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POTENTIAL IMPACTS OF REGIONAL TRADE ENLARGEMENT IN EAST ASIA ON LAOS' TRADE

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Using an unbalanced panel dataset of bilateral trade flows from 1992-2009, we assess the potential impacts of the formation of ASEAN+3 and ASEAN+6 free trade areas (FTAs) on Laos' trade. We find that bilateral trade flows between Laos and its trade partners are positively related to the sum of bilateral gross domestic product (GDP) and the degree of similarity in GDP size between Laos and the partner, and inversely related to relative factor endowment differences, transportation costs, and import tariff rates. Our simulation results show that Laos stands to gain from the formation of ASEAN+3 and ASEAN+6 FTAs if tariff barriers are gradually decreased. However, such examples of regional integration could harm Laos' economy if all tariff barriers were completely removed due to Laos' lack of competitiveness.

Keywords: East Asia, Trade Flow, Gravity Model, Laos
JEL classification: C33, F14, F15

1. INTRODUCTION

Most developing economies tend be much more open to trade in goods and services than major industrial countries, but they typically have little control over the prices of the goods they export and import - that is, they typically face exogenous terms of trade. The exogeneity of the terms of trade for developing economies is due to both by their small share in the world economy and the composition of their exports. The dependence of many developing countries on primary commodity exports with exogenously determined prices accounts for an important source of macroeconomic instability given sharp price fluctuations. In landlocked countries, exporting low-value-added products, coupled with poor infrastructure, can lead to low levels of competitiveness even when tariff barriers in export markets have been lowered or removed. These problems are

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particularly acute in the Lao People's Democratic Republic (Laos) where primary commodity exports account for more than 70% of total exports. Amid the possibility of ASEAN enlargement into ASEAN+3 and ASEAN+6, it is unclear whether a small country such as Laos stands to gain from such enlargement.[1]

However, whether or not to join a potential free trade area (FTA) such as ASEAN+3 or ASEAN+6 is generally not a decision that the Lao government can make independently. For example, it becomes a matter of necessity if all other members of ASEAN+6 agree to form a regional trading bloc. At the same time, a significant increase in exports cannot easily be achieved given the current state of the Lao economy. Such gains will require a national-government-formulated plan for industrialization to diversify and boost the production of exports. The elimination of tariff barriers could lead to a greater number of Laotians successfully participating in the market economy, thereby reducing poverty. Such is the theory, but has it worked in Laos?

The primary objective of this paper is to evaluate the potential gains in Laos' trade with the formation of ASEAN+3 and ASEAN+6 trading blocs. First, we utilize panel data on bilateral export flows to empirically analyze the international trade determinants for ASEAN+6 member countries. More precisely, the study focuses on how relative factor endowment differences, combined bilateral gross domestic product (GDP), similarity in GDP, transportation costs, and tariff rates determine bilateral trade in the regional trading blocs of ASEAN+3 and ASEAN+6. The study then conducts counterfactual simulations to see whether trade flows between Laos and its trading partners could further be enhanced through tariff reduction or elimination.

The gravity model, as pioneered by Tinbergen (1962), is a useful tool to investigate regional trade integration. The existing literature on ASEAN trade applying the gravity model finds that (i) the ASEAN Free Trade Area (AFTA) has generated trade flows among its members (Kien, 2009), (ii) AFTA might be causing some trade diversion and shifting trade from countries outside the trade bloc to potentially less efficient countries inside the trade bloc (Hapsari and Mangunsung, 2006), (iii) Asian economic crises generate a stronger tendency to source imports from within the region (Elliott and Ikemoto, 2004), (iv) most East Asian regional trade agreements (RTAs) create more intra-bloc trade but do not divert extra-bloc trade (Lee and Park, 2005; Lee and Shin, 2006), (v) reducing applied tariffs to the regional average would raise intra-regional trade by about 2% (Shepherd and Wilson, 2009), and (vi) establishing an ASEAN+6 FTA would increase intra-regional trade by about 39% (Suvannaphakdy *et al*., 2011).

Most of the existing studies on ASEAN trade ignore dynamics. Eichengreen and Irwin (1996) argue that past trade patterns influence current trade flows because of the

[1] The Association of Southeast Asian Nations (ASEAN) includes Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam. ASEAN+3 includes the member countries of ASEAN plus the three East Asian nations of China, Japan, and the Republic of Korea (Korea). ASEAN+6 includes ASEAN+3 member countries plus Australia, India, and New Zealand.

sunk costs incurred by the exporting countries in the importing countries. This justifies the use of a dynamic gravity model to control for the possible persistence effects of trade flows (Bun and Klaasen, 2002; De Benedictis *et al*., 2005; De Grauwe and Skudelny, 2000; De Nardis and Vicarelli, 2004; Egger, 2001; Martínez-Zarzoso and Nowak-Lehmann, 2003). A recent empirical study by Martínez-Zarzoso *et al*. (2009) indicates that the dynamic panel gravity model serves as a significant tool to investigate the dynamic impacts of regional trade agreements on trade flows.

Several studies have investigated bilateral trade flows resulting from AFTA or regional changes resulting from enlargement. However, they tend to ignore the effects on economies such as Laos that have the least to offer a regional trade bloc. This paper is an attempt to fill this gap by applying a dynamic gravity model.[2] The paper is divided into six sections. In the next section, we review the regional economic integration of Laos over the past two decades. We outline our conceptual framework and specify our econometric model in Section 3. Data collection is explained in Section 4. We report our empirical results and policy implications in the fifth section and our conclusions in the sixth section.

2. REGIONAL ECONOMIC INTEGRATION

From the New Economic Mechanism (NEM) reforms launched in 1986 until the present, remarkable changes have occurred in the economy and society of Laos that have helped to integrate the country into the world economy. These changes have had dramatic implications for trade and investment flows, and economic growth. NEM started Laos' transition from a centrally-planned economy to a socialist-oriented market economy, leading to a broad range of social, political, and economic changes. Major reforms under NEM include removing price controls; abandoning socialist cooperative farming; unifying the exchange rate system; removing the government's monopoly on trade; reducing the number of state-owned enterprises; promoting private-firm establishments; and pursing fiscal, banking, and financial reforms.

Laos joined ASEAN in 1997 for geopolitical and economic development reasons. It has subsequently participated in ASEAN integration on a step-by-step basis in the lowering of intra-regional tariffs through the Common Effective Preferential Tariff (CEPT) Scheme for AFTA. Although ASEAN was established in August 1967, its commitment to pursuing regional economic integration in East Asia has intensified since the 1990s through arrangements such as ASEAN+3 and ASEAN+6. The East Asian economic community has evolved through multiple agreements under the frameworks of

[2] Suvannaphakdy *et al*. (2011) evaluate the potential impacts of the formation of an ASEAN+6 FTA on intra-regional trade flows, but they do not emphasize impacts on individual countries, including Laos.

ASEAN, ASEAN+1, ASEAN+3, and ASEAN+6.[3] At the heart of East Asian cooperation is ASEAN as the "driving force," with ASEAN+3 as the "main vehicle" for the realization of an eventual East Asian economic community, and ASEAN+6 as an "integral part" of the evolving regional architecture in Asia.

Overall, the regional integration process has proved moderately successful for Laos. As a result of the reforms over the last two decades, Laos has become much more integrated into the world economy. Laos' trade openness increased from 33% in 1988 to 42% in 2009, with the annual growth rate of exports (14%) exceeding that of imports (10.5%). With exports as the leading engine of growth, GDP per capita increased from US$261 in 1990 to US$665 in 2009, GDP expanded on average by 7% per year during that period, and poverty fell from 45% in 1992-1993 to 30% in 2002-2003 and 26.5% in 2009-2010 (Fane, 2006, p. 215; Ministry of Planning and Investment, 2010, p. 5).

As a result of NEM and unilateral liberalization, there have been significant changes in the tariff structure of Laos. A summary of Laos' applied tariffs in 2008 is presented in Table 1. The simple average of the most-favored nation (MFN) applied tariffs rates is 9.7%, but the tariff rate for agricultural products (19.5%) is more than twice as high as the rate for non-agricultural products (8.2%). About 50% of tariff lines for agricultural products have tariff rates lower than or equal to 10%, while all remaining tariff lines are in a range of 15%-50%. In contrast, about 90% of tariff lines for non-agricultural products have tariff rates equal to or lower than 10%, indicating that Laos is opening its country to foreign products.

Table 1. Laos' MFN Applied Tariffs in 2008: Summary and Duty Ranges

Frequency Distribution of Product Category	Tariff lines (%)					
	0~5	5~10	10~15	15~25	25~50	Average
Agricultural Products	27.3	20.8	0.0	8.2	43.0	19.5
Non-Agricultural Product	59.0	33.2	0.1	4.9	2.8	8.2

Source: World Trade Organization (WTO), International Trade Centre (ITC), and United Nations Conference on Trade and Development (UNCTAD) (2010).

Note: MFN = most-favored nation.

As of 2009, Laos had traded with more than 60 countries around the world, although most of its trade flows are concentrated in East Asia. Tariff rates faced by Laos' exporters in key markets are illustrated in Table 2. The European Union (EU) is the key market for Laos' agricultural products, receiving around $30 million in exports in 2008,

[3] The ASEAN+1 processes consist of ASEAN+China, ASEAN+Japan, ASEAN+Korea, ASEAN+India, and ASEAN+CER (i.e., Closer Economic Relations between Australia and New Zealand), and are largely in the form of FTAs or comprehensive economic partnership agreements (EPAs).

while Thailand is the key market for Laos' non-agricultural products, receiving around $581 million in exports in the same year. Despite the fact that the EU absorbs various kinds of Laos' non-agricultural products, the weighted average of traded tariff lines imposed by the EU is higher than in other export destinations for Laos' goods. For example, Thailand, China, and Korea have removed more than 50% of their tariff lines for Laos' non-agricultural exports. It is also important to note that a 100% duty-free import scheme is being offered by the United States (US) for agricultural products and the EU for non-agricultural products.

Table 2. Laos' Exports to Major Trading Partners and Applied Duties, 2008

Market	Bilateral Imports	Diversification: 95% Trade in Number of		MFN Average of Trade Tariff Line		Duty-Free Imports	
	US$ million	HS 2-digit	HS 6-digit	Simple	Weighted	Tariff Line (%)	Value (%)
Agricultural Products							
1. EU	30	4	7	13.3	1.6	90.6	99.1
2. Thailand	28	9	19	22.6	26.9	81.2	45.7
3. China	17	7	12	21.7	29.7	39.1	44.0
4. Vietnam	12	11	14	23.0	18.4	47.3	49.4
5. United States	4	2	2	0.0	0.0	100.0	100.0
Non-Agricultural Products							
1. Thailand	581	8	17	12.0	2.6	76.5	95.2
2. Vietnam	196	4	11	17.8	1.1	42.7	97.1
3. EU	170	4	41	7.5	11.8	100.0	100.0
4. China	117	7	13	6.5	2.3	63.1	86.3
5. Korea	52	2	2	7.9	2.0	51.4	99.2

Note: MFN = most-favored nation.

Source: WTO, ITC, and UNCTAD (2010).

The size and structure of Laos' foreign trade has changed as a result of domestic liberalization and growth, and developments among trading partners. Data by Otani and Pham (1996, p. 30) for 1979-1994 show that Laos' key exports include wood and wood products, coffee, hydroelectric power, and garments. Laos' key imports include rice and food stuffs, petroleum products, and machinery and raw materials. In 1979-1991, member countries of the Council for Mutual Economic Assistance (CMEA) (particularly the Soviet Union) were Laos' key trading partners, accounting for roughly one-third of total exports and one-half of total imports.

However, bilateral trading agreements between CMEA member countries and Laos were terminated in 1991 because of the collapse of the council and the reorientation of the Eastern European economies toward market-based trade. This forced Laos to search elsewhere for new export markets and supplies of fuel and production inputs. Meanwhile,

Thailand, Vietnam, and China provided ready markets for many products due to their own experiences of rapid economic liberalization and growth. Given these developments, continued domestic economic decentralization, and improvements in infrastructure and border access, exports rapidly increased beginning in the 1990s. Imports also increased dramatically, fueled by rising exports and significant foreign direct investment (FDI) inflows.

Table 3. Laos' Exports by Product and Destination, 2009 (% of Total Exports)

	Thailand	Vietnam	China	Japan	ASEAN	ASEAN+3	ASEAN+6	EU	Others	Total
Minerals	17.92	10.20	3.72	0.00	29.04	34.35	35.31	0.00	10.64	45.95
Garments	0.26	0.00	0.00	0.34	0.27	0.71	0.72	12.86	1.23	14.81
Electricity	9.86	0.00	0.00	0.00	9.86	9.86	9.86	0.00	0.00	9.86
Agricultural Products	3.99	1.73	3.05	0.01	5.73	8.78	8.78	0.04	0.02	8.84
Gold	0.00	0.00	0.00	0.00	0.00	0.00	8.78	0.00	0.00	8.78
Wood and Products	2.04	2.39	0.16	0.09	4.43	4.69	4.69	0.03	0.08	4.81
Others	1.71	1.60	0.34	0.65	3.34	4.37	4.38	0.91	1.67	6.96
Total	35.78	15.92	7.27	1.08	52.65	62.76	72.52	13.84	13.64	100.00

Note: ASEAN = Association of Southeast Asian Nations, EU = European Union.

Source: Ministry of Industry and Commerce (MOIC) (2011).

Table 4. Laos' Imports by Product and Origin, 2009

	Thailand	Vietnam	China	Japan	ASEAN	ASEAN+3	ASEAN+6	EU	Others	Total
Capital Goods	31.81	5.60	3.21	0.55	37.45	41.26	41.79	0.18	0.11	42.09
Vehicles and Spare Parts	11.68	1.26	1.56	0.10	12.94	16.27	16.27	0.01	0.01	16.29
Fuel and Gas	11.61	2.65	0.00	0.00	14.26	14.28	14.28	0.00	0.00	14.28
Industrial Goods	5.31	1.67	2.02	0.06	7.01	9.16	9.38	0.62	0.12	10.12
Garments and Raw Materials	2.94	0.40	0.47	0.03	3.66	4.19	4.23	0.02	0.44	4.70
Construction Materials	1.29	0.80	0.43	0.00	2.09	2.52	2.52	0.00	0.00	2.52
Others	5.59	1.61	2.19	0.00	7.64	9.86	9.86	0.11	0.04	10.01
Total	70.22	13.99	9.89	0.74	85.06	97.53	98.33	0.94	0.73	100.00

Note: ASEAN = Association of Southeast Asian Nations, EU = European Union.

Source: MOIC (2011).

Most of Laos' trade flows are concentrated within East Asia (Table 3). In 2009, 53% of Laos' exports went to ASEAN member countries and 72.5% went to ASEAN+6 countries. Laos' leading export is minerals, accounting for 46% of total exports, and the primary recipients of Laos' mineral exports are Thailand and Vietnam. Other key exports include garments, accounting for 15% of total exports, with the EU as the primary destination, and electricity, accounting for 10% of total exports, with Thailand as the largest recipient.

ASEAN+6 countries accounted for nearly all of Laos' total imports in 2009 with a 98% share (Table 4). Thailand alone accounted for 63% of the total imports. The key product group among Laos' imports is capital goods, accounting for 42% of its total imports. Capital goods are imported mainly from Thailand (32% share of total imports) and Vietnam (6%). Thailand is also the main source of Laos' imported vehicles and spare parts (12% share of total imports), and fuel and gas (12%).

In summary, Laos primarily exports minerals, garments, and electricity to the rest of the world in exchange for capital goods, vehicles and spare parts, and fuel and gas.

3. CONCEPTUAL FRAMEWORK AND ECONOMETRIC MODEL

To investigate the potential impacts of East Asian FTAs on Laos' trade, we apply the gravity model, which predicts that the volume of trade between two countries is positively related to their GDPs and negatively related to trade barriers between them. For our purpose, we have modified the gravity model based on recent trade theory and gravity model literature.

According to Helpman and Krugman (1985), the two determinants characterizing New Trade Theory (NTT) 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 NTT in the gravity model framework. According to this literature, the key determinants of international trade consist of the combined GDP of bilateral partners, similarity in GDP, and transportation costs. In addition, the difference between per capita incomes of exporters and importers is included to capture the relative factor endowment differences.

To empirically evaluate the potential trade impacts of FTAs in East Asia, we incorporate import tariffs into the gravity model. This is grounded in the fact that one of the objectives of integration through ASEAN+3 and ASEAN+6 is to reduce or eliminate members' import tariffs. Hence, explicitly including import tariffs in the gravity model specification provides us with an indicator of the potential effects of tariffs on trade flows. Our empirical model can be expressed as follows.

$$\ln(X_{ijt}) = \beta_0 + \beta_1 LGDPT_{ijt} + \beta_2 LDist_{ij} + \beta_3 LSIM_{ijt} + \beta_4 LdGDP_{ijt} + +\beta_5 Tar_{ijt} + u_{ijt}, \quad (1)$$

where $\ln(X_{ijt})$ denotes the log 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 combined GDP, the higher the volume of trade. The coefficient of $LGDPT_{ijt}$ should therefore be positive. u_{ijt} is a composite error term defined as $u_{ijt} = \lambda_t + \mu_{ij} + \varepsilon_{ijt}$, where λ_t is the time-specific fixed effects, μ_{ij} is the country-pair effects, and ε_{ijt} is a log-normally distributed error term.

$LDist_{ij}$ is the log of distance used as a proxy for transportation costs. Since higher transportation costs between two countries reduces trade flows between them, the coefficient on $LDist_{ij}$ should be negative. $LSIM_{ijt}$ denotes the similarity in country size and is intended to capture the contribution of intra-industry trade to total trade.[4] Its coefficient is expected to be positive. $LdGDP_{ijt}$ denotes the absolute differences in GDP per capita of importers and exporters, and is used to capture the differences in relative factor endowments.[5] A positive coefficient for $LdGDP_{ijt}$ means that the trade pattern can be explained by the Heckscher-Ohlin-Samuelson (HOS) model. That is, trade is of an inter-industry nature (Baltagi *et al*., 2003; Clark and Stanley, 1999; Bergstrand, 1990). A negative coefficient for $LdGDP_{ijt}$, however, illustrates that the trade pattern can be explained by Linder's hypothesis. This implies that the more dissimilar two countries are in terms of relative factor endowments, the smaller the trade volume between them.

Tar_{ijt}, defined as $\ln(1 + Tar_{ijt})$, denotes import tariff rates imposed by country *j* at time *t*. Since tariff barriers impede trade flows across international borders, we expect its coefficient to be negative. The statistical significance and negative sign of the coefficient for import tariffs in the gravity models of ASEAN+3 and ASEAN+6 imply that a further reduction in tariff rates is necessary to increase trade flows in these trading blocs; hence, the formation of East Asian FTAs could play an important role in achieving this goal.

Although the gravity model specified in Equation (1) has been widely used to investigate trade flows, it does not account for the fact that the volume of trade from country *i* to country *j* should be influenced by trade costs between countries *i* and *j* relative to those with the rest of the world. The seminal work by Anderson and van Wincoop (2003) suggests that ignoring the theoretically motivated multilateral resistance

[4] $LSIM_{ijt}$ is defined as $LSIM_{ijt} = \ln\left(1 - \left(\frac{GDP_{it}}{GDP_{it} + GDP_{jt}}\right)^2 - \left(\frac{GDP_{jt}}{GDP_{it} + GDP_{jt}}\right)^2\right)$.

[5] $LdGDP_{ijt}$ is defined as $LdGDP_{ijt} = \left|\ln\left(\frac{GDP_{it}}{capita_{it}}\right) - \ln\left(\frac{GDP_{jt}}{capita_{jt}}\right)\right|$.

terms for exporting and importing countries can lead to the misspecification of empirical gravity models. Due to the non-linearity of the structural relationships, they suggest that estimation requires a custom, non-linear least squares program to account properly for the endogeneity of prices and to estimate the comparative static effects of trade costs. While the approach of Anderson and van Wincoop (2003) provides consistent, efficient estimates of gravity-equation coefficients using cross-sectional data, it is difficult to apply to the dynamic panel data model since it requires sophisticated estimation methods. One of the most widely used estimation methods is the system generalized method of moments which is a linear estimator. Therefore, we first need to transform the bilateral resistance terms to the multilateral and world resistance (*MWR*) terms so that the linear estimator can be applied. To do so, we follow the approach proposed by Baier and Bergstrand (2010) to construct the *MWR* terms of distance and tariff rates. Equation (1) can be rewritten as

$$\begin{aligned}\ln X_{ijt} = {} & \beta_0 + \lambda_t + \beta_1 LGDPT_{ijt} + \beta_2 LSIM_{ijt} + \beta_3 LdGDP_{ijt} + \beta_4 LDist^*_{ij} \\ & + \beta_5 Tar^*_{ijt} + \mu_{ij} + v_{ijt},\end{aligned} \tag{2}$$

where $LDist^*_{ij} = LDist_{ij} - MD_{ij}$ and $Tar^*_{ijt} = Tar_{ijt} - MT_{ijt}$. The *MWR*s of distance and tariff rates are, respectively, denoted as MD_{ij} and MT_{ijt}. They have the opposite signs of their respective level variables. MD, for example, has a positive sign, meaning that an increase in the multilateral and world resistance of distance relative to the bilateral distance ($LDist$) raises bilateral trade flows. These *MWR*s are defined as follows

$$MD_{ij} = \left[\frac{1}{N} \left(\sum_{j=1}^{N} LDist_{ij} \right) + \frac{1}{N} \left(\sum_{i=1}^{N} LDist_{ij} \right) - \frac{1}{N^2} \left(\sum_{i=1}^{N} \sum_{j=1}^{N} LDist_{ij} \right) \right],$$

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

where N is the number of countries in the sample. The theoretical model obtained by Baier and Bergstrand (2010, p. 105) suggests that coefficient estimates for *MWR*s (*MD*, *MT*) and their respective level variables (*LDist*, *Tar*) are restricted to having identical, but oppositely signed, coefficient values. Therefore, these two variables appear in the restricted forms and are expressed in Equation (2).

Furthermore, the partial adjustments hypothesis is used to formulate the adjustment period of a variable to the desired level due to institutional rigidities, reflecting slow adjustments within the regional trade agreement process. This takes into account how producers adjust their levels of production when a change in demand for their products,

or other trade determinants, have been anticipated. In addition, possible time lags between contracts and the actual transfers of goods and services may be a source of slow adjustments in international trade. Assume that the log of real bilateral exports, $\ln X_{ijt}$, follows the partial adjustments hypothesis, then the gravity model (2) is rewritten as in Equation (3).

$$\begin{aligned}\ln X_{ijt} = {} & \varphi_0 + \gamma\lambda_t + \varphi_1 \ln X_{ij,t-1} + \varphi_2 LGDPT_{ijt} + \varphi_3 LSIM_{ijt} + \varphi_4 LdGDP_{ijt} \\ & + \varphi_5 LDist^{*}_{ijt} + \varphi_6 Tar^{*}_{ijt} + \mu_{ij} + v_{ijt}.\end{aligned} \tag{3}$$

Equation (3) is the dynamic gravity model based on the partial adjustments hypothesis. To estimate the dynamic gravity model (3), 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, either 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 effects to the variance of idiosyncratic errors is too large. Second, it cannot be used to estimate a 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 a "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 (3).

4. DATA DESCRIPTION

In our application, the sample consists of 16 countries, including the 10 members of ASEAN (Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam) and its six counterparts (Australia, China, India, New Zealand, Japan, and Korea). This study covers the period 1992-2009 and produces an unbalanced panel for 1,968 observations. The period of study was chosen on the basis of the availability of data and the rising level of economic integration in East Asia during this time. The unbalancedness panel data is due to zero trade flows and missing data on trade flows and import tariffs. Following Ahrens and Pincus (1981), the unbalancedness statistic is 0.82, indicating that the dataset is moderately unbalanced in terms of the number of observations each year.

It is important to note the problem of zero trade flows in bilateral trade analysis. The existing literature shows that there are two empirical methods to deal with zero trade flows: (i) employing estimation methods to account for zero trade flows or (ii) dropping zero trade flows from the dataset. The former involves the search for the best estimator for handling zero trade flows and heteroskedasticity. Some mostly applied estimators include the (i) Poission Pseudo-Maximum-Likelihood proposed by Santos, Silva, and Tenreyro (2006); (ii) Heckman sample-selection model employed by Helpman *et al*. (2008); (iii) threshold-Tobit model employed by Eaton and Tamura (1994); and (iv) Poison-Tobit model. Since these parametric estimations heavily rely on the assumptions of the data-generating process, they can seriously bias the parameter estimates as the data-generating process that generates zero trade flows is likely to differ from country to country. This is because there are different firm theories underpinning zero trade, such as those proposed by Eaton and Kortum (2002) and Helpman *et al*. (2008). Following Linnemann (1966), an alternative is to drop observations of zero trade flow from the sample. However, dropping these observations from the sample can remove useful information when the sample is small. In the present paper, we follow the latter method for two reasons. First, our panel data set remains relatively large even though all zero trade flow observations were dropped from the sample. Second, retaining only nonzero trade flow observations in the sample allows us to estimate the dynamic gravity model by the semiparametric estimation, especially the system GMM, whose estimated parameters are more robust than those of the parametric estimation under different data-generating processes.

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

The data for population are collected from the IMF's International Financial Statistics (IFS) (2006) and World Economic Outlook database. 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 are taken from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). The data for import tariffs on all products are derived from the World Bank's World Development Indicators and Global Development Finance database, which is the simple average of tariff rates for MFNs. Summary statistics and a correlation matrix of variables used in the analysis are reported in Appendix A in Tables A.1 and A.2, respectively.

5. EMPIRICAL RESULTS AND POLICY IMPLICATIONS

5.1. Estimation Results

To evaluate the potential impacts of the formation of an ASEAN+6 FTA on Laos' trade, the gravity model of regional trade flows is estimated. Since Laos has intensively traded with East Asian countries, estimated parameters obtained from such a gravity model provide a good approximation of the changing determinants of Laos' trade as well as of other countries involved. Table 5 reports the dynamic gravity model results of ASEAN+6 in terms of the short-and long-run impacts. The short-run gravity model is estimated by the system GMM, based on the model specified in Equation (3).[6] Robust standard errors from this estimation are generated on the assumption that there are correlations within each country pair, but not across them. It is, therefore, necessary to estimate the model with time dummies in order to account for universal time-related shocks from the errors (Roodman, 2006, p. 26). The estimated gravity model contains five key variables (sum of bilateral GDP, similarity in GDP, distance, differences in relative factor endowments, and tariff rates) and one lagged bilateral export.

Since the system GMM for dynamic panel data model is very complicated and the obtained results could be invalid if some assumptions fail, it is important to interpret the results starting with the model diagnostics. The approach of the system GMM assumes linearity and that the disturbance terms are not serially correlated; that is, the applied instruments in the model are exogenous. As a result, testing for the validity of instruments is crucial in testing the statistical properties of this model. The statistical tests for system GMM include the following diagnostics. First, it is assumed there are no serial correlations in the twice-lagged residuals. Autocorrelation in the error terms is,

[6] 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 Eaton and Kortum (2002), Anderson and van Wincoop (2003), and Feenstra (2004). The reason is that the trade flows between countries *i* and *j* are 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 countries *i* and *j* with the other *N*–2 countries.

therefore, subject to be tested. According to Arellano and Bond (1991), the GMM estimator requires that there is first-order serial correlation, but that there is no second-order serial correlation in the residuals. Because the null hypotheses are that there is no first-order, or there is second-order, serial correlation, it means that one needs to reject the null hypothesis for the test of first-order serial correlation, but not to reject it for the test of second-order serial correlation to get appropriate diagnostics. As shown in Table 5, these tests support the validity of the model specification.

Table 5. Dynamic Regression Results for Real Bilateral Exports of ASEAN+6 Members

Dependent variable: Bilateral Export	ASEAN+6	
Explanatory variables:	Short-run	Long-run Impacts
Constant	-14.576***	-
	(3.732)	-
Lag One Year of Bilateral Exports	0.561***	-
	(0.104)	-
Bilateral Sum of GDP	0.785***	1.789***
	(0.197)	(0.091)
Similarity in GDP	0.548***	1.248***
	(0.134)	(0.079)
Difference in Relative Factor Endowments	-0.095**	-0.216***
	(0.041)	(0.075)
Distance	-0.313***	-0.712***
	(0.108)	(0.198)
Tariff Rates	-0.088**	-0.202**
	(0.039)	(0.088)
Number of Observations	1721	
Number of Groups	230	
Model Degrees of Freedom	22	
Residual Degrees of Freedom	229	
Number of Instruments	39	
RMSE	0.76	
Diagnostic Tests: *F*(model df, residual df)	203.63***	
Wald Test for time Effects: *F*(16, residual df)	5.34***	
Arellano-Bond test for AR(1) in first difference:	*Z*=-2.95***	
H_0: *There is no first-order serial correlation in residuals*		
Arellano-Bond test for AR(2) in first difference:	*Z*=-0.66	
H_0: *There is no second-order serial correlation in residuals*		
Hansen *J*-test of Overidentifying Restrictions:	*Chi2*(16)=17.67	
H_0: *Model specification is correct and all overidentified instruments are exogenous*		

Notes: *** denotes significance at the 1% level, ** at the 5% level, and * at the 10% level. All variables are in logarithmic form. Distance and tariff rates are estimated in restricted forms, specified in Equation (2).
Source: Authors' estimation.

Second, the Hansen *J*-statistic tests the null hypothesis of correct model specification and over-identifying restrictions (Baum and Schaffer, 2003, p. 16). A rejection of the null hypothesis indicates that either or both assumptions are questionable. Our result of the Hansen test of over-identifying restrictions in Table 5 does not reject the null at any conventional level of significance, suggesting that the model has valid instrumentation.

Third, according to Roodman (2006, p. 26), estimating the model with time dummies could remove universal time-related shocks from the errors and, thus, there is no cross-section dependence. In Table 5, the *F*-test for time effects is statistically significant. Consequently, the inclusion of time dummies in our specification have improved the statistical diagnostics and removed universal time-related shocks from the error term.

Fourth, a large collection of instruments generated by the difference and system GMM estimators can be collectively invalid in finite samples because they over-fit endogenous variables and, hence, cause bias estimates. One rule of thumb suggests that the number of instruments should not exceed the number of observations, which is adhered to in our case (39 instruments<1,968 observations). Furthermore, the *p*-value of the Hansen *J*-statistic should be at least 0.25 (Roodman, 2007, p. 11). In our model, the Hansen *J*-test reports a *p*-value of 0.35, which satisfies this rule. Therefore, the number of instruments is optimal.

Finally, the *F*-statistics in the short-run model are statistically significant at conventional levels, indicating that our model can be used to determine bilateral trade flows among ASEAN+6 countries.

Based on the various statistical tests that have been conducted, there is enough evidence to reasonably conclude that the examined statistical tests satisfy the principle assumptions of system GMM estimation and that this model is an appropriate statistical generating mechanism.

The results for the short-run impacts obtained from the dynamic gravity model can be interpreted as follows. First, all variables have the expected signs. Second, the model shows a significant positive impact of the NTT variables (sum of bilateral GDP, similarity in country GDP) on bilateral trade. Third, our model supports Linder's hypothesis, captured by the variable of differences in GDP per capita, which states that two countries trade less if they have different levels of GDP per capita and, hence, different preferences. Fourth, the statistical significance of import tariffs at the 10% level indicates that further reduction of tariff barriers can increase trade flows in the proposed trading bloc: a 1% decrease in tariff rates is associated with, on average, a 9.8% rise in bilateral trade flows in ASEAN+6.

To provide insight on the institutional rigidities within ASEAN+6, it is useful to examine the long-run adjustments through the one-year lag of bilateral exports toward the equilibrium. In the long-run, bilateral exports at the current and previous years are equal; that is, $\ln X_{ij,t} = \ln X_{ij,t-1}$. Following this concept, we calculate the speed of adjustment as the reciprocal of one minus the coefficient of lagged bilateral exports. The speed of adjustment is equal to 2.31, meaning that it takes more than two years for

bilateral trade flows in ASEAN+6 to respond to a change in one variable, holding other variables constant. In other words, the time horizon over which the determinants of trade change does matter. Consequently, the reduction of tariff rates in ASEAN+6, for example, would not stimulate bilateral trade flows overnight.

According to many empirical studies utilizing the gravity model to evaluate trade flows, the variable for distance, which is a proxy for transportation costs, has a negative effect on bilateral trade flows and, hence, reduces trade flows. In the context of ASEAN+6 trade integration, bilateral trade flows increase by 3.51% given a 10% decrease in transportation costs. This evidence suggests that regional trade can be improved through the comprehensive development of land transportation infrastructure, especially among the least developed economies of ASEAN.

Using the delta method, we estimate both coefficients and standard errors for the long-run effects in a dynamic panel data model. The results are reported in the second column of Table 5. The long-run effect of a covariate is defined to be the current coefficient divided by one minus the sum of the lagged coefficient on the dependent variable, where the denominator comes from the long-run equilibrium condition, which equalizes the present and previous values of the dependent variable. Using this definition of the long-run effect of the covariate, the long-run impact of overall market size, measured as the log of the combined GDPs of a trading pair ($LGDPT_{ijt}$), is 1.75 for ASEAN+6; that is, a 1% increase in the combined size of the economies of a trading pair increases their bilateral exports by 1.75%. Thus, bilateral exports grow more rapidly than income. This international trade phenomenon is explained by NTT in Helpman (1987, p. 69).

Furthermore, in the long-run the elasticity of the differences in relative factor endowments exhibits a negative impact on bilateral export flows. Nevertheless, it is a relatively small impact, with a coefficient of about 0.2. The coefficient of similarity in GDP size also confirms the importance of similarities among countries involved in a regional trading bloc. Moreover, the coefficient of the tariff variable is negative and statistically significant at the 10% level, indicating that a reduction in tariffs can increase trade flows. More precisely, the suggested long-run impact of a 1% reduction in import tariffs is a 22.26% increase in trade flows, which is relatively large compared with the magnitudes of other trade determinants in our dynamic gravity model. This implies that the formation of an ASEAN+6 FTA can play an important role in enhancing intra-regional trade among member countries.

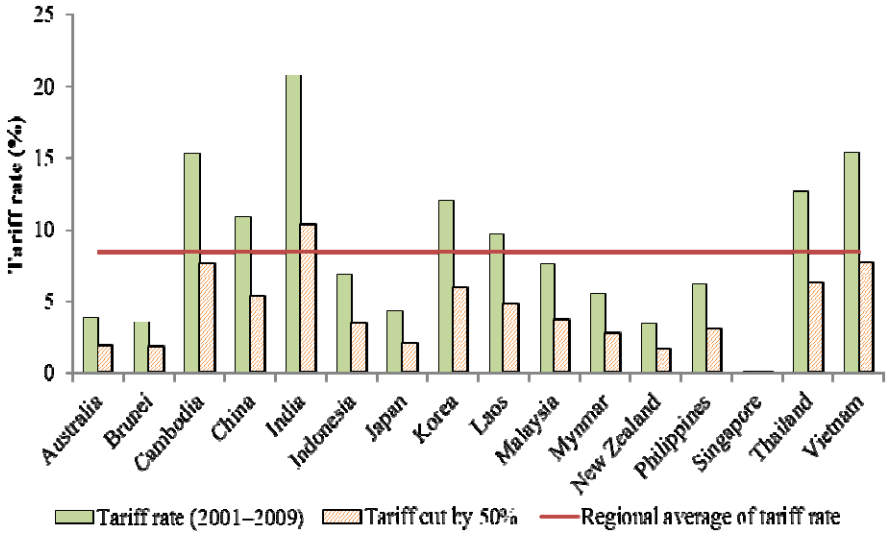
5.2. Simulation Analyses

In order to make our analysis more realistic, it is useful to construct monetary estimates of the trade gains associated with reduced import tariffs in East Asia. Attention is given to trade between Laos and other members of ASEAN, as well as the “plus six” countries. To do so, we use estimated coefficients from the gravity model to examine how much trade between Laos and its regional trading partners might increase under

various tariff reduction scenarios. This approach has also been applied to conduct simulations of projections of trade flows in previous studies, including Frankel *et al*. (1993), Wilson *et al*. (2005), Shepherd and Wilson (2009), and Athukorala (2012). The estimated coefficients from the gravity model are used as the basis for counterfactual simulations that can be analyzed comparatively.

We re-estimate the gravity equation at shorter intervals, one for 1992-2000 and another for 2001-2009, and find that there is a significant change in the coefficients, especially for tariff rates (Table A.3). However, the coefficient for tariff rates is statistically significant in the latter period but not the former. Therefore, the estimated coefficients from the regression that covers 2001-2009 are used for the simulation analyses.

We conduct the simulations as follows. We recalculate our tariff rates with the condition that those countries that are above the regional average for 2001-2009 have their rates reduced to that threshold. This allows us to calculate the percentage change in the tariff rates for each country pair, which we map to approximate trade impacts using gravity model elasticities. To do so, we calculate the annual average value of trade for each country pair, which is defined as the sum of bilateral trade over time divided by the number of years the pair has engaged in trade.



Note: ASEAN = Association of Southeast Asian Nations.

Source: Authors' calculation.

Figure 1. Average Tariff Rates in ASEAN+6, 2001-2009

Results for our three possible scenarios are presented in Tables 6, 7, and 8. In Scenario 1, we consider a cut in tariff rates to the current regional average of 8.51% so that no country sets its tariff rates above this threshold. We think of this scenario as representing integration in which countries that have tariff rates higher than the regional average must reduce them to the specified threshold. In doing so, countries that already have tariff rates lower than the threshold are likely to gain from trade, as those countries that previously had higher tariff rates become more attractive markets. As shown in Figure 1, countries with annual average tariff rates above the regional average include Cambodia, China, India, Korea, Laos, Thailand, and Vietnam. Among these countries, Laos has the lowest tariff rates.

Table 6. Scenario 1: Simulation Results for Laos' Trade Gains in ASEAN+6 ($ million and % change from baseline)

Country	Import Gain	%	Export Gain	%	Trade Balance	%
Indonesia	0.73	16.46	0.00	0.00	-0.73	18.99
Malaysia	1.10	16.41	0.00	0.00	-1.10	18.71
Philippines	0.17	16.52	0.00	0.00	-0.17	18.11
Singapore	4.53	16.36	0.00	0.00	-4.53	16.95
Thailand	67.03	16.42	83.20	101.79	16.17	-4.95
Vietnam	10.87	16.34	104.94	178.45	94.07	-1,222.75
China	18.60	16.41	4.90	24.13	-13.70	14.73
Japan	4.89	16.38	0.00	0.00	-4.89	26.48
Korea	3.56	16.48	0.77	59.73	-2.79	13.75
Australia	2.70	16.41	0.00	0.00	-2.70	17.70
India	0.98	16.29	1.13	304.89	0.15	-2.67
New Zealand	0.17	16.39	0.00	0.00	-0.17	23.14

Notes: Sample includes all listed countries (with the exception of Brunei, Cambodia, and Myanmar) for the period 2001-2009. Simulation involves cut in tariff rates to the regional average of 8.51%.
Source: Authors' estimation.

Table 6 shows the simulation results from Scenario 1 for evaluating Laos' trade gains in the context of an ASEAN+6 FTA. In this case, Laos can benefit by experiencing an increase in trade of about $310 million per year. This gain results from an increase in exports to Vietnam, Thailand, China, and India, which would improve Laos' trade balance with members of ASEAN+6 by almost 15% (Table 9). The recipients of increased exports from Laos are mainly its neighboring countries: Vietnam accounts for 53.8% ($104.9 million) of the total export gains, Thailand accounts for 42.7% ($83.2 million), and China accounts for 2.5% ($4.9 million). As shown in Table 3, key exports from Laos to these three countries include electricity, minerals, wood and wood products, and garments. Furthermore, the simple average of the MFN tariff rate for primary

products in 2006 was 17.7% for Vietnam, 16.1% for Thailand, and 10.7% for China.[7] This suggests that further reduction in tariff rates for primary products would generate intra-regional trade gains for Laos.

Table 7. Scenario 2: Simulation Results for Laos' Trade Gains in ASEAN+6 ($ million and % change from baseline)

Country	Import Gain	%	Export Gain	%	Trade Balance	%
Indonesia	3.94	88.60	0.35	58.48	-3.59	93.24
Malaysia	5.94	88.56	0.61	73.56	-5.33	90.67
Philippines	0.91	88.65	0.04	41.16	-0.87	93.22
Singapore	24.49	88.53	0.001	0.11	-24.49	91.71
Thailand	361.54	88.57	117.23	143.42	-244.31	74.84
Vietnam	58.86	88.51	108.13	183.88	49.27	-640.41
China	100.37	88.56	19.15	94.36	-81.21	87.30
Japan	26.42	88.54	3.71	32.59	-22.71	123.04
Korea	19.13	88.62	1.53	119.05	-17.61	86.70
Australia	14.60	88.56	0.38	31.50	-14.22	93.05
India	5.34	88.47	0.88	237.00	-4.46	78.71
New Zealand	0.94	88.55	0.10	32.89	-0.84	111.47

Note: Simulation involves a cut in tariff rates in ASEAN+6 by 50%.

Source: Authors' estimation.

A deeper form of regional integration under Scenario 2 would entail a 50% reduction in tariff rates in all countries, regardless of existing rates (Figure 1), in order to boost mutual trade. The simulation results from Scenario 2 for evaluating the trade gains of Laos in the context of ASEAN+6 are illustrated in Table 7. Under this scenario, Laos would benefit from an increase in trade of about $875 million per year. However, import gains would exceed export gains, thereby worsening the trade deficit between Laos and other ASEAN+6 countries by about 71% (Table 9). The major sources of Laos' export gains under Scenario 2 are Thailand ($117.2 million), Vietnam ($108.1 million), China ($19.2 million), Japan ($3.7 million), and Korea ($1.5 million). The major sources of Laos' import gains are Thailand ($361.5 million), China ($100.4 million), Vietnam ($58.9 million), Japan ($26.4 million), Singapore ($24.5 million), and Korea ($19.1 million). Regarding bilateral trade, the trade balance between Laos and Vietnam would improve substantially by 640%, whereas it would be severely worsened with Japan by 123%. As the Laos' economy progresses in the industrialization process, Japan can be an important source of capital goods.

[7] Data obtained from the World Bank's *World Development Indicator 2010*.

Table 8. Scenario 3: Simulation Results for Laos' Trade Gains in ASEAN+6 ($ million and % change from baseline)

Country	Import Gain	%	Export Gain	%	Trade Balance	%
Indonesia	11.84	266.56	0.92	155.12	-10.92	283.71
Malaysia	17.86	266.40	1.72	208.09	-16.14	274.58
Philippines	2.74	266.73	0.09	101.21	-2.65	282.67
Singapore	73.67	266.26	0.00	0.22	-73.67	275.84
Thailand	1,087.55	266.44	437.42	535.14	-650.13	199.16
Vietnam	177.02	266.19	456.59	776.44	279.57	-3,633.88
China	301.90	266.40	59.00	290.69	-242.90	261.10
Japan	79.48	266.30	8.75	76.84	-70.73	383.13
Korea	57.56	266.61	5.16	402.77	-52.40	258.02
Australia	43.90	266.40	0.89	73.93	-43.02	281.52
India	16.06	266.02	4.37	1,174.39	-11.69	206.35
New Zealand	2.82	266.35	0.24	77.71	-2.58	344.00

Note: Simulation involves the elimination of all tariff rates in ASEAN+6.

Source: Authors' estimation.

In order to fully realize the gains from free trade, integration should progress to the point of completely removing all tariff barriers, as is the case in Scenario 3. As shown in Table 8, Laos would significantly benefit from such a scenario with an increase in trade of about $2,848 million. Again, it is important to note that import gains exceed export gains, which would worsen Laos' trade deficit with members of the trading bloc by 171%. The major sources of Laos' export gains would be Vietnam ($456.6 million), Thailand ($437.4 million), China ($59.0 million), Japan ($8.8 million), and Korea ($5.2 million). The major sources of Laos' import gains would be Thailand ($1,087.6 million), China ($301.9 million), Vietnam ($177.0 million), Japan ($79.5 million), Singapore ($73.7 million), and Korea ($57.6 million). In this scenario, the bilateral trade balance between Laos and Vietnam will substantially improve by 3,634%, while it will worsen with Japan by 383%. As in Scenario 2, Laos will require additional capital goods from Japan to support its industrialization process.

5.3. Policy Implications

As indicated in Table 9, which summarizes the simulation results from Scenarios 1, 2, and 3, the expected intra-regional trade gains for Laos from reduced import tariffs are large. Through ASEAN+3 and ASEAN+6 FTAs, Laos stands to realize trade gains of 35.7% ($305 million) and 35.2% ($310 million), respectively, from reducing tariffs to the regional average. Furthermore, the trade deficit between Laos and its partners is reduced by 16.4% in ASEAN+3 and 15.2% in ASEAN+6. This implies that under the current state of the Lao economy, ASEAN enlargement will bring small static trade

gains to Laos.

Table 9. Scenarios 1, 2, and 3: Comparison of Simulation Results for Laos' Trade Gains in ASEAN+3 and ASEAN+6 ($ million and % change from baseline)

Scenario	ASEAN+3				ASEAN+6			
	Trade Gain	%	Trade Balance	%	Trade Gain	%	Trade Balance	%
Scenario 1	305.28	35.69	82.34	-16.36	310.28	35.23	79.61	-15.16
Scenario 2	852.34	99.66	-350.86	69.71	874.58	99.30	-370.38	70.55
Scenario 3	2,779.28	324.96	-839.97	166.89	2,847.56	323.32	-897.26	170.91

Notes: Sample includes all listed countries (with the exception of Brunei, Cambodia, and Myanmar) for the period 2001-2009. Scenario definitions are as set out above.

Source: Authors' estimation.

Furthermore, reducing current regional tariffs by 50% would see Laos realize trade gains in ASEAN+3 of 99.7% ($852.3 million) and in ASEAN+6 of 99.3% ($874.6 million). Finally, eliminating all tariffs would increase Laos' trade by a considerable amount: 325.0% ($2,779.3 million) in ASEAN+3 and 323.3% ($2,847.6 million) in ASEAN+6 (Table 9). (Enlargement from ASEAN+3 to ASEAN+6 provides small static gains to Laos' exports because bilateral trade relations between Laos and Australia, India, are New Zealand are low relative to ASEAN+3 countries.) Under Scenarios 2 and 3, the trade deficit between Laos and its partners increases by a substantial amount.

The results of this study suggest that there is an economic rationale for ASEAN members and its six counterparts to continue reducing tariffs as a part of the regional integration process. The formation of East Asian FTAs is one possible means to realize such substantial gains. However, given the low level of competitiveness in Laos' economy, too much liberalization could lead to a severe worsening of the trade deficit between Laos and other ASEAN+6 countries.

A large trade deficit, coupled with the inflexibility of domestic macroeconomic instruments and inconsistent policies in a weak institutional setting, could substantially contribute to macroeconomic volatility in Laos, which in turn can lead to unstable growth rates in terms of real GDP and private consumption. Consequently, increased macroeconomic volatility resulting from a widening trade deficit would be a very negative development in Laos.

Nonetheless, since joining an ASEAN+6 FTA would potentially be a matter of necessity, future gains for Laos may be achieved through structural changes that involve the gradual shift of workers from labor-intensive and low-productivity agriculture to labor-intensive manufacturing, thereby moving further up the value chain and increasing productivity. A national plan for industrialization, for instance, should not be biased toward the mining sector, rather it should provide more incentive to develop the high-value-added manufacturing sector. Moreover, Laos needs to implement more rapid

and systematic reforms, including reform of the infrastructure and financial sectors in order to catch up with other countries, especially China, in the process of Asian economic integration (Zhang, 2006). In particular, improving national transportation routes remains a strategic priority. By doing so, Laos can enhance the competitiveness of domestic firms and attract FDI to support its production base. As trade costs fall, a country's small GDP is no longer an FDI constraint because of fragmented production processes being practiced by multinationals across East Asia.

6. CONCLUSIONS

In this paper, we use an unbalanced panel dataset of bilateral export flows from 10 ASEAN countries plus Australia, China, India, Japan, Korea, and New Zealand over the period 1992–2009. We identify the bilateral trade determinants of ASEAN+6 trade based on NTT, including overall bilateral GDP, relative factor endowment differences, similarities in GDP, 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 flows are positively related to the sum of bilateral GDP and similarities in GDP, and are inversely related to the relative factor endowment differences, transportation costs, and import tariff rates. Our empirical results support NTT and Linder's hypothesis. Our results also highlight the importance of reducing gaps in GDP per capita among member countries of an FTA to ensure that the full benefits of regional economic integration can be enjoyed by all members.

Using the parameter estimates of trade determinants in ASEAN+6, we conduct the simulation through three possible scenarios to evaluate the potential impacts of ASEAN enlargement on Laos' trade: (i) a cut in all tariff rates to current regional averages, (ii) a 50% reduction in the tariff rates of all FTA members, and (iii) the elimination of all tariff barriers by all FTA members. As indicated in our simulation results, Laos has much to gain from regional tariff reduction or elimination. At the same time, ASEAN+3 and ASEAN+6 FTAs would stimulate exports but raise imports by an even greater amount, leading to a worsening of Laos' trade deficit. To the extent that current trade arrangements have constrained the growth of output and living standards, our findings have important implications for the sequencing and degree of liberalization in Laos. Nonetheless, the enlargement of a regional economic framework in East Asia will give Laos the opportunity to move further up the value chain and increase productivity.

APPENDIX

Table A.1. Summary Statistics of Variables Used in the Analysis of Laos' Trade Flows in ASEAN+6

Variable	Mean	Std. Dev.	Min	Max
$\ln X_{ijt}$	19.72	3.11	8.94	25.33
$LGDPT_{ijt}$	27.11	1.37	22.39	29.71
$LSIM_{ijt}$	-2.11	1.42	-7.35	-0.69
$LDist_{ijt}$	8.15	0.76	5.75	9.45
$LdGDP_{ijt}$	2.10	1.43	0.00	6.17
Tar_{ijt}	0.10	0.07	0.00	0.44

Source: Authors' calculation.

Table A.2. Correlation Matrix for All Variables Used in the Empirical Analysis

Variable	$\ln X_{ijt}$	$LGDPT_{ijt}$	$LSIM_{ijt}$	$LDist_{ijt}$	$LdGDP_{ijt}$	Tar_{ijt}
$\ln X_{ijt}$	1.00					
$LGDPT_{ijt}$	0.59	1.00				
$LSIM_{ijt}$	0.37	-0.32	1.00			
$LDist_{ijt}$	0.00	0.33	-0.03	1.00		
$LdGDP_{ijt}$	-0.21	0.03	-0.20	0.16	1.00	
Tar_{ijt}	-0.07	-0.04	0.04	-0.10	-0.06	1.00

Source: Authors' calculation.

Table A.3. Subsample Estimations of Bilateral Exports of ASEAN+6 Members

Dependent Variable: Bilateral Export	ASEAN+6	
Explanatory Variables:	1992-2000	2001-2009
Constant	-14.991**	-8.674**
	(5.752)	(3.450)
Lag One Year of Bilateral Exports	0.577***	0.744***
	(0.160)	(0.097)
Sum of Bilateral GDP	0.815**	0.438**
	(0.319)	(0.173)
Similarity in GDP	0.513**	0.323**
	(0.192)	(0.132)

Difference in Relative Factor Endowments	-0.131*	-0.056**
	(0.067)	(0.026)
Distance	-0.248**	-0.197**
	(0.113)	(0.095)
Tariff Rates	-5.816	-14.036*
	(5.070)	(7.856)
Number of Observations	471	1398

Source: Authors' calculation.

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