries experiencing labour shortage will widened inequality between labour and capital. For that reason, the impact of international trade on wage inequality is different.International trade is lower the wage inequality in labour-abundant countries and widen its distribution in labour-scarce countries.

Whereas, the simple H-O theory does not recognize the possibility that countries diversify their production. In fact, countries in the world are producing both labour-intensive products and capital-intensive goods. The difference is relied on the proportion of products that they produced. Labour abundant countries have higher proportion of labour-intensive products, meanwhile countries possesscapital produce more capital-intensive products. Moreover, trade among countries in present day is no longer between two countries with very distinctive resources. The regional trading agreement comprises special treatment for member countries with similar characteristics of resources. The ASEAN trade agreement for example, facilitating trading activities by lower tariffs between member countries with similar resources endowment.

In the contemporary international trade, countries are classified either they are skilled or unskilled abundant country. As described by Bliss (2007), the Krugman-Wood model describes that the distinction between the “South” and the “North” is on the relative proportion of skilled to unskilled labour. The “North” has highly skilled educated labour, while the labour force in the “South” countries is dominated by unskilled labour with few formal skills.Further, Bliss (2007) explains that the distinction between trading countries using the proportion of skilled labour is appropriate considering that capital is footloose meaning that it is freely move.

An empirical study on the impact of international trade on wage distribution of skilled and unskilled workers in a labour abundant country of India is conducted byKumar and Mishra (2008). They find a strong, negative, and robust relationship between changes in trade policy and changes in industry wage premiums in India. The results are consistent with H-O theory that international trade contributes to lower the wage inequality between skilled and unskilled labour. They argue that trade liberalization enhances productivity at the firm level, which get passed on to industry wages. Since tariff reductions were proportionately larger in sectors that employ a larger share of unskilled labour, an increase in wage premiums in these sectors goes to the unskilled labour. Their relative income to the skilled workers and so the wage inequality is shrinking.

On the other hand, Katz and Murphy (1992) that examining the wage inequalities in the U.S labour market conclude that international trade widen the wage inequality between skilled and unskilled labour. A rising of wages inequalities during the observation periods was due to a rapid growth in demand for skilled labour. Moreover, the study suggested that a combination of volatile supply and a steady demand of skilled workers explain a wider wage gap between skilled and unskilled workers.

Interesting study byAmiti and Cameron (2012) reveals another side of the relationship between international trade and skill premium by separating the analysis of import tariff either for input or final goods.As the technology level for producing intermediate inputs are higher than those employs for producing final goods, a lower tariff for (intermediate) input import generates significant impact on lowering skill premium.A 10 percentage point fall in input tariffs reduces the wage skill premium by 10 percent for the average importing firm, with the effects larger the higher the share of imported inputs.Therefore, this is not the case for lower tariff for final goods. A lower input does not pose significant impact of wages distribution in the Indonesia labour market.

Lower tariffs of intermediate-input contribute to explain lower skill premium in the Indonesian labour market(Amiti and Cameron 2012). It is argued that Indonesian intermediate input has higher skilled intensities compared to the production of final goods. Thus, a reduction of tariff facilitates firms to expand their production using imported input. However, production expansion is supported by imported intermediate input. Thus, the demand for skilled labour in Indonesian labour market is lowered and so the wage premium.

Their study relied on the proportion of wages of non-production to production workers in firms' level to measure skill premium. However, the study also presents evidence that this measure with another measure of skill premium which is the proportion of wages of high educated workers to uneducated workers. The study also finds that globally engaged firms pay higher wages than domestically-engaged firms. The Fixed-Effect panel data approach is employed to estimate the impact of lower tariff of input and output on skill premium. The skill premium, input and output tariff are industry level data while input and output share are firm level data. The estimation is conducted at the 5-digits industry (manufacturing) level data between 1991 and 2000.

A study byAmiti and Cameron (2012) identifies Indonesia as a country with abundant unskilled workers that even higher than other middle economies countries such as Brazil and Columbia. However, this is relevant for Indonesia in the 1990s. In the 2000s, the proportion of skilled labour with tertiary education rise significantly. Manning (2014), on the supply side, the educated workforce has expanded dramatically at senior high and tertiary levels accounting for over half of the growth in the labour force from 2007–2012. While there were significant problems with the quality of the skilled workforce, Indonesia now boasts a core of well-educated workers ready to support new investments.

Another study discussing developing countries byMamoon and Murshed (2013) shows that trade liberalization does worsen the distribution of wages between skilled and unskilled labour. This is because trade stimulates the escalation of skilled-labour demands. In many instances, the supply of unskilled labour is far more elastic than supply of skilled labour. This may sharpen skilled–unskilled wage premium and inequalities. As increased trade utilizes both more skilled and unskilled labour, but offer higher returns to the skilled relative to the unskilled, the effect of increased education induced by greater globalization should increase wage inequality.

Another study in the Indonesian labour marketby Lee and Wie (2013)analyzed the supply-demand of labour ofKatz and Murphy (1992). Their analysis is focused of the period 1990 to 2005. Sample is divided into 64 different labour groups according to gender, education level, experience and region. Furthermore, their study aggregated 20 years of observation into five four-year intervals. Lee and Wie (2013) show that there was a demand shift in the Indonesian labour market favouring the skilled workers and this may induce wider wage inequality. Currently, the demand for skilled workers is higher than unskilled ones particularly in 2000s. An increase in the demand of skilled labour is contributed by an adoption of technology in the production process. Thus, industries prefer to employ skilled-labour. This explains wider income inequality in Indonesian economy in the 2000s.

Another study by Kis-Katos and Sparrow (2015) reveals a positive effect of trade liberalization through the tariff elimination in Indonesia. They show that poverty reduced more in regions that were more strongly exposed to import tariff liberalization. Among the potential channels behind this effect, they highlight the job formation, formalization of the unskilled labour force and structural reallocation of labour. However, the benefit of trade liberalization is persisted if the tariff eliminations are introduced on intermediate goods instead of in the final outputs.

Some studies focusing Mexico also suggest that trade liberalization increases demand for skilled-labour within the manufacturing sector (Revenga 1997, Robertson 2004, Verhoogen 2008). However, Mehta and Mohr (2012) suggest demand shifting into skilled workers is observed between industry. Their study argues that in the case of Mexico, an increase of skill demand was not observed within-sector, such as skill-biased technological change, may not be central to the rise in college

premium as is often thought. Rather, demand shifted for skilled labour is contributed by between sector shifting.

The demand for workers to fill white collar type of occupations is higher particularly in the non-traded rather than tradable manufactured goods. Another study by Betrán and Pons (2004) also highlights the importance of structural change from agriculture to industrialized economy or even to service oriented economy to explain an increase of wage inequalities due to skills differential.

1.2 The ASEAN Economic Integration

ASEAN countries aim to strengthen the economic relationship by further removing tariffs and non-tariffs barriers. The commitment to establish the single market can be traced back from the implementation of ASEAN Free Trade Area (AFTA) in early 1990s. The AFTA agreement was signed on 28 January 1992 by six members which are Indonesia, Brunei, Malaysia, Singapore, Thailand and Phillipines. The removal of tariff barriers was conducted by establishing the Common Effective Preferential Tariffs Scheme (CEPT) in order to improve the flow of goods and services among the ASEAN countries.

CEPT scheme is generally managed the elimination of the import duties to facilitate larger intra-trade between the ASEAN countries. The elimination of tariff is subjected to the products category whether they are under the the Inclusion (IL) or the exclusion list (EL). Products in the first category are subject to tariff removal until zero. Those in the second category are divided into Temporary Exclusion List (TEL) and Sensitive List (SL). TEL are further shifted into IL thus are subjected to tariff elimination in the future. The tariff elimination scheme was revised several times. The current scheme is based on the ASEAN Trade in Goods Agreement (ATIGA) which was signed in December 2006. The import duties of IL products under the schedule A removed by 2010 for six original member countries and by 2015 for the new members of Cambodia, Laos, Myanmar, and Vietnam (CLMV).

Following the CEPT arrangement, six original member countries have been eliminated more than 99 per cent of the tariff lines of products in the inclusion list (IL) in 2010 (Okabe and Urata 2014). Below figure shows the progress of tariff elimination. There are particularly significant in 2003, 2008 and 2010. By 2010 there were 105,000 tariff lines that have been removed into zero per cent in the six original members of ASEAN or close to 99.2 per cent of the total tariff lines.

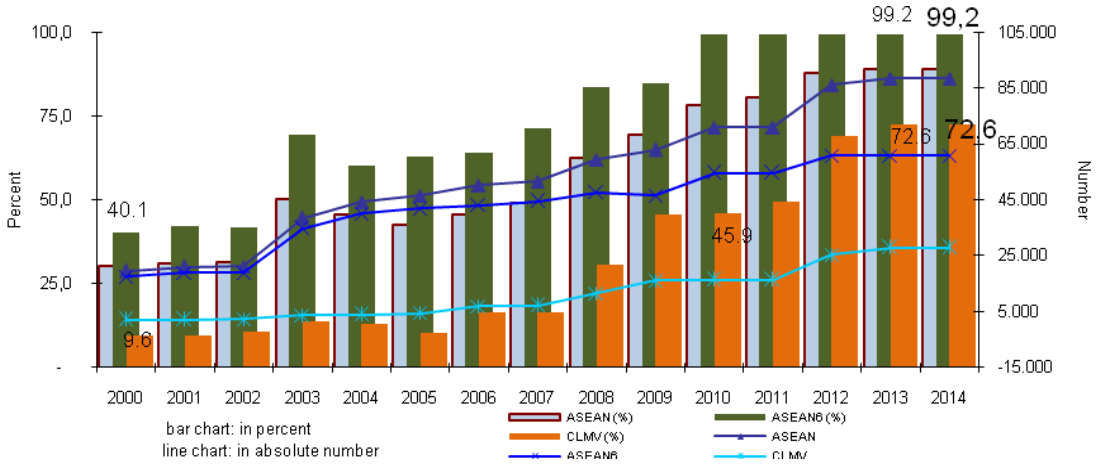

Figure 1. Trend of the Percentage of CEPT Tariff Lines with zero tariff rate, 2000-2014
Source: The ASEAN Secretary

The tariffs have been gradually removed during the period of 2000 into 2014. The figure below reveals that in the 2000, the average tariff rate on intra-ASEAN import was 4.4 per cent for all ASEAN members. The lower average tariff was particularly commenced among the six original members of ASEAN by 3.6 per cent in 2000. The new members of CLMV countries have an average tariff rate of 7.5 per cent. The gradual removal of tariff barriers is clearly shown in below figure that

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the average tariff rate among ASEAN countries is gradually reduced into zero per cent in 2010 for six original members and 1.3 per cent for CLMV countries.

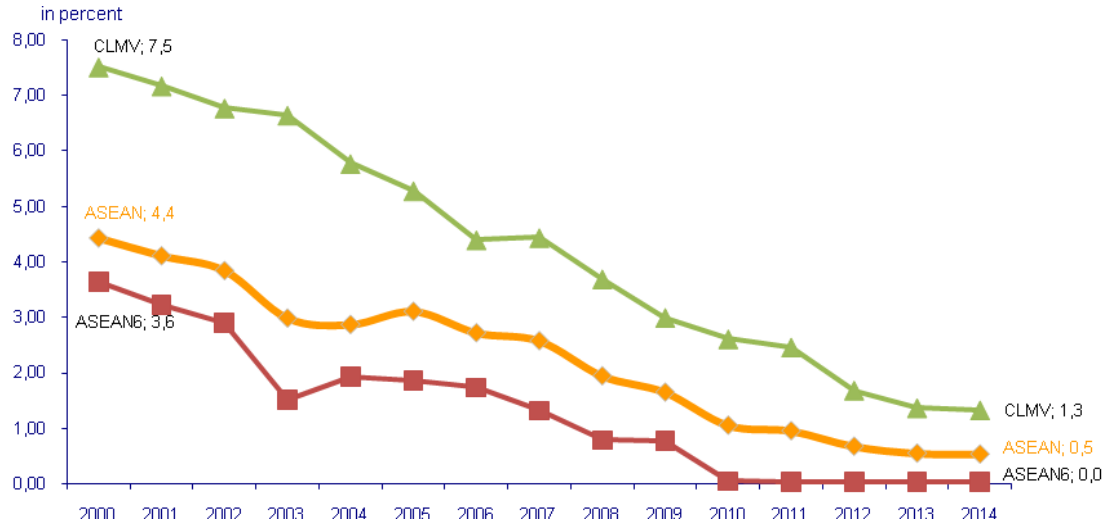

Figure 2. Trend of the Average Tariff Rate on Intra-ASEAN Imports, 2000-2014
Source: The ASEAN Secretary

In the beginning of ASEAN economic integration, two countries namely Singapore and Malaysia dominated the trade activities. In 1990s, the contribution of two countries in ASEAN intra-trade of export reached almost 70 per cent. Moreover, the domination of Malaysia and Singapore in the import within ASEAN countries was also very substantial by 79 per cent in 1990 (Okabe and Urata 2014). The contribution of export and import in the ASEAN intra-trade of Thailand was coming third by 18.9 per cent of export in 1990 and 11.4 per cent of import in 1990. Meanwhile, other countries such as Indonesia, Philippines, and Brunei were relatively small players contributed less than 15 per cent of ASEAN export and 10 per cent for import.

The removal of tariffs barriers had a role in expanding ASEAN intra-trade. More than 70 per cent of product categories traded within ASEAN countries increased (Okabe and Urata 2014). The trade expansion is also important to trigger the development of production network within ASEAN countries. ASEAN economies has becoming an important place of Japan, South Korea and Taiwan to develop their production and distribution network for electronics industry (Thorbecke 2010). In addition, the development of production network is also observed for automotive industry lead by Japan.

In addition to electronic and automotive products, lowers tariffs introduced for intra-trade of ASEAN has positive effect in increasing trade activities of agricultural products; beverages and tobacco; materials such as crude rubber; textile fibres; crude animal and vegetable materials; processed animal and vegetable oils; some chemical products such as plastics and perfumes; manufactured materials such as rubber manufactures, wood manufactures, textile yarn and fabrics, non-ferrous metals; and electrical machinery; transportation equipment; and other manufactured articles. Meanwhile, tariff reduction has had no effect on either imports or exports in the case of wood, pulp and paper; mineral fuels; crude chemicals and coal; medical and pharmaceutical products; and fertilizers and explosives(Okabe and Urata 2014).

In the case of Indonesia, between 2001 and 2006, export to ASEAN countries was dominated by mineral products, machinery and electronics, base metals, and chemical products. In regards to import, Indonesia relied on ASEAN countries to supply minerals, chemical products, machinery and electronics, vehicles and transport equipment and base metals. The product composition of Indonesia trade with ASEAN countries is dominated by intermediate-input and capital. Considering the composition of products traded between Indonesia and ASEAN countries, this may relate to the development of production and distribution network of electronics and vehicles industries. Please refer to appendix for detail information of Indonesia import and export with ASEAN countries.

It is interesting to examine the trade relationship between Indonesia and others ASEAN countries.According to Thorbecke (2010), Indonesia's export dependency on labour-intensive manufacture to the world market is the highest compared to other ASEAN countries as presented in figure 3. However, the contribution of labour-intensive manufacture such as textile and footwear on Indonesia export to ASEAN countries is relatively small. In addition, data presented byThorbecke (2010) reveals that the United States and European Union are the major market of labour-intensive manufacture from ASEAN countries included Indonesia, Malaysia, the Phillipines and Thailand. Thus, the expansion of the intra-trade of Indonesia and ASEAN countries is mainly to support the development of production and distribution network of technology-intensive industries such as machinery, electronics and vehicles and transportation in ASEAN.

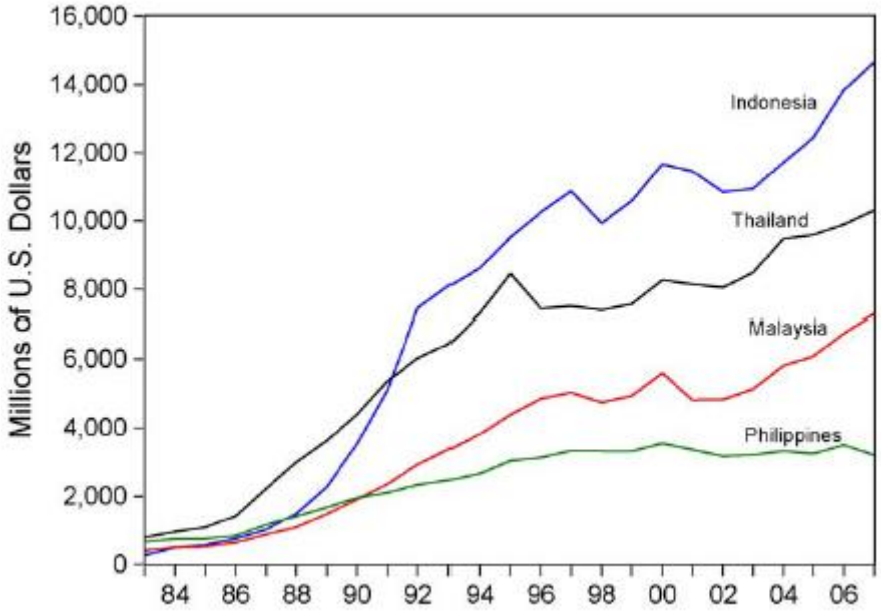

Figure 2. The Value of Labour-Intensive Export from ASEAN Countries to World Market
Source: based on CEPII-CHELEM database, collected from Thorbecke (2010)

2. RESEARCH METHOD

Literature suggests that trade liberalization influences labour market through changes of demand of labour and further alters the price of labour relatively to other inputs. This study aims to investigate the influence of ASEAN trade liberalization on Indonesian labour market particularly the wage premium. Following the recent literature of international trade, countries are classified into two, based on the proportion of skilled labour in the labour market. The "North" labeled for rich countries are relatively rich of highly skilled educated workers. Meanwhile, "South" associated for developing countries is perceived as unskilled-labour pool with basic education (Bliss, 2007).

International trade will change the proportion of outputs produce in the economy. For example, South countries will specialize in labour-intensive industry in order to penetrate to developed countries. On the other hand, countries that rich with skilled labour focus producing technology intensive products. Trade will lower the price of labour-intensive products in the "North" and increase the value of technology-intensive goods. The opposite situation is observed in the developing countries with abundant unskilled labour. According to H-O model, the economy experiencing international trade will reach its equilibrium when the revenue is maximum. Below equation shows that revenue (R) is maximized if the sum of given output prices (p^f and p^m) of the value of both optimal output levels (y^f and y^m) equals to the optimal factor shadow prices (w_K and w_L) of two given factor supplies (K_0 and L_0) (Bliss, 2007).

$$R(p^f, p^m, K_0, L_0) = p^f y^f + p^m y^m = w_k K_0 + w_l L_0 \quad \text{(equation 1)}$$

As described above, international trade alters the outputs prices. In order to attain the maximum revenue, trade will influence the price of factor supplies (input price). A response of a factor shadow price to a change in input price is known as a Stopler-Samuelson effect (Bliss, 2007). The response can be calculated by differentiating the revenue equation with respect to prices and then with respect to factor quantities. Further, the magnification property of the Stopler-Samuelson analysis finds that the proportion of wage reduction rate is much higher than the fall in the output price if the tariff (protection) is removed from the labour intensive goods.

In order to estimate the influence of tariffs removal and an increase of intra-trade of ASEAN to Indonesia labour market, this study employs approach introduced by Te Velde and Morrissey (2004) that further developed by Sangkaew (2013). Te Velde and Morrissey (2004) developed the model to test the effect of Foreign Direct Investment on wages and wage distribution. Further, Sangkaew (2013) expands the model to capture the effect of international trade on wages distribution in Thailand.

The model is based on Cobb-Douglas production function. It assumes that the production of output (Y) is relied on three types of factors which are capital (K), skilled labour (H) and unskilled labour (L). Further, α is defined as the elasticity of production with respect to capital and labour (skilled and unskilled); γ is the distribution of parameter where it has value between 0 and 1. A is the technology change that determines productivity of skilled workers and B is those for unskilled workers. t refers to years which are year 2001, 2002, 2003, 2004, 2005, and 2006. Finally, σ is the elasticity of substitution between skilled and unskilled workers (Sangkaew 2013).

$$Y = F(K, H, L) \qquad \text{(equation 2)}$$

$$Y = K^{\alpha}\left(\gamma(A(t)H)^{\sigma-1/\sigma} + (1-\gamma)(B(t)L)^{\sigma-1/\sigma}\right)^{(1-\alpha)\sigma/\sigma-1} \qquad \text{(equation 3)}$$

If we differentiate equation Y with respect to concerned factors of H and L, we will get below equation.

$$\partial Y/\partial H = \varphi[A(t)H]^{\sigma-1/\sigma}A(t) = W_H \qquad \text{(equation 4)}$$

$$\partial Y/\partial L = \varphi[B(t)L]^{\sigma-1/\sigma-1}B(t) = W_L \qquad \text{(equation 5)}$$

Dividing equation (4) by (5), we will get below equation.

$$W_H/W_L = \varphi/\gamma\left[A(t)/B(t)\right]^{\sigma-1/\sigma}\left[H/L\,\tfrac{H}{L)}\right]^{1/\sigma} \qquad \text{(equation 6)}$$

Take the natural log on both sides of equation 6 and let φ/γ which is constant=C, thus,

$$ln\left[W_H/W_L\right] = Ln\,C + Ln\;\sigma - 1/\sigma\left[A(t)/B(t)\right] + Ln\,1/\sigma\left[H/L\right] \qquad \text{(equation 7)}$$

The mathematical model above is further transformed to econometric model as below:

$$Ln\left(WH_{ijt}/WL_{ijt}\right) = \alpha_0 + \alpha_1 Ln\left(H_{ijt}/L_{ijt}\right) + \alpha_2(trend_t) + \alpha_3(tariff_{it}) +$$

$$Foreign_{ijt} + sec_{it} + \varepsilon_{it}$$

(equation 8)

Table 2
Definition of The Variables

Variable	Definition
$\frac{WH_{ijt}}{WL_{ijt}}$	The proportion of skilled to unskilled workers at firm *i*, sector *s* and time *t*.
$\frac{H_{ijt}}{L_{ijt}}$	Skill premium calculated as the proportion of wages of skilled to unskilled workers at firm *i*, sector *s* and time *t*
trend	Time trend capturing technological progress
tariff	The differentials between the most-favoured nation (MFN) tariff rates and the Common Effective Preferential Tariff (CEPT) for the SITC-1 digit level
Foreign	The percentage of foreign ownership at firm *i*, sector *s* and time *t*.
sec	Dummy of sector using Harmonized System (HS) classification
i	Firm
j	Sector based on Harmonized System (HS) classification
t	Year of 2001 and 2006

Panel data approach is employed to estimate the impact of ASEAN intra-trade on Indonesia labour market. The Fixed-Effect is utilized to capture the heterogeneity of firmsworking in the Indonesian manufacturing industry. There are around 24 thousand firms that classified into 13 manufacturing industries based on the Harmonized System (HS). Further, the HS code is synchronized with the International Standard Industrial Classification (ISIC) of the manufacturing survey published by the Indonesia Bureau of Statistics (BPS). Thus, the 13 sectors tariffs, export and import data,which are generated from ASEAN export and import database, are corresponding with the 13 sectoral classifications of ISIC of manufacturing survey. The complete list of sectors analyzed in this study is available in appendix.

The dependent variable is logarithmic natural of the ratio of wages of skilled to unskilled workers. The first explanatory variable is the condition of labour supply that represent by the logarithmic of ratio of the number of skilled to unskilled workers. Tariff is employed to measurethe reduction of trade barriers for ASEAN intra-trade. Tariff is defined as the differentials between the most-favoured nation (MFN) tariff rates and the Common Effective Preferential Tariff (CEPT) for the SITC-1 digit level from 2001 and 2006(Okabe and Urata 2014). Further, this study employs time trend to capture technological progress, the proportion of foreign ownership and individual characteristics of sectors as fixed effect.

3. RESULTS AND DISCUSSION

Table three provides descriptive information of an average of main variables of trade barrier, trade volume of Indonesia to and from ASEAN countries and workers characteristics across sector import between 2001 and 2006. The average figures are presented for 13sectoral groups. The 13 sectoral groups are required to pay tariff less than 5 per cent. Thus, Indonesia has applied the CEPT tariff reduction required by the ASEAN. The lowest tariff is observed in wood and article from wood by 0.684. The highest tariff (in average) is observed in footwear, headgear, umbrellas, sun-umbrellas commodities by 4.74 per cent.

In terms of export, machinery and mechanical appliances, electrical equipment, sound recorder and television image recorded the highest values close to 1.8 billion US$ in average between 2001 and 2006. Further, Indonesia export to ASEAN countries is supported by base metals and articles from base metals of 1.65 billion US$. At the third, in average between 2001 and 2006, export value of chemical and its allied industries was around 850 million US$.

It is interesting that the composition of commodities of Indonesia import is very similar with its export. Data in table 3 shows that Indonesia import is dominated by chemical products and its allied industries, machinery and mechanical appliances, electrical equipment, sound recorder and television image, and base metals. In addition, Indonesia also imported quite large amount of vehicles, aircraft, vessels, and associated transport equipment with the value 917 million US$. In addition, the export figure for vehicles, aircraft, vessels, and associated transport equipment is also quite large close to 600 million US$ in average between 2001 and 2006.

Table 3
Average of Tariff, Trade Volume of Indonesia to/ from ASEAN Countries and Workers Characteristic 2001-2006

HS	Commodity Classification	Merge				
		Tariff (%)	Export (Million US$)	Import (Million US$)	Proportion of skilled to unskilled workers	Skill Premium
4	Prepared foodstuffs, beverage and tobacco	3.151	599	413	0.184	2.395
6	Product of chemical and allied industries	2.603	847	1,560	0.311	2.726
7	Plastics, rubber and articles thereof	4.145	545	497	0.181	2.749
9	Wood and article from wood	0.684	115	30.3	0.154	3.718
10	Pulp of wood and paper	3.660	500	135	0.227	3.250
11	Textiles and textile articles	2.682	581	120	0.131	2.711
12	Footwear, headgear, umbrellas, sun umbrellas	4.747	54.3	12.6	0.137	2.320
13	Articles of stone, plaster, cement, asbestos, mica, ceramic and glassware	4.395	135	29.4	0.173	2.061
14	Natural or cultured pearls, precious stones, precious metal, jewelry	4.079	204	3	0.147	3.647
15	Base metals and articles of base metal	2.831	1,650	808	0.227	3.455
16	Machinery and mechanical appliances, electrical equipment, sound recorder, television image	1.655	1,780	919	0.205	2.942
17	Vehicles, aircraft, vessels, associated transport equipment	4.123	598	917	0.193	2.509
18	Optical, photographic, cinematographic, measuring checking, precision, medical or surgical instruments and apparatus, clocks	2.090	178	179	0.211	3.101

Source: Tariff data is collected from the ASEAN Secretary, Export and Import Data are collected from Indonesian Bureau of Statistics.

Regarding to measures of international trade, the pair-wise correlation is presented in table 4. Tariff has negative association with export and import. This implies that higher tariffs correspond with lower export and import. Further, import and export have positive relationship. This may indicate that exporting sectors rely on imported input. In addition, this may also represent a production and distribution network of machinery, electronics and vehicles industries in ASEAN countries. Indonesia is involved in the network that production and distribution are spread all over ASEAN countries.

Table 4
Pair-wise Correlation of International Trade Measures

	Tariff	Import	Export
Tariff	1.000		
Import	-0.1678	1.000	
Export	-0.0149	0.4970	1.000

Source: Author's Estimations

Table 5
Empirical Results

$\frac{ws_{ijt}}{wu_{ijt}}$ **as dependent variable**[1)]	**Pooled Least Square**	**Fixed Effect**	**Random Effect**
$\frac{s_{ijt}}{u_{ijt}}$**, skill premium**	-.297*** (.005)	-.492*** (.01)	.373*** (.009)
Trend	.006** (.0027)	.001 (.003)	.002 (.003)
Tariff	-.010** (.004)	-.008** (.003)	-.0090*** (.003)
Foreign	.005*** (.000)	.0008*** (.0003)	.0029*** (.0002)
Cons	-.283*** (.025)	-.523*** (0.062)	-.47*** (.027)
Sectoral[2)]			
Chemical (HS-4)	.32***	-.106	.33***
Plastic (HS – 6)	.16***	-.07	.186***
Wood (HS – 7)	.035**	.060	.06***
Paper (HS – 9)	.14***	-.027	.187***
Textiles (HS – 10)	-.018*	-.141	-.026*
Footwear (HS – 11)	.080***	-.031	.067**
Stone (HS – 13)	.071	.188	.11
Pearls (HS – 14)	-.052**	-.047	-.017
Base metals (HS – 15)	.258***	-.062	.288***
Machinery (HS – 16)	.192***	-.143	.21***
Vehicles (HS – 17)	.213***	.048	.243***
Optical (HS – 18)	.236***	-.092	.24***
Observation	81,353	81,353	81,353
F-stats/ Wald chi2	287.73	287.73	287.73
Degree of freedom	16:81,336	16:81,336	16:81,336
Prob >F	0.000	0.000	0.000

Source: Author's Estimations

where:

) = *** is significant at 1%; ** is significant at 5% and *** is significant at 10%

2) = Prepared foodstuffs, beverage and tobacco as a base.

A simple regression employing three methods of Pooled Least Square (PLS), Fixed Effect (FE) and Random Effect (RE) shows that international trade measures of tariff has statistically significant contribution in determining the wage premium in the Indonesian labour market between 2001 and 2006. Tariff has negative impact on wage premium meaning that lower tariffs contributes to increase premium enjoyed by skilled workers higher than those generate by unskilled labour.

Lower tariff associates with higher export and import. ASEAN tariff reduction policy was important in enhancing ASEAN intra-trade. The data shows that Indonesia contribution in both export and import intra-ASEAN increased substantially in the 2000s after tariff and non-tariff barriers removal since early 1990s. The empirical estimation reveals that lower tariffs contribute to widen the wage distribution between skilled and unskilled workers. Regarding to major exporting industries, the data shows that the leading industries are the technology-intensive ones such as machinery, electronics and vehicles. Higher export of technology-intensive industries requires firms to increase production as well as the use of factor inputs such as skilled labour. Higher demand of skilled workers will increase their wages that further widen the wage differentials.

4. CONCLUSIONS

ASEAN countries aimed to enhance trade and investment relationship among its member countries in order to develop single production and market. Indonesia benefits from the trade liberalization and economic integration particularly in penetrating ASEAN market and having access on the supply of intermediate-input from ASEAN countries. The value of export and import between Indonesia and ASEAN countries increased so the contribution of Indonesia in ASEAN intra-trade raised from only 2-3 per cent in 1990s into 16-19 per cent in 2010. In terms of commodities, Indonesia export and import to ASEAN are dominated by technology-intensive product such as electrical and machinery, chemical and its allied industries and vehicles.

ASEAN policy to lower tariff has positive impact in increasing trade volume within ASEAN countries included Indonesia. As tariff reduction induces Indonesia's export of technology-intensive product, trade liberalization increases demand for skilled labour and contributes to widen wage inequality between skilled and unskilled workers.

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