

RESEARCH ARTICLE

International Trade and Unemployment: Evidence From Selected ASEAN+3 Countries

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Abstract: The present study seeks to examine empirically whether exposure to international trade creates or destroys jobs for a sample of eight ASEAN+3 countries (APT). The findings of the PMG technique shows that trade liberalization policies have a negative influence on unemployment rate in the long run. Since medium and unskilled workers are the majority of the workforce, a reduction in trade barriers is likely to expand the trading sector. For the APT countries to compete globally, the trading sector is likely to shift to a more efficient production mode by using intensive capital and high skilled labor, leaving unskilled workers unemployed. The findings are robust since we use various proxies for the trade liberalization policies.

Keywords: globalization, trade policies, unemployment

JEL Classifications: J64, F130, F66

In the last decade, the south-eastern region of Asia has experienced one of the lowest unemployment rates in the world. In 2010, the region registered a 3.5% unemployment rate (measured as percentage of labor force) which was less than that of Europe (10%), OECD (8.3%), North America (9.42%) and the global average (5.8%). Despite the low unemployment rate, recent evidence shows that the unemployment rates in most economies of the region show an increasing trend. For instance, during the period of 1990–2012, the unemployment rate increased by 64% in China, 156% in Indonesia, 38% in Korea, and 107% in Japan. Of course, several factors may have contributed to the unemployment problem, including labor market regulations, overall macroeconomic

policies, and globalization. The success or failure to overcome unemployment problems depends largely on the adaptation process implemented to respond to the ever-changing global economy (Dutt, Mitra, & Ranjan, 2009). Recently, in the era of globalization, the attention of the scholars has shifted to examine whether policies relating to external sectors have effects on unemployment rates. More specifically, the studies seek to determine whether exposure to international trade creates or destroys jobs. According to Landman (2000), policy makers are concerned about the present and future effects of globalization in relation to their respective labor markets. Rama (2003) argued that integration with the world market bears the promise of prosperity for the developing and transitional

economies, but such integration may also adversely affect such economies.

The basic theoretical model explaining the impact of trade policies on unemployment can be traced back to Ricardo's work on comparative advantage (Ricardo, 1951–1973), which is based on relative technological differences; and Heckscher-Ohlin's work on comparative advantage, which is based on international differences in relative factor endowments (Dutt et al., 2009). According to Dutt et al. (2009), trade affects unemployment rate through the above sources of comparative advantage in several different fashions. If trade is solely driven by Ricardo's comparative advantage, then trade liberalization accomplished through tariff lessening, for example, will result in reduction in unemployment rate in a country. However, trade driven by Heckscher-Ohlin (1919) based comparative advantage is expected to reduce unemployment only if the country is labor-abundant. However, it appears that the Heckscher-Ohlin prediction is empirically demonstrated not to be the dominant effect of trade on unemployment (Dutt et al., 2009).

Additionally, the impact of trade policies on unemployment is likely to vary between skills and unskilled workers; and over time. The notion that trade liberalization increases unemployment in the short run as workers are reallocated from the shrinking to the expanding sectors is widely accepted (Felbermayr, Prat, & Schmerer, 2011; Dutt et al., 2009). However, the effect of trade liberalization on unemployment in the long run is still inconclusive (Felbermayr et al., 2011). While it is widely accepted that trade liberalization policies will decrease unemployment among skilled workers, at the same time unemployment among unskilled workers will increase, making the overall impact of such policies on overall unemployment ambiguous (Sener, 2001; Moore & Ranjan, 2005).

The available data concerning trade policies in Southeast Asia indicates the gradual removal of barriers and restrictions imposed on trade over time. For instance, during the period of 1990 to 2013, tariff rates (applied, simple mean, all products (%)) decreased by 87%, 78%, 63%, and 86% in China, Korea, Malaysia, and the Philippines, respectively (World Bank, 2017). Additionally, data on Economic Globalization Index (EGI), an

alternative measurement for trade liberalization by accounting for various dimensions of economic globalization, indicates that all the countries in the region have a tendency to move towards the global market (see Dreher, 2006; Dreher, Gaston, & Martens, 2008, for more information on this index). For instance, during the period of 1990–2013, the EGI depicts an increase in trade liberalization by 79%, 74%, and 87% in China, Indonesia, and Thailand, respectively (Dreher, 2006). Given the trade and unemployment nexus, the observed increase in unemployment rate and the tendency of countries in Southeast Asia to merge with the global market raises the two following questions: is it possible to attribute the increasing rate of unemployment to the adoption of trade liberalization policies; and does the impact of these policies on unemployment vary over time?

Previous studies concerning the impact of trade policies on unemployment, which are reviewed below, present mixed findings. The inconclusive findings suggest the need for further investigation because questions regarding whether trade liberalization policies will increase or reduce unemployment is “primarily an empirical issue,” as suggested by Davidson and Matusz (2004), that remains unanswered. Nevertheless, no existing empirical study examines such issues, especially in regard to the recent experiences in the Asian region. The present study does not attempt to test a specific theoretical model, but to answer the questions whether trade liberalization policies will increase or reduce unemployment and produce robust evidence concerning the impact of trade policies on unemployment rate for a panel of selected southern Asian countries.¹ Hence, the key objective of the present study is to examine whether trade liberalization policies will increase or reduce unemployment in regard to the recent experiences in the Asian region.

The present study is organized into six sections. The first section is introduction; the second section briefly reviews unemployment and trade policies in Southeast Asian countries. Section three provides a survey of the conceptual framework and literature review. In section four, the methodology utilized to examine the impact of trade policies on unemployment is presented. The findings are presented in section five, while the final section concludes the present study.

Unemployment and Trade Policies in Southern Asia Countries: Overview

This section surveys the main features of the labor market and trade policies of countries included in this study's sample. Since most of the theoretical models on trade liberalization policies and economic development are based on the impact of such policies on the economic growth of a given country, the discussion will begin with the growth—employment nexus in Southeast Asia. The fact that the region has been experiencing one of the world's highest growth rates cannot be solely attributed to trade liberalization policies. The present study is not interested in the impact of trade liberalization on economic growth, but examines how the generated economic growth, irrespective of its sources, affects unemployment in the region.

Table 1 shows the elasticity of employment with respect to economic growth for selected countries in Southeast Asia during the 1980s and 1990s; and the productivity growth during the period of 1980 to 2001. The decline in the elasticity of employment with respect to economic growth in the countries examined during 1990s is associated with a positive growth in total factor productivity during the same period, indicating that factor productivity growth is the main source of economic growth in the countries examined. For example, whilst the elasticity of employment with respect to economic growth decreased by 61% in China, productivity growth is positive with a relatively high growth rate (5.2%).

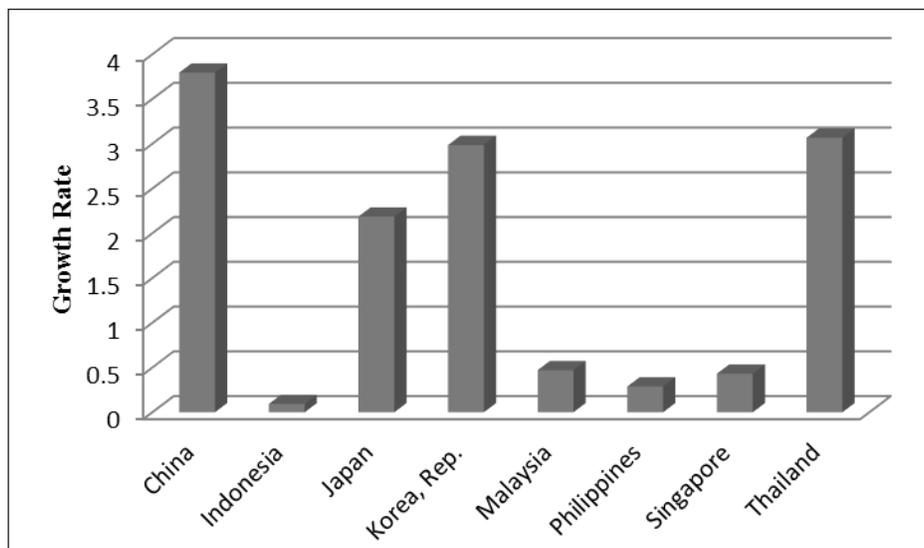
Over time, the generated economic growth in the countries examined has created marginal opportunities in the labor market. One possible justification for the declining pattern in employment-economic growth elasticity is due to the extensive use of technology in production processes. In the globalization era, firms competing in the international market need to utilize technology that produces products with relatively higher quality and lower costs. The expansion in the utilization of such technology implies that more demand exists for capital than labor. Thus, the increase in the total factor productivity in the countries examined may be due to the increase in capital utilization with marginal and/or without any significant influence on the employment level.

It is also important to note that the tendency of Southeast Asian countries to move towards the global market is expressed through exports and imports (i.e., trade openness). Figure 1 represents the average annual growth rate of trade (% GDP) in the countries examined. According to Figure 1, the average growth rate of trade during the period of 1990 to 2012 varies between the countries examined, but all of the countries recorded positive growth rates. For instance, China registers the highest average annual growth rate of more than 3.5%, followed by Thailand and Korea, with growth rates of nearly 3%; and Japan 2%. Indonesia registers the lowest annual growth rate, while the remaining countries recorded an average annual growth rate of less than 0.5%.

Table 1. *Employment Elasticity and Labor Productivity*

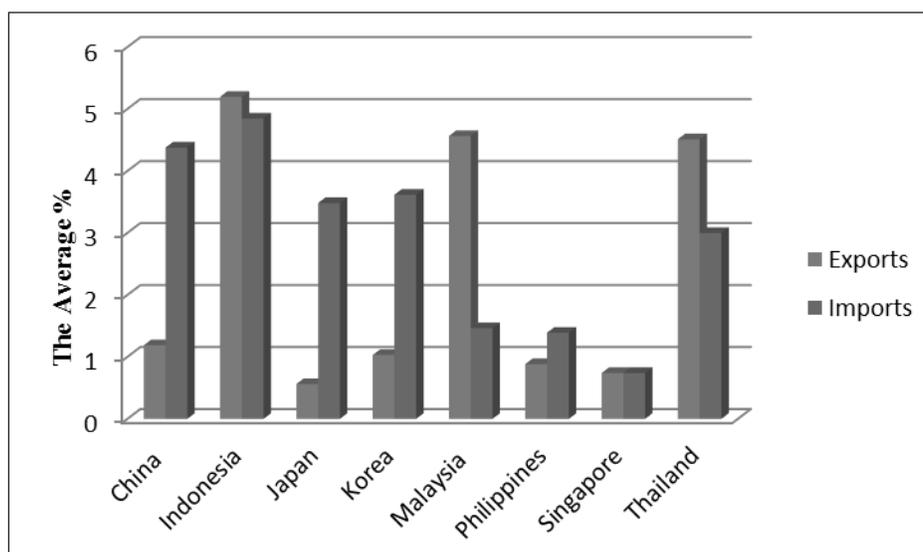
Countries	Elasticity		Change (%) in the Elasticity	Productivity growth During 1980 and 2001
	1980s	1990s		
China	0.33	0.13	-61.0%	5.2
Indonesia	0.44	0.38	-12.0%	1.8
Malaysia	0.68	0.41	-40.0%	2.8
Thailand	0.33	0.19	-41.0%	3.9

Source: Asian Development Bank, 2005) and , International Labor Organization, 2003.



Source: United Nation conference of trade and Development, 2014.

Figure 1. Trade, average annual growth rate (1990–2012).

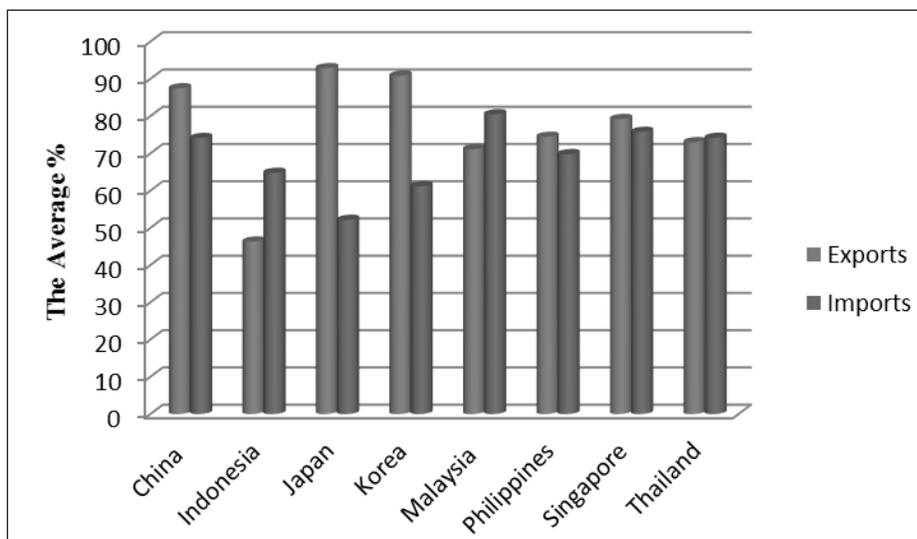


Source: World Bank, 2017

Figure 2. Average share of agriculture exports (% of merchandise exports).

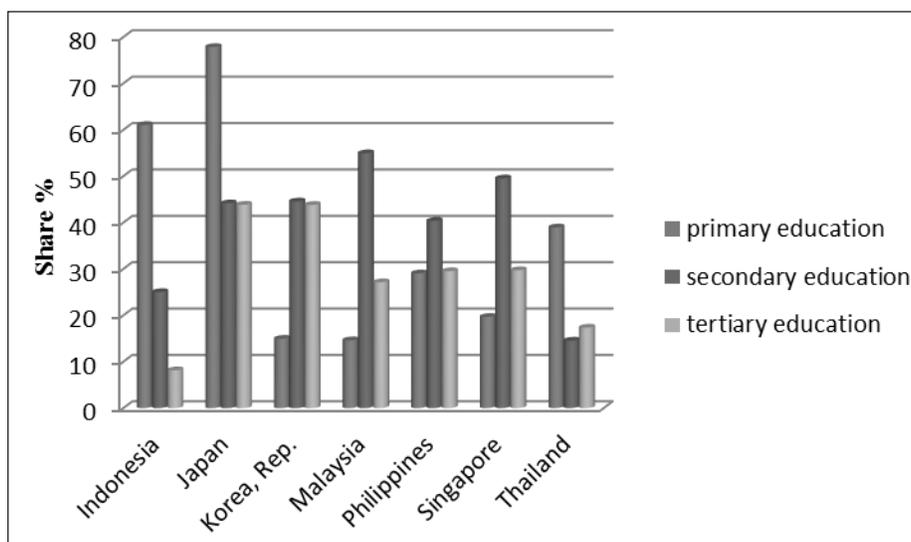
In terms of trade composition, trade in agricultural and raw material products also varies between the countries in the sample, as demonstrated in Figure 2. While the trade of such products in countries like Singapore and Philippines constitutes less than 12% (measured as the percentage of merchandise trade), in Indonesia the trade of agricultural and raw

material products constitutes an average of 50% of merchandise trade. China, Japan, and Korea are net importers of agricultural and raw material products, while Malaysia and Thailand are net exporters of such products. In contrast, more of the trade in most of the countries examined consists of manufactured products, as reflected in Figure 3. The trade in such



Source: World Bank, 2017.

Figure 3. Average share of manufacturing exports (% of merchandise exports) and imports (% of merchandise imports), 1990–2012.

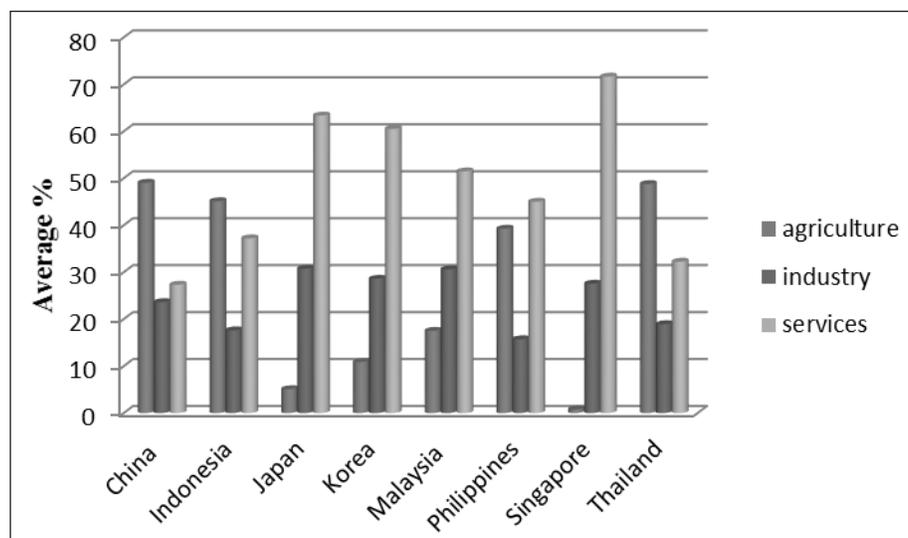


Source: World Bank, 2017.

Figure 4. Labor force by education level (% of the total labor force), 2012.

products constitutes more than 70% of merchandise trade in most countries. China, Japan, and Korea are net exporters for such products, while for the export and imports for the rest of the countries examined are equal for some products, with the exception of Indonesia. Given the trend and the structure of trade in the countries examined, the present study now seeks to determine whether trade structures have a relationship with the structure of the labor market

in the countries examined. First, the skills among the labor force are examined because, as mentioned previously, the impact of trade liberalization policies on unemployment rate is affected by the level of skill of the labor force. Thereafter, the manner in which employment is distributed among the economic sectors must be considered. Figure 4 describes the labor force according to skill based upon the education level of the labor force in the countries examined in 2012.



Source: World Bank, 2017.

Figure 5. The average share of employment (% total employment) by sector, 1990–2012.

Table 2. Unemployment Rate and Trade Policies, 1990–2013

Country	Unemployment rate (% labor force)				Tariff rate, applied, simple mean, all products (%)			
	1990	2000	2013	Change (%)1990-2013	1990	2000	2013	Change (%)1990-2013
China	2.5	3.1	4.1	64	36.63	16.38	4.85	-70.39
Indonesia	2.4	6.08	5.9	145.83	16.83	7.78	3.72	-52.19
Korea, Rep.	2.5	4.4	3.5	40	12.98	8.82	10.03	-22.73
Malaysia	5.06	3.1	3.1	-38.67	13.77	7.88	5.09	-35.37
Philippines	8.4	11.18	7.03	-16.37	19.54	7.19	2.37	-67.04
Singapore	2.11	3.7	3.08	45.97	0.33	0.03	0	-100
Thailand	2.2	2.4	0.65	-70.45	37.38	16.86	4.54	-73.07
Japan	2.1	4.73	4.2	100	3.69	3.03	2.42	-20.13

Sources: Data on unemployment rate is from International Monetary Fund, 2015 and data on Tariff rate is from the World Bank, 2017.

Clearly, a variation exists in the distribution of skills between the countries. However, the majority of the countries examined lack high skilled laborer in their labor markets. With the exception of Korea, workers with low and/or medium skills dominate the labor markets in the rest of the countries. In Indonesia, Japan, and Thailand, laborers with low skills constitute the majority of the labor market. Additionally, in Malaysia, the Philippines, and Singapore, workers

with medium skills constitute the majority of the labor market. From the aforementioned figures, the conclusion can be drawn that laborers with low or medium skills are representative of the labor force in the countries examined in the present study.

Due to the high proportion of workers with low or medium skills in the labor force, the service sector is the main source of employment in most of the countries sampled. More than 50% of workers in Japan, Korea,

Malaysia, and Singapore are employed in the service sector (World Bank Development Indicator, 2017). For the rest of the countries, the agricultural sector is the key sector of employment. The service and/or the agricultural sectors require workers with low and/or medium skills; and are in contrast to the industrial sector, which requires workers with relatively high skills to deal with the sophisticated technology and equipment. Clearly, the distribution of employment between the sectors is consistent with the skills of the labor force.

Table 2 describes the relationship between unemployment rate and trade policies as measured by the tariff rate for each country in the sample. In Table 3, a simple correlation is made between unemployment rates and several trade policy measurements (at aggregate level). Although the unemployment rate in most of the countries examined was relatively low at the end of 2013, the unemployment rate increased over the period of 1990 to 2013 in most of the countries examined. Although some countries, such as the Philippines, registered a decreasing rate of unemployment at the end of 2013, the current figure concerning unemployment is still high (i.e., 7.03%). During the period of 1990 to 2013, the unemployment rate increased by 145.83%, 100%, 64%, 45.97%, and 40% in Indonesia, Japan, China, Singapore, and Korea, respectively. The increased rate of unemployment is associated with the evidence of trade liberalization since tariff rates are diminishing in all countries examined.

While Korea had a relatively high tariff rate at the end of 2013, Singapore had totally removed barriers on trade (i.e., no longer imposing any tariff on any products). Nonetheless, the negative correlation between unemployment rate and trade liberalization does not hold for some countries (i.e., Malaysia, Thailand and, to some extent, the Philippines) and a growing body of empirical studies document the

possibility of unemployment increases after trade liberalization. More importantly, Malaysia, Thailand, and the Philippines lack a skilled labor force, as demonstrated previously, and unemployment is likely to increase over time in light of the liberalization of trade. Given the fact that the labor force in the three countries is predominantly low skilled and that most of these countries trade in manufactured products, the liberalization of trade, particularly that related to manufactured products, will likely minimize the expected benefits from trade liberalization in terms of creating more job opportunities. This is due to the fact that a reduction in trade barriers improves the profitability of exporting firms, thus leading to expansion in the trading sector. If this sector is characterized by labor market friction, unemployment will increase when a mismatch in skill requirements exists and will leave unskilled workers, who represent the majority of the labor force, unemployed.

Many underlying reasons exist for the negative relationship between the trade liberalization and unemployment. One of the key reasons is the lack of appropriate policy concerning business environments, which may lead to high costs for entrepreneurs. In relation to trade policies, several theoretical models explain that trade policies may affect unemployment rates through labor market regulation mechanisms (e.g., Davis, 1998a, 1998b; Moore & Ranjan, 2005; Boulhol, 2008). For instance, rigidity of the labor market regulation in regards to minimum wage laws will likely lead to an increase in labor costs and, hence, the prices of goods in the host country. Meanwhile, tariff reduction will cause imported goods to become relatively cheaper in host countries, which will lead to increase in unemployment rate. Table 4 shows the degree of flexibility in labor market regulation in the sample (in the methodology section, the main components of this index will be discussed in greater detail). While Malaysia, Japan, and Singapore have

Table 3. *Simple Correlation Between Unemployment Rate and Trade Policies Measurement, 1990-2013, for the Countries in Our Sample*

Variables	Non-tariff barriers	Tariff, simple mean	Tariff, weighted mean	Tariff rate, most favored nation, simple mean	Openness (X+M)/GDP
Unemployment rate	-0.13	-0.16	-0.07	-0.16	-0.21

Source: author calculation

Table 4. *Average Labor Market Regulation Index (1990-2013)*

Country	Labor Market Regulation Index
China	5
Indonesia	5
Korea	4
Malaysia	8
Philippines	6
Singapore	7
Thailand	5
Japan	8

Sources: Gwartney, Hall, & Lawson, 2013.

Note: The index is normalized to range from 0 to 10, with high score representing high economic freedom and less regulation (flexible labor market regulation).

flexible labor market regulations, the remaining countries have rigid labor market regulations. The rigidities exist in relation to the hiring and firing regulations. Such regulations may induce firms to look for temporary labor and/or encourage firms towards capital-intensive investments, which will likely be reflected in reduced demand for labor. Similarly, minimum wage policies and employment protection legislation will lead to increases in labor costs and, hence, decreases in the demand for labor.

Conceptual Framework and Literature Review

Based on Ricardian model, trade will increase marginal productivity of labor in the export sector due to increase in the domestic relative price of the goods produced by this sector. The model assumed that trade will lead to complete specialization, in which the marginal productivity of labor in the import-competing sector will experience decline and fail to survive trade liberalization. However, the marginal product of labor for the overall economy continued to increase due to efficiency, encouraging greater investment which leads to more job creation and less unemployment.

Under the Heckscher-Ohlin model, in a closed capital-abundant country, the prices of capital intensive goods are relatively lower compared to the rest of the countries. Opening to trade will therefore lead to

relative rise in return for capital in this country. This will lead to increase in the demand for capital compared to labor and, thus, decrease the average level of wages and consequently boost unemployment. In contrast, in labor abundant country, trade will lead to increase in the demand for labor, thus wages increase resulting in lower unemployment rate (Dutt et al., 2009).

Studies concerning the impact of globalization or trade liberalization on unemployment rates that are based on single or multiple countries produce mixed results. No consensus exists concerning whether an increase in trade will lead to a higher or lower aggregate unemployment rate. According to Hasan, Mitra, Ranjan, and Ahsan (2012), the ambiguousness of the relationship may be due to the methodology, the specific features of the countries that the respective studies examined, or the proxy used to represent the trade liberalization variables. For example, a study by Dutt et al. (2009) that uses cross-country data found fairly strong and robust evidence supporting the Ricardian prediction that unemployment rate and trade openness are negatively related. However, based on the Heckscher-Ohlin model, the negative effect is only true in the case of labor-abundant countries, while positive effects are found in capital-abundant countries. Using panel data analysis, the study found that the effects of trade liberalization on unemployment increase in the short run, but is followed by an unemployment-reducing effect leading to a new steady-state in the long run. Dutt et al. (2009) argued that trade openness that

improves aggregate labor productivity will reduce unemployment as it will lead to more job creations and job searches. A similar study by Felbermayr et al. (2011), utilizing panel data from 20 OECD countries, found a negative correlation between unemployment rates and economic openness. This reaffirms the findings of Matusz (1996), who asserted that trade may improve economy-wide productivity and reduce unemployment rates. The reason is that trade results in a greater division of labor due to the increase in variety of available intermediary activities.

In contrast, Helpman and Itskhoki (2007) argued that low trade barriers can lead to an increase in unemployment because reductions in trade barriers improves the profitability of exporting firms, thus leading to expansion of the trading sector. If this sector is characterized by labor market friction, unemployment will increase when a mismatch in skill requirements exists and leave unskilled workers unemployed. Janiak (2007) also demonstrated that higher trade exposure is associated with a higher level of unemployment. The reason is that job destruction, resulting from the exit of small low-productivity firms, exceeds job creation among large high-productivity firms because larger firms will extract higher rents, which limits the level of job creation. Sener (2001) and Moore and Ranjan (2005) argued that trade liberalization leads to an increase in the unemployment of unskilled workers, although the studies are theoretically ambiguous regarding aggregate unemployment. Sener (2001) argued that trade liberalization increases the profitability of innovation activity by raising the profit margin of the exporting firms. Consequently, more firms will engage in research and development (R&D), resulting in an increase in the demand for skilled labor. On the other hand, a high frequency of innovations increases the turnover rate of unskilled workers by speeding up the creative destruction process and increasing the frictional unemployment rate of unskilled workers. Hence, the effects of trade liberalization on aggregate unemployment rates are ambiguous. For similar reasons, Moore and Ranjan (2005) argued that aggregate unemployment is likely to decrease in a skilled-labor abundant country and increase in an unskilled-labor abundant country. This is because in a country that is characterized by search-generated unemployment and abundant skilled-labor, in the sense that it has comparative advantage in the skilled

good, opening up to trade leads to an increase in the price of skilled output relative to unskilled output. This will reflect in an increase in skilled labor market tightness, a decrease in the skilled unemployment rate, and an increase in the skilled real wage. The effects are opposite in an unskilled-labor abundant country (Moore & Ranjan, 2005).

Following the criticism of the cross-country analysis, many recent empirical studies relate trade policy to unemployment following the examination of individual countries, including those of Attanasio, Goldberg, and Pavcnik (2004), Filho and Muendler (2007), Porto (2008); and Hasan et al. (2012). The aforementioned studies focus on the experiences of Columbia, Brazil, Argentina, and India, respectively. Attanasio et al. (2004) examined trade liberalization in Colombia and discovered that the probability of unemployment increases after liberalization. The increase is driven by non-trading sectors, which include wholesale and retail trade, rather than trading sectors, such as manufacturing. Filho and Muendler (2007) found that trade liberalization in Brazil during the 1990s led to the displacement of formally employed workers from largely protected industries, whilst the comparative advantage industries, which consist mainly of exporting firms, did not fully absorb the displaced workers. The findings demonstrate that formally employed workers move primarily to the informal sector or self-employment, whilst others lose their jobs and are unemployed. A similar study by Porto (2008) in Argentina, which focused on how world agricultural trade liberalization affected unemployment and wages, found that the increase in the price of Argentine agro-manufactured exports led to a decrease in unemployment, but positively affected wages.

As demonstrated by the review of existing studies, no study has been conducted to examine the impact of the trade liberalization policies on a panel of Southeast Asian countries. While several studies examine the issue in relation to unemployment for individual countries,² the present study examines a panel of countries in the region. As mentioned previously, one of the main objectives of the present study is to fill the gap in the literature concerning issues related to trade policies and unemployment rates by examining the experiences of Southeast Asian countries.

Methodology

Following Felbermayr et al. (2011), the following model is estimated:

$$U_{it} = \alpha + \beta_1 TR_{it} + \beta_2 GDP_{it} + \beta_3 POP_{it} + \beta_4 LMR_{it} + \beta_5 VGDP_{it} + \beta_6 Civl_{it} + \varepsilon_{it} \quad (1)$$

where U_{it} is the unemployment rate of country, i , at year t ; α is a constant; TR is various trade policies measurements comprising non-tariff barriers, tariff simple mean, tariff weighted mean, tariff rate, most favored nation, simple mean and openness; GDP is gross domestic product (PPP constant 2005 international \$); POP is population aged between 15-64 years; LMR is labor market regulation index; $VGDP$ is volatility of the GDP; $Civl$ is civil rights index; and ε_{it} is the error term.

To measure the effects on unemployment, the approach utilized by Dutt et al. (2009) and Felbermayr et al. (2011) is adopted and unemployment rate (i.e., percentage of total labor force) is used as a conventional indicator for unemployment. International trade, as mentioned previously, can affect unemployment level through its effect on labor market regulations. Past studies examining relationships between labor market regulations and unemployment are inconclusive. It is widely accepted that rigidity within the labor market regulations will boost unemployment in the formal sector. However, in contrast, such rigidity reduces unemployment in the informal sector, which subsequently leads to inconclusive effect to the overall unemployment (Stephen, 1997; Blanchard, & Wolfers, 2000; Layard, Nickell, S., & Jackman, 2005; Dutt et al., 2009; Felbermayr et al., 2011).

Botero, Djankov, La Porta, Lopez-de-Silanes, & Shleifer (2004) argued that every country in the world has a complex system of laws and institutions to protect the interests of workers; and to help guarantee a minimum standard of living for its population. Such laws include employment laws, which regulate individual employment contracts. Additionally, such laws include collective or industrial relations laws, which regulate the bargaining, adoption, and enforcement of collective agreements, the organization of trade unions, and industrial action by workers and employers (Botero et al., 2004). The present study measures labor market institutions according to the

labor market regulation index from the Economic Freedom of the World database (Gwartney, Hall, & Lawson, 2013). The index consists of six sub indicators that measure the influence of hiring regulations and minimum wages, hiring and firing regulations, centralized collective bargaining, working hour regulations, mandated costs of worker dismissal, and conscription. The index is calculated to measure the extent to which these infringements exist. The indicators are normalized to range from 0 to 10, with a high score representing high economic freedom and less regulation (flexible labor market regulation). The aggregate index is calculated as the arithmetic mean of the ratings of its six sub indicators.³

The summary measure on trade openness used virtually universally in existing empirical studies is nominal imports plus exports relative to nominal GDP, which is usually referred to as (trade) openness.⁴ In the present study, imports plus exports relative to GDP (all at 2005 US) is used as a proxy for the openness. With respect to trade policies, according to Dutt et al. (2009), finding a single measure of trade protection that summarizes such a multiplicity of instruments is a task economists have long struggled with. Since it is impossible to capture and summarize the wide variety of trade policy instruments used, the present study uses the following policy measures in addition to an outcome measure (openness) to check for robustness. The first measure consists of non-tariff barriers, which include quotas, levies, embargoes, sanctions, and other type of restrictions. The data on non-tariff barriers are obtained from the Economic Freedom of the World (Gwartney et al., 2013). The second measure is tariff rate, applied, simple mean, all products (%), which represents the weighted average of effectively applied rates for all products subjected to tariffs calculated for all traded goods. The third measure is tariff rate, applied, weighted mean, all products (%), which represents the average of effectively applied rates weighted by the product import shares corresponding to each partner country. The fourth measure is tariff rate, most favored nation, weighted mean, all products (%), which represents the average of most favored nation rates weighted by the product import shares corresponding to each partner country.⁵

A measure for output volatility is used to control for the effects of recessions and expansions; booms and bursts; and financial crises in the APT countries examined. The method used by Gary and Valerie

(1995) and Dutt et al. (2009) is followed in the present study and output volatility is measured as the standard deviation of the annual growth rate of GDP per capita for each of the countries in the sample over the period of 1991 to 2012. Furthermore, approach used by Dutt et al. (2009) and Felbermayr et al. (2011) is followed and the size of the economy is controlled for using the working-age population (ages 15–64 years) in addition to real GDP. For institutional quality measurement, the present study uses the civil rights index as proxy for institutional quality. This index is designed to capture freedom of expression, the right to organize, the rule of law, and personal autonomy (see Freedom House (2016) for more information about this index).

The data on variables are gathered from various sources. Data on population, real GDP, and openness of the several measures of tariffs are obtained from the World Development Indicators. The data concerning the labor market regulation index are gathered from the Economic Freedom of the World database. Data on civil rights index are obtained from Freedom House. The descriptive statistic of the data is reported in the Table A1 in the appendix. The sample covers the period of 1990–2013 of eight East Asian and Pacific countries, which consists of China, Indonesia, Japan, Republic of Korea, Malaysia, the Philippines, Singapore, and Thailand. The study is limited to only these countries due to limited data. A few missing data for some variables are estimated using straight-line interpolation and/or extrapolation method (see Appendix 2).

The recent literature on dynamic panel estimation with relatively large time series (T) compared with cross section (N) suggests the use of the mean group (MG) estimation method, dynamic fixed effect (DFE) estimation method, and the pooled mean group (PMG) estimation method. In accordance with the MG estimation method, the coefficients related to the variables are first calculated separately for each group (N). Then, the coefficients are presented as the average for all groups. Therefore, with the MG estimation method, the intercept, short run coefficient, and the error variance are allowed to vary between the groups (Pesaran & Smith, 1995). The DFE estimation method, which assumes that the groups are homogeneous, treats the panel data as one group (pool). Consequently, with the DFE estimation method, the long run and short run coefficients are constrained to be equal across the groups. Nevertheless, if in reality the groups are heterogenous, then DFE will yield inconsistent

estimators. Pesaran, Shin, and Smith (1999), and Pesaran, Shin, and Smith (1999) suggested the use of the PMG estimation method that combines both the average (MG) and the pool (DFE). In other words, with the PMG, the intercept, short run coefficient, and the error variance are allowed to vary between the groups as with the MG estimation method, but the long run coefficients are constrained to be equal across the groups as with the DFE estimation method.

Loayza and Ranciere (2006) argued that among these three methods of estimations, the PMG estimator yields the most consistent and efficient estimator because it allows the coefficients to be equal in the long run (countries are homogeneous) and differ in the short run (countries are heterogenous). In addition to that, the PMG estimator is able to control for country-specific characteristics (the unobserved characteristics) resulting due to differences in unemployment (e.g., geographic location, customs and traditions, etc.). In reality, the long-run coefficients are equal across countries, where estimation by PMG will yield consistent and efficient results. Nonetheless, the MG estimates only yield consistent results. In contrast, if the long-run coefficients are not equal across countries, then the PMG estimates will be inconsistent; but the MG estimator will still provide a consistent estimate on the average of long-run coefficients across countries. In practice, the validity of long-run homogeneity restrictions is usually tested by using the Hausman and likelihood ratio tests to compare the long-run coefficients between the PMG and MG estimates.

Nevertheless, the consistency and efficiency of the PMG estimates depend on the following conditions. The first is the absence of correlation between the regression residuals and the explanatory variables. The second condition refers to the existence of long-run relationships between the variables. The present study seeks to fulfill the above requirements by imposing different lag lengths on the explanatory variables to avoid serial correlation between the residuals and explanatory variables, but the selected lags must reflect minimum value of the Akaike Information Criteria (AIC). Given the relatively small sample size of the present study and in order to avoid the problems in the lack of degrees of freedom, ARDL (2.1.1.2.2.2) is selected, which minimizes the AIC. For the second condition, the existence of long run relationship is tested through the error correction term (ECT-1). If the value appears negative, less than one, and statistically

significant, then these indicate the existence of long run relationships between the variables and vice versa (Banerjee, Dolado, & Mestre, 1998; Loayza & Ranciere, 2006).

The basic concept of the aforementioned estimation methods can be illustrated assuming that the existence of Autoregressive Distributed Lag (ARDL) takes the following form:

$$y_{it} = \sum_{j=1}^p \delta_{ij} y_{i,t-j} + \sum_{j=0}^q \gamma_{ij} X_{i,t-j} + u_i + \epsilon_{it} \quad (2)$$

where y is dependent variable; p and q are lag length; i is the number of groups (i.e., i = 1, 2, ..., 8); t is the time period (i.e., t=1,2,...,24); X is a k-1 vector of explanatory variables; γ is the k-1 coefficient vector; δ are scalars; and u is the country-specific effect. If all variables in (2) are assumed to be I(1)/ I(0) and cointegrated, u is implied to be I(0) for all groups. The existence of cointegration relationships between the variables implies that the short run dynamic of the variables in the system is influenced by deviations from the long run equilibrium relationship. The short run dynamic relationship can be represented in the following error correction model:

$$\Delta y_{it} = \varphi_i (y_{i,t-1} - \theta_i X_{it}) + \sum_{j=1}^{p-1} \delta_{ij}^* \Delta y_{i,t-1} + \sum_{j=0}^{q-1} \gamma_{ij}^* \Delta X_{i,t-1} + u_i + \epsilon_{it} \quad (3)$$

Where

$$\varphi_i = - \left(1 - \sum_{j=1}^p \delta_{ij} \right), \theta_i = \frac{\sum_{j=0}^q \gamma_{ij}}{1 - \sum_{k=1}^p \delta_{ik}}, \delta_{ij}^* = - \sum_{h=j+1}^p \delta_{ih} \quad j = 1, 2, \dots, p - 1, \text{ and } \gamma_{ij}^* = \sum_{h=j+1}^q \gamma_{ih} \quad j = 1, 2, \dots, q - 1.$$

The coefficient φ_i is the error-correcting speed of adjustment term. If the value of φ_i is equal to zero, this implies the absence of long run relationship between the variables. Therefore, the coefficient φ_i must be negative, less than one, and statistically significant to ensure the existence of cointegration relationship between the variables.

Results and Discussions

Before continuing to the main findings, it is necessary to identify the order of integration between the variables by conducting panel unit root tests. In this study, two types of panel unit root tests are employed: the IPS test of Im, Pesaran, and Shin (2003) and the LLC test of Levin, Fu Lin, and Chu (2002). The results of these tests are presented in Table 5. The results show that the order of integration between the variables is mixed (i.e., I(0) and I(1)). The variables for openness, GDP, and the labor market regulation index are I(1) and the rests of the variables are I(0). After examining the order of integration between the variables, the next step is to test the existence of the long run relationships between the variables.

Equation 1 is estimated using MG, DFE, and PMG. However, in Table 6, and in order to save space, only the PMG results are reported since the joint Hausman and likelihood ratio tests suggest that the estimation performed by the PMG estimation method yields consistent and efficient results. The finding implies that restrictions on the long run coefficient to be equal across countries and the short run to vary between these countries is valid. The efficiency of the PMG over MG in the present study is expected because, as suggested by Loayza and Ranciere (2006), MG estimates are sensitive to the outlier countries in small sample, such as the present study. However, the PMG estimation method is likely to produce efficient estimators.

The results show that, over time, trade liberalization policies have a negative, but marginal, impact on the unemployment rate in these countries. The results are robust for several trade policy measurements. In the long run, a reduction in a tariff by 1% will increase unemployment rate, on average, by less than 0.10%. The finding contradicts the findings of the Dutt et al. (2009) and Felbermayr et al. (2011), but is consistent with the conclusions of Attanasio, Goldberg, and Pavcnik (2004), and Helpman, and Itskhoki (2010). The conflict may be attributed to country-specific policies, the use of different unemployment and trade measures, the econometric methodology, omitted variable bias, model specifications, or the varying time spans of the studies. It is difficult to attribute this negative impact of trade liberalization on unemployment in the study to a specific factor for two reasons. Firstly, the dependent variable is

Table 5. *Panel Unit Root Tests*

The Variables	At level		At first difference	
	IPS	LLC	IPS	LLC
Unemployment rate	-2.20** [0.014]	-2.60*** [0.005]		
Non-tariff barriers	-0.58 [0.28]	-0.57 [0.28]		
Tariff, simple mean	-2.40*** [0.008]	-3.75*** [0.000]		
Tariff, weighted mean	-3.75*** [0.000]	-2.55*** [0.002]		
Tariff rate, most favored nation, simple mean	-3.70*** [0.000]	-3.48*** [0.000]		
Openness (X+M)/GDP	-1.51* [0.07]	0.28 [0.61]	-6.89*** [0.000]	-7.54*** [0.000]
Output volatility	-4.87*** [0.000]	-3.96*** [0.000]		
GDP	3.22 [0.99]	6.04 [1.000]	-7.32*** [0.000]	-5.35*** [0.000]
Population(15-64)	-3.05*** [0.000]	-2.22** [0.013]		
Labor Market regulation index	-2.33*** [0.009]	-1.18 [0.12]	-7.32*** [0.000]	-5.35*** [0.000]
Civil liberties	-14.21*** [0.000]	-2.05** [0.012]		

Notes: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

general unemployment rate (i.e., unemployment is not classified by skill or sector). However, as mentioned previously, the impact of such trade policies on overall employment level is ambiguous because trade liberalization leads to increased unemployment among unskilled workers, although the studies are theoretically ambiguous regarding aggregate unemployment (Sener, 2001; Moore & Ranjan, 2005). Secondly, the above results reflect the long run impact of trade policies on overall employment, which is also ambiguous. This is because it is widely accepted that trade liberalization increases unemployment in the short run as workers are reallocated from shrinking to expanding sectors (Felbermayr, Prat, & Schmerer, 2008; Dutt et al., 2009). However, the effect of trade liberalization on unemployment in the long run is still inconclusive (Felbermayr et al., 2011).

Nevertheless, the long run negative impact of trade liberalization policies on unemployment in

these countries may be due to the following factors. Given the average skill level among the labor force in most of the countries examined (see figure 4), a reduction in trade barriers is likely to cause expansion in the trading sector. In an attempt to compete in international market, it is likely that the trading sector will shift to a more efficient mode of production through the utilization of intensive capital and highly skilled labor, leaving the unskilled labors, which are the majority in these countries, unemployed. Almeida (2012) examined whether the increased openness and technological innovation in East Asia have contributed to an increased demand for skills in the region. Using firm level data set across eight countries, the results support the idea that greater openness and technology adoption have increased the demand for skilled labor. Thus, in the era of the economic globalization, the countries examined should improve the skill level of their labor force in

Table 6. *The Long Run Relationship, Dependent Variable is Unemployment Rate*

Explanatory Variables	1	2	3	4	5
Non-tariff barriers	-0.07* [1.70]				
Tariff, simple mean		-0.06*** [3.38]			
Tariff, weighted mean			-0.08*** [5.08]		
Tariff rate, most favored nation, simple mean				-0.07*** [3.78]	
Openness (X+M)/GDP					0.09 [0.12]
Output volatility	-0.48 [0.32]	13.64** [2.15]	9.49*** [3.02]	17.24** [2.55]	11.97** [2.55]
GDP	1.74** [2.12]	1.04*** [5.24]	3.52** [2.63]	3.22*** [3.02]	7.24 [0.44]
Population(15-64)	0.09*** [7.30]	0.26*** [5.55]	-0.03 [0.62]	0.29*** [4.88]	0.07* [1.61]
Labor Market regulation index	-0.37*** [9.43]	-0.46*** [4.09]	-0.32** [2.66]	-0.49** [3.75]	-0.47** [2.91]
Civil liberties	-0.85*** [10.41]	-0.51*** [3.54]	-1.10*** [7.32]	-0.51*** [8.25]	-0.82*** [6.77]
No of the observation	154	154	154	154	154
Hausman test	4.52	3.22	0.59	3.1	0.96

Notes: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. The null hypothesis of the Hausman test is that the PMG is efficient against the alternative H_p , which is PMG is inconsistent.

order to reap the benefits from trade liberalization in the form of more employment opportunities.

The results also show that in the long run, statistically, volatility in output negatively affects unemployment rate. Several factors can cause volatility in GDP, including inappropriate macroeconomic policies. Recently, the main sources for such volatility include the growing phenomenon of globalization, the shocks and fluctuations in output prices in the international market, and financial crises. One effective way to minimize output volatility and, hence, reduce unemployment is through the diversion of the structure of an economy that facilitates similar diversion in the components of exports and imports. Dutt et al. (2009) came to the same conclusion regarding the effects of international trade on unemployment for a sample of developing countries. The finding implies

that controlling the main sources of output volatility, such as oil and food price shocks, is one of the most important tools in reducing unemployment rate within the region.

In the long run, an increase in output will lead to increase in unemployment rate. Okun's law suggests the existence of a negative relationship between unemployment rates and economic growth. However, in the present study, GDP is measured in terms of level and not growth; and the GDP coefficient is positive. One possible justification for the findings is that output may expand without affecting employment level due to utilization of technology (capital) in production processes in the long run. Similarly, output may increase due to the increasing productivity of workers as a result of education and training without acquiring extra demand for employment. The finding supports the

Table 7. *The Short Run Relationship, Dependent Variable is Unemployment Rate*

Explanatory Variables	1	2	3	4	5
ECT ₋₁	-0.41*** [3.20]	-0.35** [2.21]	-0.38*** [3.53]	-0.35** [2.19]	-0.35*** [2.86]
Δ Non-tariff barriers	0.26 [0.83]				
Δ Tariff , simple mean		0.02 [0.96]			
Δ Tariff , weighted mean			0.03 [0.46]		
Δ Tariff rate, most favored nation, simple mean				0.05 [0.55]	
Δ Openness					-1.70 [0.94]
Δ Output volatility	0.75 [0.29]	0.22 [0.06]	1.21 [0.32]	1.23 [0.31]	0.77 [0.18]
Δ GDP	-5.46e-11** [2.46]	-4.81e-11*** [3.08]	-5.34e-11*** [3.27]	-4.72e-12*** [3.00]	-5.03e-11*** [2.69]
Δ Population(15-64)	0.16 [0.53]	0.07 [0.25]	0.03 [0.13]	0.10 [0.30]	0.21 [0.66]
Δ Labor Market regulation index	-0.53 [1.03]	-0.05 [0.25]	0.14 [0.66]	-0.06 [0.33]	-0.14 [0.74]
Δ Civil liberties	-0.21** [2.15]	0.06 [0.52]	-0.02 [0.21]	0.05 [0.55]	-0.10 [0.87]
Constant	3.73*** [5.15]	0.72** [2.24]	0.17*** [2.52]	0.51 [1.46]	2.67*** [5.16]

Notes: ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

previous conclusions reached concerning the declining elasticity of employment with respect to output growth in the selected countries in the region over time (see Table 1). Extant studies demonstrated that human capital development is likely to have a great impact on job creation process. From a perspective, with the increase in human capital level of workforce will come an increase in technological intensity. Generally, technology has the capacity to replace workers in the production process. Several studies have concluded that increase in human capital will raise the level of technology (Nelson & Phelps, 1966, Papageorgiou, 2003, Moretti, 1999, Hollanders & Weel, 2002). Mass transit systems, videophones, and automation and computerization of various processes have all eliminated or reduced the number of jobs. Even the

creators of these high-tech information technology products saw that their jobs are being replaced by these technologies. On other hand, however, faster technological change and higher technology level may increase or decrease the equilibrium of unemployment rate (Postel-Vinay, 2002; Sener, 2001; Szostak, 1995; Nakanishi, 2002; Conte & Vivarelli, 2005; Parisi, Schiantarelli, & Sembenelli, 2006). Preceding literature identified two key sources of innovation: the R&D investment and what is called “embodied technological change (ETC)” (Vivarelli, 2013). The innovation literature suggests that only complex product innovation, which is mostly delivered by large firms in high-tech sectors relies on formal R&D (Vivarelli, 2013; Conte & Vivarelli, 2005; Jenkins, 2008; Parisi et al., 2006). However, in the ETC,

it is hard to create pure innovation, diffusion, and imitation implying that ETC is most likely to acquire by investment in new machinery and equipment and through the purchasing of external technology incorporated in licenses, consultancies, and know-how (Jenkins, 2008; Vivarelli, 2013). Summing-up, R&D and ETC are the key drivers of technological change, with the former more related to product innovation and the latter more related to process innovation (Edwards, 2004). In relation to unemployment, it is most likely that process innovation creates a direct labor-saving effect, mainly related to the introduction of machineries that allow producing the same amount of output with fewer workers and therefore more unemployment. However, product innovation may generate more jobs (less unemployment) through the emergence of new markets (Bogliacino & Pianta, 2010; Vivarelli, 2013).

Ceteris paribus in the long run, an increase in the size of working-age population (15–64) will increase in unemployment rate. In the long run, the increase in working-age population (demographic transition), in addition to the increase in the female share of the labor market, will increase labor participation rates. The growing utilization of technology in production processes will decrease the demand for workers; and hence a growing number of workers will be unable to find opportunities in the labor markets.

The most notable finding relates to the long run influence of labor market regulation on unemployment rates. Since a high score representing high flexible labor market regulation, the results demonstrate that if these countries adopted more flexible regulation of the labor market, unemployment rate will decrease. This finding is consistent with the studies of Amin (2009), Feldmann (2009), and Felbermayr et al. (2011). The result is also consistent with some studies in ASEAN countries. For instance, Alatas and Cameron (2008) examined the impact of minimum wages regulations on employment in Indonesia during the period: 1990–1996. Uses difference-in-differences (DID) estimates, the results shows that larger increase in minimum wages reduces employment level and employment growth. The mean of this index in our sample is equal to, approximately, 6 points (see table A1 in the appendix) representing, to some extent, moderate flexibility in the labor market regulations. Since this index contain more than five components of labor market regulations, the exact numbers of components that can impact unemployment are not clear. Notwithstanding, these countries should

work to improve all components of the index in order to decrease unemployment rates. Most importantly, although the rigidity of the labor market regulation will lead to an increase in unemployment in the formal sector, the impact on the informal sector remains unclear and requires further investigation (Comola & de Mello, 2011; Hohberg & Lay, 2015).

In the long run, improvement in freedom and emphasizing the role of law will help to decrease unemployment rates. Masron and Abdullah (2010) investigated the impact of institutional quality on FDI inflows into ASEAN for the period from 1996 to 2007. The result shows that improving the institutional quality play crucial role in attracting new FDI to inflows into the region. Feldman (2007) analyzed whether and to what extent economic freedom affects unemployment using data for 87 countries during the period 1980–2003. The results demonstrate that economic freedom is likely to noticeably reduce unemployment, especially among women and young people. Further, government system that is characterized by an independent judiciary, impartial courts, and an effective protection of property rights is most likely to have beneficial effects on unemployment. In addition, many studies highlight the importance of governance quality on economic development processes and explain the channels through which good governance affects economic development, including unemployment rates. For example, good governance is associated with huge flows of FDI; increases in the rate of return to education; improvements in the degree of income distribution; and stability of macroeconomic variables that can enhance the designing and planning of good economic path (Levchenko, 2007; Knack & Keefer, 1995; Nugent & Lin, 1995; Glaeser, Rafael, Florencio, & Andrei, 2004). All of these factors can contribute to the reduction of unemployment through the creation of new projects or the expansion of existing ones. Dutt et al. (2009) arrived at the same conclusion regarding the impacts of international trade on unemployment for a sample of developing countries. For ASEAN countries, Subramaniam and Baharumshah (2011) investigated the existence of long-run relationship between unemployment and several key macroeconomic variables in Malaysia, Singapore, and the Philippines. The results showed that while exports and foreign direct investment are important determinants of unemployment in Malaysia, in the Philippines, government spending and exports

are inversely related to unemployment. In Singapore, only exports appeared as a significant factor in determining unemployment.

The results in Table 7 show that during the adjustment period (i.e., the short run), international trade policies, as measured by several proxies, have an insignificant impact on unemployment. The findings imply that the impact of international trade on unemployment rates in the region is likely to appear in the long run. The difference between the short and long run impact of trade on unemployment depend on how long does it take for mobile workers to shift from import-competing to export-oriented sectors? How long does it take for all production factors (capital, skilled, and unskilled labor) to shift to a sector paying relatively higher rewards for their services? As mentioned previously, a reduction in trade barriers is likely to cause expansion in the trading sector. In an attempt to compete in international market, it is likely that the trading sector will shift to a more efficient mode of production through the utilization of intensive capital and high skills labor, leaving the unskilled labors, which are the majority in these countries, unemployed. Our finding implies that this process occurs in the long run. Thus, countries that are currently experiencing low unemployment rates are expected to face unemployment problems in the future if they are to continue with the liberalization of trade policies without considering their economic and labor market structures.

In the short run (i.e., the adjustment period), and increase in output has a positive, but marginal, influence on the unemployment rates in the region. The finding indicates that relying upon an increase output level alone as a tool to reduce unemployment is possible in the short run. However, in the long run, this may adversely affect unemployment. Labor and capital are complements in the short run, so labor demand will tend to increase in line with capital. However, in the long run and with the increase in the globalization that increases competition, most of the firms tend to implement more efficient ways in the production. One of these efficient mechanisms is the use of more capital/technology in the production process, implying that capital tends to substitute labor over time reflecting in more unemployment rate (Almeida, 2012; Blechinger, Kleinknecht, Licht, & Pfeiffer, 1998). In others words, as mentioned previously, contrary to product innovation, process innovation creates a direct labor-

saving effect, mainly related to the introduction of machineries that allow producing the same amount of output with fewer workers and therefore more unemployment. In others words, as the workers become more skillful, firms can take the advantage from the availability of these highly skilled workers by utilizing superior technology. When the country's human capital level is low, human capital is likely to play a complementary role with technology. This is because the firms discover that it is more profitable to hire more workers to work with the technology since the worker-replacing effect is not sufficiently strong. However, in view that technology has an increasing ability to replace worker, firms will ultimately find that it is more profitable as well as more productive to replace workers with such technology, given that these better-trained workers are more capable at working with such machines. Thus, to minimize the negative impact of increasing GDP on unemployment in the long run, improving the skills of workers, reforming the economic structure, and adopting labor intensive industries should be undertaken. In addition, policy makers should emphasize on adoption of specific policies to attract large foreign firms to invest in the high-tech sectors. Otherwise, encourage the local firms in the R&D investment.

One remarkable finding relates to the adjustment coefficient (ECT_{-1}), which appears with a favorable sign and magnitude. The adjustment coefficient is also statistically significant, which indicates the existence of a long run relationship between the variables. The interpretation of this coefficient indicate that if an unemployment rate deviates from its long run equilibrium path because of certain shocks this year, all the chosen explanatory variables will interact together and correct, on average, more than 35% of the disequilibrium during the following year. Additionally, the significance of the ECT_{-1} also indicates the existence of a causality relationship between the variables, at least in one direction.

Conclusion

The present study examines the impact of international trade policies on unemployment for eight APT countries over the period from 1990 to 2013. In addition to the trade policies measurements, the variables that represent macroeconomic distortion,

the economic size of a country, the quality of the institution and labor market regulations are controlled for. The results of the PMG estimation method show that, over time, trade liberalization policies have a negative but marginal influence on unemployment rate. Since the impacts of trade liberalization on overall unemployment rates in general, particularly in the long run, are unclear, the possible interpretation for the results is that, because the majority of the labor force is comprised of un-skilled workers, a reduction in trade barriers is likely to expand the trading sector. In an attempt to compete in international market, it is likely that the trading sector will shift to a more efficient mode of production through the utilization of intensive capital and high skilled labor, leaving the unskilled workers, which are the majority in these countries, unemployed. Thus, in the era of economic globalization, these countries should improve the skill levels of their labor force so that it may benefit from trade liberalization in the form of more employment opportunities.

The results also show that macroeconomic distortion policies, such as output volatility and inflation, contribute negatively and significantly to the creation of new jobs in the long run. Consequently, to reduce high unemployment rate, the region should implement proper macroeconomic policies to minimize the volatility of output. Most importantly, since labor market regulation is shown to be the key contributor in solving unemployment problems, the continuation of labor market reform policies is necessary. The quality of governance institutions appears to be one of the most important factors that can be exploited by policy makers to minimize unemployment rates in the region. Nonetheless, further studies are required to identify the type of labor market regulation required in any unemployment reduction strategy. It is also imperative that more studies be performed to determine the impact of international trade policies on unemployment in specific sectors and/or among skilled and un-skilled workers.

Notes

¹ For detailed information on the theoretical model on trade liberalization and unemployment see for example, Felbermayr et al. (2011), Dutt et al. (2009), Hasan et al. (2012).

- ² For instance, see Mohd Noor, Mohamed Nor, and Abdul Ghani (2007), Thirunaukarasu (2008) and Ting and Ling (2011) for the case of Malaysia; and Haussin et al. (2012) for the case of India.
- ³ For example, see the theoretical background that links international trade with labour market regulation in Potrafke (2013).
- ⁴ For recent examples see Alesina, Spolaore, and Wacziarg (2000), Dinopoulos, and Thompson (2000) or Alcalá and Ciccone (2004).
- ⁵ For more information on the methodology and the structure of these four types of tariffs, see the World Bank 2017.

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APPENDIXES

Appendix 1

Table A1. *Descriptive Statistic for the Variables*

Variables	Obs	Mean	Std. Dev.	Min	Max
Tariff, simple mean	192	9.55	8.61	0	42.64
Non-tariff barriers	192	5.74	1.48	2.15	9.01
Openness	192	1.19	1.06	0.17	4.60
Tariff rate, most favored nation,	192	10.57	8.96	0	44.81
Tariff , weighted mean	192	8.72	19.24	1.44	255.79
Unemployment rate	192	4.36	2.60	0.65	11.825
Civil liberties index	192	4	1.40	1	7
Output volatility	192	0.03	0.011	0.007	0.07
GDP	192	9.88e+11	1.50e+12	4.91e+10	4.77e+12
Pop(15–64)	192	25.53	7.79	12.24	40.93
Labor Market regulation index	192	5.91	1.40	3.2	8.6

Appendix 2

Straight-line interpolation and/or extrapolation method *extrapolation & interpolation*

The simplest form of *interpolation* is probably the straight line, connecting two points by a straight line. Let two data points (x_0, y_0) and (x_1, y_1) be given. We can use the following formula to estimate the unique straight line passing through these points.

$$P_1(x) = \frac{x-x_1}{x_0-x_1} y_0 + \frac{x-x_0}{x_1-x_0} y_1$$

In the straight-line *extrapolation* we draw a tangent line at the endpoint of given graph and extending it beyond the limit. Let us assume that the two endpoints of a linear graph be (x_1, y_1) and (x_2, y_2) and the value of the point x is to be extrapolated; then the formula for extrapolation is given below :

$$y(x) = y_1 + \frac{x-x_1}{x_2-x_1} (y_2 - y_1)$$