ENHANCING TRADE FLOWS IN ASEAN PLUS SIX

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Abstract
Using an unbalanced panel dataset of bilateral trade flows, we study the determinants of bilateral trade of ASEAN 10 countries, Australia, China, India, Japan, New Zealand, and South Korea, from 1989 to 2009. We find that bilateral trade flow is positively related to the overall bilateral country size and similarity in country size and inversely related to the relative factor endowment differences, transportation costs, and import tariffs. Our simulation results show that establishing the free trade area in ASEAN+6 is important for promoting intraregional trade by about 39.3% ($66.6 billion), and that a new economic community of the "6" countries together with ASEAN promotes mutual trade.
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JEL classifications: C33, F14, F15.

1. Introduction

Regional Trade Agreements (RTAs) can be an effective means to expand trade and increase cooperation in the region. By the middle of 2010, there were 474 agreements had been notified to the World Trade Organization (WTO) and 283 of these agreements were in force. Among others, the *ASEAN Plus Three cooperation* (hereafter, APT), which was institutionalized in 1999, has been a highly significant deal. The APT refers to the cooperation between the Association of Southeast Asian Nations[1] (ASEAN) and the three East Asian nations of China, Japan, and South Korea. Furthermore, in 2005, *ASEAN plus Three* (ASEAN+3) was enlarged to include three additional countries, namely, Australia, India, and New Zealand. This resulted in the so-called *ASEAN plus Six* (ASEAN+6).

In fact, the bilateral trade agreements between ASEAN and each of the 'plus six' countries have already been signed and have come into force for ASEAN-China since 2005, for ASEAN-Japan since 2008, for ASEAN – Australia – New Zealand, ASEAN – India, and ASEAN – Korea (republic of) since 2010. The establishment of bilateral trading arrangements between ASEAN and its six partner countries would serve as the building blocks for a possible establishment of an East Asia Free Trade Area (EAFTA) in the near future. Given the existing low tariff rates in some countries of ASEAN+6, it is interesting to ask whether there is some room for enhancement in trade flows of its members.

The primary objective of this paper is to evaluate the potential benefit of the formation of ASEAN+6. This is done in two steps. First, we utilize panel data on bilateral export flows to empirically analyze the international trade determinants of ASEAN and its six partners. More precisely, the study focuses on how relative factor endowment

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[1] ASEAN includes Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.

differences, overall bilateral country size, similarity in country size, transportation costs, and tariff rates determine bilateral trade in ASEAN+6. The study then conducts a simulation analysis to assess potential gain from trade in each country.

In order to achieve our objective, the gravity model, pioneered by Tinbergen (1962), is arguably a suitable candidate to do just that. The fundamental assumption of the gravity model of trade is that trade flows between two countries relate positively to their gross domestic products (GDPs), and inversely to the distance between them. The gravity equation has been used to analyze several issues, including the impact of international borders, preferential trading blocs, currency unions, and membership in the WTO, as well as the determinants of international trade and FDI.

Recent literature on the analysis of ASEAN trade using the gravity model includes Kien (2009) who employs Hausman-Taylor estimations to investigate the determinants of ASEAN exports in the panel data framework of 39 countries for the period 1988–2002. The author finds that bilateral exports are proportional to GDPs, and that AFTA has generated trade flows among its members. Hapsari and Mangunsung (2006), however, estimating panel data of 19 countries including five ASEAN and ASEAN's trading partners from 1993–2003 using pooled OLS, point out that AFTA might be causing some trade diversion and shifting trade from countries outside the trade bloc to possibly less efficient countries inside the trade bloc. Furthermore, Elliott and Ikemoto (2004) investigate whether the Asian financial crisis has a positive or negative impact on intra-ASEAN trade. Estimating the panel data on 34 countries from 1983–1999, Elliott and Ikemoto (2004) conclude that Asian economic crisis generates a stronger desire to source imports from within the region. Lee and Park (2005) and Lee and Shin (2006), using their gravity model, show that most East Asian regional trade arrangements will create more intra-bloc trade but will not divert extra-bloc trade. Chowdhury (2005) assesses the liberalization efforts of South Asian countries (Bangladesh, India, Pakistan, and Sri Lanka) using descriptive statistics. The author finds that Bangladesh and Sri Lanka gain from openness, India and Bangladesh gain from international competitiveness until mid 1990s, but Pakistan and Sri Lanka are unlikely to gain from trade liberalization. Focusing on ASEAN countries, Shepherd and Wilson (2008) examine the impacts of trade facilitation reform at the aggregate level using the gravity model. Their simulation results suggest a reform program on two areas: transport infrastructure and information technology. Their results also show that reducing applied tariffs to the regional average would raise intra-regional trade by about 2% ($6.3 billion).

To the best of our knowledge, few studies have taken into consideration the effect of regional trading bloc enlargement on trade flows in ASEAN+6. This paper is one of the first attempts to investigate this. More precisely, our paper is different from the existing literature on the analysis of ASEAN trade in two points. First, we specifically investigate the determinants of trade flows of ASEAN+6 using data that covers recent trend of ASEAN trade and its six counterparts. This may increase the accuracy of estimated determinants of ASEAN regional trading blocs. Second, we apply the dynamic gravity model with explicit control of multilateral resistances (MRs) to examine the determinants of the ASEAN+6. From the econometric point of view, controlling for MRs is essential for conducting simulation in gravity model and for estimating the dynamic gravity model. By doing so, the estimated determinants will be unbiased and hence provide more reliable policy implications.

In our empirical work, we find that international trade between the ASEAN 10 countries and their six partners is determined by overall bilateral country size, and is characterized by intra-industry trade. In addition, the Linder effect has dominated the Hecksher-Ohlin- Samuelson effect, meaning that there is more trading between countries with similar income level. Moreover, our simulation results show that the formation of ASEAN+6 can potentially increase intraregional trade by 39.3% ($66.6 billion) through eliminating the rates of the import tariffs of its members.

The remainder of the paper is organized as follows. In the next section, we outline our conceptual framework. The econometric model is specified in the third section. The data is described in the fourth section. We report our empirical results and policy implications in the fifth section and our conclusions in the sixth section.

2. Conceptual framework

The so-called gravity equation of trade is now known to be consistent with a rigorous theoretical derivation. The standard gravity framework predicts that the volume of trade between two countries is positively related to their gross domestic products (GDP) and negatively related to trade barriers between them. In this paper, we employ the theoretical gravity model of Anderson and van Wincoop (2003).

From basic microeconomic principles, Anderson and van Wincoop (2003) derive a gravity-like model of exports from country *i* to country *j* at time *t*:

$$X_{ijt} = \frac{Y_{it}Y_{jt}}{Y_{wt}}\left(\frac{t_{ijt}}{\Pi_{it}P_{jt}}\right)^{1-\sigma} \qquad (1)$$

where X_{ijt} is the value of exports from country *i* to country *j* at time *t*; $Y_{it}\,(Y_{jt})$ denote income of exporter (importer) at time *t*; and Y_{wt} is the aggregate (world) income at time *t*. σ is the elasticity of substitution between all goods; and t_{ijt} denotes the unobserved trade costs facing exports from country *i* to country *j* at time *t*. $(P_{jt})^{1-\sigma} = \sum_{i=1}^{n} \Pi_{it}^{\sigma-1}\theta_{it}t_{ijt}^{1-\sigma}$, it is the inward resistance which captures the fact that *j*'s imports from *i* depend on trade costs across all suppliers. $(\Pi_{it})^{1-\sigma} = \sum_{j=1}^{n} \Pi_{jt}^{\sigma-1}\theta_{jt}t_{ijt}^{1-\sigma}$, it is the outward resistance which captures the dependence of exports from country *i* to country *j* on trade costs across all importers. $\theta_{it}\,(\theta_{jt})$ denotes country *i*'s income share (country *j*'s income share) in the world income.[2]

[2] In Anderson and van Wincoop (2003), Π_{it} and P_{jt} are referred to as multilateral resistance terms (or prices) as they depend on all bilateral resistances (t_{ijt}).

In order to estimate the gravity equation in (1), we first take the natural logarithm to both sides of it. However, the bilateral trade costs, t_{ijt}, cannot be observed and hence the multilateral resistance terms (Π_{it} and P_{jt}) cannot be estimated too. Anderson and van Wincoop (2003) solved this problem by making an additional assumption of symmetrical trade costs and a custom programmed system of non-linear equation. Alternatively, using the same assumption as Anderson and van Wincoop (2003), Baier and Bergstrand (2010) first apply first-order Taylor-series expansion to the multilateral resistance terms, and substitute these into equation (1). Therefore, taking all steps together, equation (1) can be rewritten as

$$\ln X_{ijt} = \beta_0 + \ln(Y_{it}Y_{jt}) - (\sigma - 1)\ln t_{ijt} + (\sigma-1)\left[\left(\sum_{j=1}^{N}\theta_{jt}\ln t_{ijt}\right) + \left(\sum_{i=1}^{N}\theta_{it}\ln t_{ijt}\right) - \sum_{i=1}^{N}\sum_{j=1}^{N}\theta_{it}\theta_{jt}\ln t_{ijt}\right] + u_{ijt} \quad (2)$$

where $\beta_0 = -\ln Y_{wt}$ is constant across country pairs for each time t, as is $\sum_{i=1}^{N}\sum_{j=1}^{N}\theta_{it}\theta_{jt}\ln t_{ijt}$.

For estimation purposes, Baier and Bergstrand (2010) centered the Taylor-series expansion around the symmetric trade costs and economic sizes. By doing so, the first-order log-linear Taylor expansion of the multilateral price equations yields a reduced-form similar to (2) that replaces the income-share weights (θ_{it}, θ_{jt}) with equal weights (1/N). Consequently, equation (2) can be rewritten as

$$\ln X_{ijt} = \beta_0 + \ln(Y_{it}Y_{jt}) - (\sigma - 1)\ln t_{ijt} + (\sigma-1)\left[\frac{1}{N}\left(\sum_{j=1}^{N}\ln t_{ijt}\right) + \frac{1}{N}\left(\sum_{i=1}^{N}\ln t_{ijt}\right) - \frac{1}{N^2}\sum_{i=1}^{N}\sum_{j=1}^{N}\ln t_{ijt}\right] + u_{ijt} \quad (3)$$

To implement equation (3) empirically we need to replace the unobservable theoretical trade-cost variable (t_{ijt}) with some observed variables. These variables contain factors enhancing and impeding trade. This task is carried out in Section 3.

3. Econometrics of the gravity model

3.1 Model specification

In order to put the gravity equation (3) into work in panel data framework, further modifications are needed. First, assume that the log of the observed trade flow ($\ln X_{ijt}$) is equal to the log of the true trade flow plus a composite error term ($u_{ijt} = \lambda_t + \varepsilon_{ijt}$), where λ_t is the time-specific fixed effects and ε_{ijt} is a log-normally distributed error term.

Second, $Y_{it}(Y_{jt})$ can be represented empirically by observable $GDP_{it}(GDP_{jt})$. Third, we need to specify bilateral trade costs t_{ijt} in terms of observable variables. This can be done by specifying trade costs as a function of distance (a proxy for transport costs), relative factor endowment differences, similarity in country size, and tariff rates. Substituting these observable variables into equation (3) and making some algebraic manipulation yield the basic gravity model as follows:

$$\ln X_{ijt} = \beta_0 + \lambda_t + \beta_1 LGDPT_{ijt} + \beta_2 LDist_{ij} + \beta_3 LSIM_{ijt} + \beta_4 LdGDP_{ijt} + \beta_5 Tar_{ijt} + \beta_6 MWRDis_{ij} + \beta_7 MWRS_{ijt} + \beta_8 MWRD_{ijt} + \beta_9 MWRT_{ijt} + \varepsilon_{ijt} \quad (4)$$

where $\ln X_{ijt}$ denotes the natural logarithm of real bilateral exports of country *i* to country *j* in year *t*, and β_0 is the constant. $LGDPT_{ijt}$ is the overall economic size, defined as $LGDPT_{ijt} = \ln(GDP_{it} + GDP_{jt})$. The interpretation of $LGDPT_{ijt}$ is that the larger the overall economic size, the higher the volume of trade. The coefficient on $LGDPT_{ijt}$ should therefore be positive.

$LDist_{ij}$ is the natural logarithm of distance used as a proxy for transportation costs. Since higher transportation costs between two countries lower trade flows between them, the coefficient on $LDist_{ij}$ should be negative. $LSIM_{ijt}$ denotes the similarity in country size, defined as

$$LSIM_{ijt} = \ln\left(1 - \left(\frac{GDP_{it}}{GDP_{it} + GDP_{jt}}\right)^2 - \left(\frac{GDP_{jt}}{GDP_{it} + GDP_{jt}}\right)^2\right)$$

Following differentiated product trade theory, the variable $LSIM_{ijt}$ is intended to capture the contribution of intra-industry trade to total trade. Its coefficient is expected to be positive.

$LdGDP_{ijt}$ denotes the absolute differences in per capita GDP of importers and exporters, defined as

$$LdGDP_{ijt} = \left|\ln\left(\frac{GDP_{it}}{capita_{it}}\right) - \ln\left(\frac{GDP_{jt}}{capita_{jt}}\right)\right|$$

The variable $LdGDP_{ijt}$ is used to capture the differences in relative factor endowments. The positive coefficient on $LdGDP_{ijt}$ means that trade patterns are explained by the Heckscher-Ohlin-Samuelson (HOS) model. That is, trade is of an inter-industry nature.

The negative coefficient on $LdGDP_{ijt}$, however, illustrates that the trade patterns are explained by the Linder's hypothesis. This implies that the more dissimilar two countries are in terms of relative factor endowments, the smaller the trade volumes between them.

The multilateral and world resistances (MWRs) of distance, similarity in country size, relative factor endowment differences, and tariff rates are, respectively, denoted as $MWRDis_{ij}$, $MWRS_{ijt}$, $MWRD_{ijt}$, and $MWRT_{ijt}$. They have the opposite signs of their corresponding normal variables. $MWRDis_{ij}$, for example, has the positive sign, meaning that an increase in the multilateral and world resistance of distance relative to the bilateral distance ($\ln Dist_{ij}$) raises the bilateral trade flows. These MWRs are defined as follows:

$$MWRDis_{ij} = \left[\frac{1}{N}\left(\sum_{j=1}^{N} \ln Dist_{ij} \right) + \frac{1}{N}\left(\sum_{i=1}^{N} \ln Dist_{ij} \right) - \frac{1}{N^2}\left(\sum_{i=1}^{N}\sum_{j=1}^{N} \ln Dist_{ij} \right) \right]$$

$$MWRS_{ijt} = \left[\frac{1}{N}\left(\sum_{j=1}^{N} \ln LSIM_{ijt} \right) + \frac{1}{N}\left(\sum_{i=1}^{N} \ln LSIM_{ijt} \right) - \frac{1}{N^2}\left(\sum_{i=1}^{N}\sum_{j=1}^{N} \ln LSIM_{ijt} \right) \right]$$

$$MWRD_{ijt} = \left[\frac{1}{N}\left(\sum_{j=1}^{N} \ln LdGDP_{ijt} \right) + \frac{1}{N}\left(\sum_{i=1}^{N} \ln LdGDP_{ijt} \right) - \frac{1}{N^2}\left(\sum_{i=1}^{N}\sum_{j=1}^{N} \ln LdGDP_{ijt} \right) \right]$$

$$MWRT_{ijt} = \left[\frac{1}{N}\left(\sum_{j=1}^{N} Tar_{ijt} \right) + \frac{1}{N}\left(\sum_{i=1}^{N} Tar_{ijt} \right) - \frac{1}{N^2}\left(\sum_{i=1}^{N}\sum_{j=1}^{N} Tar_{ijt} \right) \right]$$

where N is the number of countries in the sample.

Basically, the gravity equation is an ex-post analysis which is not suitable to apply for the analysis of regional trading bloc that has not been formally established. However, one of the important tasks of the integration of ASEAN+6 is to bring down or eliminate import tariffs of its members. Hence, explicitly including import tariffs in the gravity model specification provides us an indicator of the potential effect of tariffs on trade flows. Unlike other continuous variables (total bilateral country size, distance, similarity in country size, and differences in GDP per capita) which enter the model in natural logarithmic form, the variable of import tariffs enters the model in percentage of a level form. Since tariff barriers impede trade flows across international borders, we expect its coefficient to be negative. The statistical significance and negative sign of import tariffs' coefficient in the gravity model implies that further reduction in tariff rates is necessary to increase trade flows and hence the formation ASEAN+6 could play an important role to achieve this goal.

The specification of the gravity model in equation (4) is motivated by the international trade theory. According to Krugman (1980) or Helpman and Krugman (1985), the two determinants characterizing New Trade Theory (N-T-T) are economies of scale combined with product differentiation and transportation costs. Helpman (1987), Bergstrand (1990) and Hummels and Levinsohn (1995) put forward early explanations of the N-T-T in the gravity model framework. According to these literatures, the key determinants of international trade consist of overall bilateral country size, similarity in bilateral country size, and transportation costs. In addition, the inequality between per capita incomes of exporters and importers is included to capture the relative factor endowment differences.

It is important to note about the use of the inequality between per capita incomes as a proxy variable of the relative factor endowment differences. Bergstrand (1990) formally derives the gravity model for explaining the effects of differences in national incomes, per capita incomes, capital-labour ratios, and tariffs on the degree of intra-industry trade between trading partners. According to one of the propositions, Bergstrand (1990, pp. 1221) states that greater difference in per capita incomes leads to lower the share of intra-industry trade due to a greater divergence in tastes. There are two possible channels about how per capita income affects the volume and pattern of trade. These are supply and demand sides. For the former, national income is ultimately characterized by either capital or labour in the long-run. That is, the greater capital-labour endowment ratio must be associated with higher per capita income. For the latter, greater inequalities between two countries' per capita incomes potentially decrease the share of intra-industry trade by widening taste differences, as suggested by Linder (1961).

Following the 2×2×2 model illustrated in Helpman and Krugman (1985) and Helpman (1987), where one good is differentiated and the other is homogeneous, the total volume of trade of each country could be represented as the sum of inter- and intra-industry trade volumes. The reduced form for evaluating the volume of world trade can then be expressed as in equation (4).

By using equation (4), we can explain the international trade phenomenon in terms of New Trade Theory. This trade phenomenon is captured by the effect of the overall economic size ($LGDPT_{ijt}$), the relative economic size ($LSIM_{ijt}$), and the transportation costs ($LDist_{ij}$). Moreover, if the coefficient of the difference in *per capita* GDP of exporters and importers ($LdGDP_{ijt}$) is positively statistical significance, part of trade pattern seems to be explained by the HOS model. On the other hand, if the coefficient of the differences in *per capita* GDP of exporters and importers is negatively statistical significance, part of trade pattern seems to be explained by the Linder's hypothesis. Finally, import tariffs serve as an indicator to evaluate the potential enhancement of ASEAN+6 on trade flows of its members. The next section shows how this static gravity model of trade can be modified to be a dynamic one.

3.2 Dynamic gravity model

The implication of the coefficients estimated from the static gravity model is that bilateral trade (exports) responds contemporaneously to any of its explanatory variables. In other word, it adjusts to the equilibrium within one period. Eichengreen and Irwin (1998) argue that past trade patterns influence current trade flows due to sunk costs invested by the exporting countries in the importing countries. Bun and Klaassen (2002) support this idea by estimating the dynamic panel gravity model. The authors confirm that lagged trade plays an important role in formulating dynamic gravity model. Furthermore, Zarzoso et al. (2009) show that the estimated results from the dynamic panel gravity models are significant and robust in explaining RTAs.

There are many different alternatives in formulating the dynamic panel gravity model. Some authors directly introduce lagged bilateral exports (trade) into the static panel gravity model (i.e., Eichengreen and Irwin, 1998; Zarzoso et al., 2009); and some specify the model based on the autoregressive distributed lag model (i.e., Bun and Klaassen, 2002; Siah et al., 2009). Instead of following these literatures, this paper provides an alternative way to construct the dynamic panel gravity model. That is, we formulate it based on the partial adjustments hypothesis.

The partial adjustments hypothesis is typically used to formulate the adjustment of a variable to desired level. It can be considered as how the producers adjust their levels of production if when some changes in demand for their products or other trade determinants have been anticipated. In our gravity model, assume that the log of the real bilateral exports, $\ln X_{ijt}$, follows the partial adjustments hypothesis. Then, the gravity model (4) is rewritten as

$$\ln X^*_{ijt} = \beta_0 + \lambda_t + \beta_1 LGDPT_{ijt} + \beta_2 LDist_{ij} + \beta_3 LSIM_{ijt} + \beta_4 LdGDP_{ijt} + \beta_5 Tar_{ijt} + \beta_6 MWRDis_{ij} + \beta_7 MWRS_{ijt} + \beta_8 MWRD_{ijt} + \beta_9 MWRT_{ijt} \quad (5)$$

where $\ln X^*_{ijt}$ is the logarithm of the desired level of export. In the gravity model, firms in country *i* have to adjust their level of production exporting to country *j*, denoted by $\ln X_{ijt}$. But the process of adjustment cannot be completed immediately. Defining $\ln X^*_{ijt} - \ln X_{ij,t-1}$ is the desired change. The partial adjustment model states that the actual change is only a fraction of the desired change. Therefore, the partial adjustments process is typically specified as

$$\ln X_{ijt} - \ln X_{ij,t-1} = (1-\theta)(\ln X^*_{ijt} - \ln X_{ij,t-1}) + \varepsilon_{ijt} \quad (6)$$

where θ denotes the speed of adjustment and is between zero and one. Combining the two relations, equations (5) and (6), produces the desired level of ASEAN+6 bilateral export flows, which is appropriate to the levels of incomes of the exporting and importing countries, and trade costs. The resulting gravity model can be expressed as

$$\ln X_{ijt} = \beta_0(1-\theta) + (1-\theta)\lambda_t + \theta \ln X_{ij,t-1} + \beta_1(1-\theta)LGDPT_{ijt} + \beta_2(1-\theta)LDist_{ij} + \beta_3(1-\theta)LSIM_{ijt} + \beta_4(1-\theta)LdGDP_{ijt} + \beta_5(1-\theta)Tar_{ijt} + \beta_6(1-\theta)MWRDis_{ij} + \beta_7(1-\theta)MWRS_{ijt} + \beta_8(1-\theta)MWRD_{ijt} + \beta_9(1-\theta)MWRT_{ijt} + \varepsilon_{ijt}$$

or

$$\ln X_{ijt} = \phi_0 + \gamma\lambda_t + \phi_1 \ln X_{ij,t-1} + \phi_2 LGDPT_{ijt} + \phi_3 LDist_{ij} + \phi_4 LSIM_{ijt} + \phi_5 LdGDP_{ijt} + \phi_6 Tar_{ijt} + \phi_7 MWRDis_{ij} + \phi_8 MWRS_{ijt} + \phi_9 MWRD_{ijt} + \phi_{10} MWRT_{ijt} + \varepsilon_{ijt} \quad (7)$$

where $\gamma = 1-\theta$ is a set of coefficients of year dummies; and $\phi_0 = \beta_0(1-\theta)$, $\phi_1 = \theta$, $\phi_2 = \beta_1(1-\theta)$, $\phi_3 = \beta_2(1-\theta)$, $\phi_4 = \beta_3(1-\theta)$, $\phi_5 = \beta_4(1-\theta)$, $\phi_6 = \beta_5(1-\theta)$, $\phi_7 = \beta_6(1-\theta)$, $\phi_8 = \beta_7(1-\theta)$, $\phi_9 = \beta_8(1-\theta)$, and $\phi_{10} = \beta_9(1-\theta)$. Equation (7) is the dynamic gravity model based on the partial adjustments hypothesis.

3.3 Estimation method

To estimate the dynamic gravity model (7), we need to employ the estimation methods used in dynamic panel-data models. Linear dynamic panel-data models include *p* lags of the dependent variable as covariates and contain unobserved panel-level effects, fixed or random. By construction, the unobserved panel-level effects are correlated with the lagged dependent variables, making standard estimators inconsistent. Arellano and Bond (1991) derive a consistent generalized method-of-moments (GMM) estimator for this model. They suggest transforming the model either by first differences or orthogonal deviations, to remove the unobserved fixed effects and to run it by using the two-step GMM estimator. The second and higher lags of the endogenous variable in levels are suitable instruments to solve the estimation problem. However, the Arellano and Bond estimator has three drawbacks. First, it can perform poorly if the autoregressive parameters are too large or the ratio of the variance of the panel-level effect to the variance of idiosyncratic error is too large. Second, it cannot be used to estimate model containing time-invariant variables. Finally, the instruments using second and higher lags of the endogenous variable become weak when data are highly persistent.

Building on the work of Arellano and Bover (1995), Blundell and Bond (1998) developed a system estimator that uses additional moment conditions. The system estimator is referred to as 'system GMM estimator'. This method assumes that there is no autocorrelation in the idiosyncratic errors and requires the initial condition that the panel-level effects be uncorrelated with the first difference of the first observation of the dependent variable. This estimator adds a system of equations in levels to that in first differences. The simulation results in Blundell and Bond (1998) suggest that the combined or system GMM estimator is more robust than difference GMM to weak instrument biases, and this method has become increasingly popular in the cross-country empirical literature. Consequently, we apply the system GMM developed by Arellano and Bover (1995) and Blundell and Bond (1998) to estimate our gravity model (7).

4. Data description

In our application, we estimate the impact on bilateral export flows of overall bilateral size (LGDPT), the similarity in bilateral size (LSIM), the differences in relative factor endowments (LdGDP), transportation costs (Dist), and rates of import tariffs (Tariff). Sample consists of sixteen countries, including ten ASEAN countries (Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam), and its six counterparts (Australia, China, India, New Zealand, Japan, and South Korea).

This study covers the period 1989–2009, and produces the unbalanced panels of 1651 observations. The unbalancedness of panel data is due to zero trade flows and missing data on trade flows and on import tariffs. Following Ahrens and Pincus (1981), the unbalancedness statistic is 0.77, indicating that the data set is moderately unbalanced in terms of observations for each year of data.

The nominal value of bilateral exports is obtained from the Direction of Trade Statistics (DOTS) of IMF CD (2006) and from the United Nations Commodity Trade Statistics Database. The data for the US CPI and nominal GDPs in USD are taken from the World Economic Outlook (WEO) database of the IMF. The value of bilateral exports and GDPs are converted into constant price USD using the US CPI with 2000 as the base year.

The data for the population is collected from the International Financial Statistics (IFS) of IMF CD (2006) and from the WEO database of the IMF. Distance is used as a proxy variable of transportation costs calculated according to the distance in kilometers between the capitals of the exporter and importer. The data for distance is taken from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII).

The data for import tariffs of all products is derived from the World Integrated Trade Solution (WITS) developed by the World Bank. The tariff rates are then simply averaged to obtain a single value of import tariffs for each year.

5. Potential gains from the formation of ASEAN+6

5.1 Estimation results

Table 1 reports the dynamic gravity model results of ASEAN+6 in terms of the short-run and long-run models. The results without controlling for the multilateral resistance terms (specifications I.A and II.A) are also reported side by side with each dynamic regression with MR terms for the purpose of comparison.[3] The short-run gravity model with MR terms is estimated based on the model specified in (7). That is, the gravity model contains five key variables (overall bilateral country size, relative factor endowment differences, similarity in country size, distance, and import tariffs), four multilateral resistance terms (MR terms of relative factor endowment differences, similarity in country size, distance, and import tariffs), and one lagged bilateral exports.

Our findings for the dynamic gravity model are the following: first, the *F*-statistic in the short-run model (I.B) is significant at conventional levels, indicating that our model can be used to determine bilateral trade flow in ASEAN+6. Second, the diagnostic statistics show that there is no second-order autocorrelation in the first differenced residuals (indicated by the Arellano-Bond test for AR(2)) and the model is not suffered from the over-identification bias (indicated by the Sargan and Hansen tests). Third, almost all variables have the expected signs, excepting the MR terms of distance (MWRDis) and similarity in country size (MWRS). Fourth, the model shows a significant positive impact of the N-T-T variables (LGDPT, LSIM) on bilateral trade. Fifth, our model supports Linder's hypothesis, captured by the variable of differences in GDP per

[3] The regression results ignoring the multilateral resistance terms are mis-specified due to the omission of measures of multilateral resistance terms, indicated by the theoretical models of Anderson (1979), Deardorff (1998), Eaton and Kortum (2002), Anderson and van Wincoop (2003), and Feenstra (2004). The reason is that the trade flow from country i to j is influenced by the prices of products in the other $N-2$ countries in the world, which themselves are influenced by the bilateral distances and other trade cost variables of each of country i and j with the other $N-2$ countries.

capita (*LdGDP*), which states that two countries trade less if they have different levels in GDP per capita and hence different tastes. Sixth, the highly statistical significance of import tariffs indicates that further reduction of tariff barriers can increase trade flows in the proposed trading bloc.

Table 1: Dynamic regression results for real bilateral exports of ASEAN+6

Dependent variable: $\ln X_{ijt}$	Short-run model		Long-run model	
Explanatory variables:	I.A	I.B	II.A	II.B
$\ln X_{ij,t-1}$	0.456***	0.502***	---	---
	(0.144)	(0.119)		
$LGDPT_{ijt}$	1.058***	1.006***	1.946***	2.020***
	(0.293)	(0.248)	(0.098)	(0.074)
$LDist_{ij}$	−0.534***	−0.470***	−0.981***	−0.944***
	(0.162)	(0.133)	(0.153)	(0.160)
$LSIM_{ijt}$	0.708***	0.450***	1.301***	0.903***
	(0.192)	(0.123)	(0.087)	(0.104)
$LDGDP_{ijt}$	−0.104**	−0.086**	−0.192**	−0.172**
	(0.050)	(0.039)	(0.074)	(0.067)
Tar_{ijt}	−0.011	−0.051**	−0.020	−0.102**
	(0.008)	(0.023)	(0.015)	(0.041)
$MWRDis_{ij}$	---	−0.193**	---	−0.388**
		(0.098)		(0.176)
$MWRS_{ijt}$	---	0.368***	---	0.738***
		(0.090)		(0.109)
$MWRD_{ijt}$	---	0.104*	---	0.209*
		(0.057)		(0.123)
$MWRT_{ijt}$	---	0.039*	---	0.079*
		(0.021)		(0.040)
Constant	−12.097***	−8.773***	---	---
	(3.636)	(2.621)		
Observations	1651	1651		
Model degrees of freedom	25	29		
Residual degrees of freedom	229	229		
Number of instruments	44	48		
F (model df, residual df)	136.611***	220.986***		
Arellano-Bond test for AR(2)	−0.920	−1.004		
Overidentification restrictions tests:				
Sargan test: Chi2(18)	14.479	20.986		
Hansen test: Chi2(18)	9.647	12.323		

Notes: (1) *** denotes significance at the 1% level; **, at the 5% level; and *, at the 10% level. (2) Robust standard errors of one-step system GMM for the short-run model (specifications I.A and I.B) are reported in parentheses. The standard errors of the long-run effects are computed by the delta-method. (3) Arellano-Bond test for AR(2) indicates the second-order autocorrelation test of Arellano and Bond (1991), which is asymptotically standard normal under the null. The null hypothesis implies that higher –order autocorrelation is absent. The test therefore checks for second-order autocorrelation in the first differenced residuals.(4) Time specific effects are included in all regression results.

More precisely, the last column of Table 1 (specification II.B) reports the long-run effect for each variable of the dynamic gravity model. The long-run effect of a covariate is defined to be the sum of the current coefficient divided by one minus the sum of the lagged coefficient on the dependent variable. It shows that the long-run impact of income elasticity of exports is 2.02. It is evident that bilateral exports are growing faster than income. This international trade phenomenon is explained by New Trade Theory (see Helpman, 1987, pp. 69).

The long-run model (II.B) of Table 1 also suggest that the long-run impact of the elasticity of the differences in GDP *per capita* of exports exhibits negative impact on bilateral export flows and is about 0.17. Nevertheless, it is relatively small. Similarly, the coefficient on *LSIM* also confirms the importance of similarities of countries involved in the regional trading bloc. This implies that the economic integration of ASEAN+6 can be fully achieved when all member countries have similar level of GDP *per capita*.

According to many research studies utilizing the gravity model to evaluate trade flows, the variable 'distance'—a proxy variable for transportation costs—has a negative effect on bilateral trade flows and hence reduces trade flows. In the context of economic integration, especially in our paper, bilateral trade flow responds almost proportionally to the negative effect of transportation costs. This evidence suggests that ASEAN+6 trade can be improved by means of comprehensive development of the land transport infrastructure, especially among least developed ASEAN economies.

Based on the long-run model results of Table 1, ASEAN+6 bilateral trade is also determined by import tariffs. Among other variables, the variable of import tariffs is served as an important indicator of the potential benefit brought by the proposed integration of ASEAN+6. The statistical significance and negative sign of import tariffs indicate that a reduction in tariff barrier can increase trade flows. More precisely, the long-run impact of import tariffs is 10.2%. This implies that the integration is necessary to enhance trade flows in East Asia.

5.2. Simulation results

In order to make our analysis more concrete policy content, it can be helpful to construct monetary estimates of the trade gains that could be associated with reduced import tariffs in East Asia. To do so, we follow the approach in Wilson et al. (2005), in which the estimated coefficients from the gravity model are used as the basis for counterfactual simulations which can be analyzed comparatively. Note that this approach is only intended to provide a broad idea of the relative impacts of different policy reforms, and is subject to several technical issues.

Our analysis consists of three scenarios. In *Scenario 1*, we consider a cut in the tariff rates to the current regional average (10.82%) so that no country sets its tariff rates over this threshold. We think of this scenario as if the integration occurs, some countries that set tariff rates higher than the regional average should reduce them to the specified threshold. By doing so, countries that have tariff rates lower than the threshold are likely to gain from export, but leave some countries that have higher tariff rates to become markets of the proposed integration. Another option is provided in scenario 2. *Scenario 2* performs the same exercise for 50% reduction in tariff rates of all countries. In this case, all member countries have to reduce their tariff rates by the specified threshold. By doing so, the integration is likely to boost bilateral trade of all member countries. In order to fully gain from free trade, the integration may move forward to completely remove the tariff barriers of all its members. This case is provided by scenario 3. *Scenario 3* considers the elimination of tariff barriers of all members in ASEAN+6.

We conduct the simulations as follows. We take 1999–2009 as our base years.[4] We then, for example, recalculate our tariff rates with the condition that those countries over regional average for 1999–2009 have their rates reduced to that threshold. This allows us to calculate the percentage change in the tariff rate for each country pair, which we map to an approximate trade impact using the gravity model elasticities. To do so, we calculate the value of trade by the annual average. The annual average value of trade for each country pair is defined as the sum of trade of such country pair over time divided by the number of years that they actually trade. In order to derive aggregate trade value of a particular country, we then average across all its trading partners.

Results for our three simulations are presented in Tables 2-4, and are compared in Table 5. Values of trade flows in these tables are measured by the annual average. Similar to the previous research results cited at the beginning of this paper, our results indicate that the expected intraregional trade gains from reduced import tariffs are large. Reducing tariffs to the regional average would enhance intraregional export and intraregional import by about 1.8% ($1.4 billion) and 2.45% ($2.2 billion), respectively. Reducing the current regional tariffs by 50% would boost export and import by 17.1% ($13.5 billion) and 17.7% ($16.1 billion), respectively. Based on our results, eliminating tariffs could increase trade by a very considerable amount: 38.5% ($30.4 billion) for export and 40% ($36 billion) for import. Trade gain increases as tariff barriers are gradually removed, increasing by about 2% in scenario 1 to 39% in scenario3.

Table 2: Simulation results, Scenario 1 (in million USD and percentage change of baseline)

Country	Import Gain	%	Export Gain	%	Trade Gain	%
Australia	0	0.00	50	1.02	50	0.56
Brunei	0	0.00	2	1.10	2	0.77
Cambodia	20	29.28	2	6.44	21	23.36
China	700	3.63	100	0.63	800	2.27
India	0	0.00	60	1.99	60	0.60
Indonesia	0	0.00	80	1.82	80	1.07
Japan	0	0.00	500	2.87	500	1.45
Korea, Republic of	0	0.00	300	1.94	300	0.78
Laos	0	0.00	1	11.20	1	2.40
Malaysia	0	0.00	80	1.76	80	0.91
Myanmar	0	0.00	3	4.02	3	1.17
New Zealand	0	0.00	6	0.65	6	0.33
Philippines	0	0.00	40	2.12	40	1.04
Singapore	0	0.00	100	1.95	100	0.95
Thailand	1,230	40.59	70	1.73	1,300	18.36
Vietnam	270	25.47	30	2.73	300	13.89

Notes: Trade impacts estimated using elasticities from Table 1 column 2 applied to total trade (value). Sample includes all listed countries, for the base years 1999–2009.Simulation involves the cut of tariff rates in ASEAN+6 to the regional average (10.82%).

[4] Since our panel data are imbalanced, we cannot take one year as the base year. Instead, we start from 1999 to 2009 because data are mostly available in this period.

Table 3: Simulation results, Scenario 2 (in million USD and percentage change of baseline)

Country	Import Gain	%	Export Gain	%	Trade Gain	%
Australia	190	4.73	740	15.10	930	10.43
Brunei	10	12.18	25	13.74	35	13.27
Cambodia	33	49.70	5	22.75	38	42.71
China	5,600	29.02	1,900	11.95	7,500	21.31
India	1,030	14.86	580	19.21	1,610	16.18
Indonesia	530	17.32	660	15.03	1,190	15.97
Japan	2,000	11.63	3,700	21.26	5,700	16.47
Korea, Republic of	3,100	13.36	3,000	19.35	6,100	15.76
Laos	7	22.12	3	31.51	10	24.13
Malaysia	990	23.40	600	13.19	1,590	18.11
Myanmar	31	17.13	17	22.22	48	18.62
New Zealand	35	3.81	98	10.63	133	7.22
Philippines	320	16.24	330	17.46	650	16.84
Singapore	20	0.37	970	18.95	990	9.43
Thailand	1,680	55.45	680	16.79	2,360	33.33
Vietnam	500	47.17	200	18.18	700	32.41

Notes: Trade impacts estimated using elasticities from Table 1 column 2 applied to total trade (value).Sample includes all listed countries, for the base years 1999–2009.Simulation involves the cut of tariff rates in ASEAN+6 by 50%.

Table 4: Simulation results, Scenario 3 (in million USD and percentage change of baseline)

Country	Import Gain	%	Export Gain	%	Trade Gain	%
Australia	390	9.70	1,660	33.88	2,050	22.98
Brunei	20	25.90	55	30.22	75	28.92
Cambodia	82	123.72	12	53.22	95	105.45
China	12,800	66.32	4,200	26.42	17,000	48.30
India	2,240	32.32	1,320	43.71	3,560	35.78
Indonesia	1,160	37.91	1,490	33.94	2,650	35.57
Japan	4,200	24.42	8,400	48.28	12,600	36.42
Korea, Republic of	6,600	28.45	6,800	43.87	13,400	34.63
Laos	15	48.72	6	73.78	21	54.09
Malaysia	2,210	52.25	1,350	29.67	3,560	40.55
Myanmar	68	37.57	38	51.27	106	41.57
New Zealand	72	7.83	218	23.64	290	15.75
Philippines	690	35.03	740	39.15	1,430	37.05
Singapore	30	0.56	2,180	42.58	2,210	21.05
Thailand	4,360	143.89	1,530	37.78	5,890	83.19
Vietnam	1,240	116.98	440	40.00	1,680	77.78

Notes: Trade impacts estimated using elasticities from Table 1 column 2 applied to total trade (value).Sample includes all listed countries, for the base years 1999–2009.Simulation involves the elimination of tariff rates in ASEAN+6 (0%).

Table 5: Comparison of simulation results, Scenarios 1-3 (in million USD and percentage change of baseline)

Country	Import Gain	%	Export Gain	%	Trade Gain
Scenario 1	2,220	2.45	1,423	1.80	3,643
Scenario 2	16,076	17.73	13,508	17.09	29,583
Scenario 3	36,178	39.91	30,440	38.52	66,618

Notes: Sample includes all listed countries, for the base years 1999–2009. Scenario definitions are as set out above.

The results of this study reinforce the need for ASEAN+6 members to continue decreasing their tariffs along with their ongoing integration in the regional markets. The formation of East Asian Free Trade Area may be one possible option to bring such substantial gains from trade to its members.

However, it is important to emphasize that our simulation results, as is the case for all simulation results, are subject to numerous technical caveats as noted by Shepherd and Wilson (2008). First, our simulation results are shown in terms of trade impacts, not economic welfare. Second, the simulated trade impacts take account only of intra-regional effects, but not of potential extra-regional effects. Finally, the fact that the elasticities on which our simulations are based remain constant before and after the policy shock is unlikely to hold for substantial regime shifts.

6. Conclusions

In this paper, we use an unbalanced panel of bilateral export flows from ASEAN 10 countries, Australia, China, India, Japan, New Zealand, and South Korea over the period 1989–2009. We identify the determinants based on the New Trade Theory, including overall bilateral country size, relative factor endowment differences, similarity in country size, and transportation costs. The model is also extended to include an additional variable, such as import tariffs. After controlling for time effects, we find that bilateral trade flow is positively related to the overall bilateral country size and similarity in country size, and is inversely related to the relative factor endowment differences, transportation costs, and rates of import tariffs. Our empirical results support the New Trade Theory and Linder’s hypothesis.

As indicated by the results in this paper, ASEAN+6 member countries have much to gain from tariff reduction or elimination. Our results also highlight the importance of reducing gaps in GDP *per capita* of the member countries to ensure that the full benefit of regional economic integration can be reaped. For countries outside ASEAN, our analysis also reveals a significant implication that forming some new economic community among “6” countries together with ASEAN will be mutually beneficial in promoting trade.

References

Ahrens, H. and R. Pincus, 1981, On two measures of unbalancedness in a one-way model and their relation to efficiency. *Biometric Journal* , **23**, pp. 227–235.

Anderson, J. E., 1979, A theoretical foundation for the gravity equation. *American Economic Review* , **69 (1)**, pp. 106–116.

Anderson, J. E. and E. van Wincoop, 2003, Gravity with gravitas: A solution to the border puzzle. *American Economic Review* , **93 (1)**, pp. 170–192.

Arellano, M. and S. R. Bond, 1991, Some tests of specification for panel data: Monte carlo evidence and an application to employment equations. *Review of Economic Studies* , **58**, pp. 277–297.

Arellano, M. and O. Bover, 1995, Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics* , **68**, pp. 29–51.

Bergstrand, J. H., 1990, The Heckscher-Ohlin-samuelson model, the linder hypothesis and the determinants of bilateral intra-industry trade. *Economic Journal* , **100**, pp. 1216–1229.

Bergstrand, J. H. and S. L. Baier, 2010, Approximating general equilibrium impacts of trade liberalizations using the gravity equation: application to NAFTA and the European Economic Area. In: The Gravity Model in International Trade (eds van Bergeijk P. A. and Brakman S.), pp. 88–134. Cambridge University Press, Cambridge.

Blundell, R. and S. Bond, 1998, Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* , **87**, pp. 115–143.

Bun, M. J. G. and F. J. G. M. Klaassen, 2002, *The importance of dynamics in panel gravity models of trade.* Discussion Paper No. 18, University of van Amsterdam.

Centre d'Etudes Prospectives et d'Informations Internationales (CEPII), 2010, The CEPII Gravity Dataset. [Online; cited March 2010.] Available from URL: http://www.cepii.fr/anglaisgraph/bdd/gravity.htm

Chowdhury, M. B, 2005, Trade reforms and economic integration in South Asia: SAARC to SAPTA. *Applied Econometrics and International Development,* **5**, pp. 23–40.

Deardorff, A. V., 1998, Determinants of bilateral trade: does gravity work in a neoclassical world? In: The Regionalism of the World Economy (ed Frankel J. A.), pp. 7–22. University of Chicago Press, Chicago.

Eaton, J. and S. Kortum, 2002, Technology, geography, and trade. *Econometrica* , **70 (5)**, pp. 1741–1779.

Eichengreen, B. and D. A. Irwin, 1998, The role of history in bilateral trade flows. In: The Regionalism of the World Economy (ed Frankel J. A.), pp. 33–62. University of Chicago Press, Chicago.

Elliott, R. J. and K. Ikemoto, 2004, AFTA and the Asian crisis: help or hindrance to ASEAN intra-regional trade? *Asian Economic Journal* , **18 (1)**, pp. 1–23.

Feenstra, R. C., 2004, *Advanced International Trade.* Princeton University Press.

Hapsari, I. M. and C. Mangunsong, 2006, *Determinants of AFTA member's trade flows and potential for trade diversion.* Working Paper No. 21, Asia-Pacific Research and Training Network on Trade.

Helpman, E., 1987, Imperfect competition and international trade: evidence from fourteen industrial countries. *Journal of the Japanese and International Economies* , **1 (1)**, pp. 62–81.

Helpman, E. and P. Krugman, 1985, *Market Structure and Foreign Trade.* Cambridge University Press, Cambridge, MA.

Hummels, D. and J. Levinsohn, 1995, Monopolistic competition and international trade: reconsidering the evidence. *Quarterly Journal of Economics* , **110 (3)**, pp. 799–836.

International Monetary Fund, 2010, World Economic Outlook Databases. [Online; cited September 2010.] Available from URL: http://www.imf.org/external/pubs/ft/weo/2010/01/weodata/index.aspx

International Monetary Fund, 2006, Direction of Trade Statistics. [CD-ROM].

International Monetary Fund, 2006, International Financial Statistics. [CD-ROM].

Kien, N. T., 2009, Gravity model by panel data approach: an empirical application with implications for the ASEAN Free Trade Area. *ASEAN Economic Bulletin* , **26 (3)**, pp. 266–277.

Krugman, P. R., 1980, Scale economies, product differentiation, and the pattern of trade. *American Economic Review* , **70**, pp. 950–959.

Lee, J. W. and L. Park, 2005, Free trade areas in East Asia: discriminatory or non-discriminatory? *The World Economy* , **28 (1)**, pp. 21–48.

Lee, J. W. and K. Shin, 2006, Does regionalism lead to more global trade integration in East Asia? *North American Journal of Economics and Finance* , **17**, pp. 283–301.

Linder, S. B., 1961, *An Essay on Trade and Transformation*. John Wiley, New York.

Shepherd, B. and J. S. Wilson, 2008, *Trade facilitation in ASEAN member countries: measuring progress and assessing priorities.* Policy Research Working Paper No. 4615, The World Bank.

Siah, K. L. and C. K.Choong, 2009, AFTA and the intra-trade patterns among ASEAN-5 economies: trade-enhancing or trade inhibiting? *International Journal of Economics and Finance* , **1 (1)**, pp. 117–126.

Tinbergen, J., 1962, *Shaping the World Economy: Suggestions for an International Economic Policy*. The Twentieth Century Fund, New York.

United Nations, 2010, United Nations Commodity Trade Statistics Database. [Online; cited September 2010.] Available from URL: http://comtrade.un.org/db/

Wilson, J. S., L. M. Catherine and O. Tsunehiro, 2005, Assessing the benefits of trade facilitation: a global perspective. *The World Economy* , **28 (6)**, pp. 841–871.

World Bank, 2010, World Integrated Trade Solution. [Online; cited September 2010.] Available from URL: http://wits.worldbank.org/WITS/wits/QuickQuery/Tariff-ViewAndExportRaw
Data/TariffViewAndExportRawData.aspx?Page=TariffViewAndExportRawData

Zarzoso, I. M., N. L. Nowak Lehman Felicitas and N. Horsewood, 2009. Are regional trading agreements beneficial? static and dynamic panel gravity models. *North American Journal of Economics and Fiance* , **20**, pp. 46–65.

Annex

n	tariff	mwrdisij	mwrsij	mwrdij	mwrtij
1	2,744843	16,74619	-4,67987	3,574068	25,20009
2	2,130596	16,74981	-4,76468	4,847158	12,60888
3	3,261268	16,65329	-4,86233	4,037569	10,85791
1380	17,02555	15,16308	-4,5146	4,133415	27,16773
1381	16,3429	15,42333	-4,66074	4,357799	23,24785
1382	15,40798	15,36622	-4,68127	4,323864	22,06227
2489	9,260239	15,38615	-3,19769	3,936918	15,28527
2490	19,82176	15,28647	-3,25285	3,630508	26,84469
2491	19,82176	15,65976	-2,90979	3,837232	26,00951

n	id	t	xid	mid	lx	lm	cx	cm	lnX	ldist	lgdptu	lsimu	ldgdpu
1	1	4	1	2	2	1	Aus	Bru	17,339	8,6529	26,71272	-3,67299	0,152908
2	1	13	1	2	2	1	Aus	Bru	16,960	8,6529	26,64855	-3,55163	0,143695
3	1	14	1	2	2	1	Aus	Bru	17,115	8,6529	26,74854	-3,6241	0,229934
1380	138	13	10	3	1	1	Mly	Cam	17,886	6,9128	25,2678	-2,53893	2,525767
1381	138	14	10	3	1	1	Mly	Cam	17,778	6,9128	25,33484	-2,54897	2,532074
1382	138	15	10	3	1	1	Mly	Cam	17,920	6,9128	25,40064	-2,55358	2,535065
2489	240	15	16	15	1	1	Vtn	Tha	19,564	6,8984	25,86206	-1,07888	1,516654
2490	240	17	16	15	1	1	Vtn	Tha	20,386	6,8984	26,03246	-1,0353	1,447532
2491	240	18	16	15	1	1	Vtn	Tha	20,457	6,8984	26,15742	-1,04643	1,478031

_It_2 to _it_21	dummy variable of years 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009

Techincal codes for estimating the model using Stata

Code	Definitions
n	number of observations
id	identifier for country pair
t	time (starting from 1989-2009)
xid	identifier for exporter
mid	identifier for importer
lx	identifier for differentiating exporter: lx = 1 if the exporter is a member of ASEAN; lx =2, otherwise.
lm	identifier for differentiating importer: lx = 1 if the exporter is a member of ASEAN; lx =2, otherwise.
cx	identifier for exporter using 3 digits code
cm	identifier for importer using 3 digits code

Country code in 3 digits

Code	Definitions	Code	Definitions
Aus	Australia	**Mly**	Malaysia
Bru	Brunei	**Myn**	Myanmar
Cam	Cambodia	**Nzl**	New Zealand
Chn	China	**Phl**	Philippines
Ida	India	**Sin**	Singapore
Ind	Indonesia	**Tha**	Thailand
Jpn	Japan	**Vtn**	Vietnam
Kor	Korea	**Mly**	Malaysia
Lao	Laos	**Myn**	Myanmar