



**ADB Working Paper Series**

**An Empirical Analysis of ASEAN's  
Labor-Intensive Exports**

---

Willem Thorbecke

No. 166  
November 2009

**Asian Development Bank Institute**

Willem Thorbecke has been a senior research fellow at ADBI since June 2009.

I thank Masahiro Kawai, Ginalyn Komoto, Mario Lamberte, Robert Owen, and seminar participants at ADBI for extremely valuable comments. Any errors are my responsibility.

The views expressed in this paper are the views of the authors and do not necessarily reflect the views or policies of ADBI, the Asian Development Bank (ADB), its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

The Working Paper series is a continuation of the formerly named Discussion Paper series; the numbering of the papers continued without interruption or change. ADBI's working papers reflect initial ideas on a topic and are posted online for discussion. ADBI encourages readers to post their comments on the main page for each working paper (given in the citation below). Some working papers may develop into other forms of publication.

Suggested citation:

Thorbecke, W. 2009. An Empirical Analysis of ASEAN's Labor-Intensive Exports. ADBI Working Paper 166. Tokyo: Asian Development Bank Institute. Available: <http://www.adbi.org/working-paper/2009/11/20/3369.empirical.analysis.asean.labor.export/>

Asian Development Bank Institute  
Kasumigaseki Building 8F  
3-2-5 Kasumigaseki, Chiyoda-ku  
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500  
Fax: +81-3-3593-5571  
URL: [www.adbi.org](http://www.adbi.org)  
E-mail: [info@adbi.org](mailto:info@adbi.org)

© 2009 Asian Development Bank Institute

**Abstract**

This paper investigates the factors affecting the demand for the Association of Southeast Asian Nations' (ASEAN) labor-intensive exports. Results obtained using a panel data set including exports to 25 countries indicate that an appreciation in ASEAN countries would substantially reduce exports of clothing, furniture, and footwear. In addition, an increase in foreign income and an appreciation among competitors would raise ASEAN's exports. These results indicate that profit margins for labor-intensive manufactures are thin and that slow growth abroad will curtail ASEAN's exports. These findings imply that policymakers should seek to promote domestic demand, expand the technological base, and consider exchange rate coordination to mitigate "beggar-thy-neighbor" policies.

**JEL Classification: F32, F41**

## Contents

1.	Introduction.....	1
2.	Data and Methodology .....	2
	2.1 ASEAN's Labor-Intensive Manufacturing Exports.....	2
	2.2 The Imperfect Substitutes Model.....	5
	2.3 Dependent and Independent Variables.....	5
	2.4 Econometric Methodology.....	7
3.	Results .....	7
4.	Conclusion.....	12
	References.....	13

## 1. INTRODUCTION

The value of the Association of Southeast Asian Nations' (ASEAN) exports increased threefold between 1998 and 2008. Many of these goods were produced within East Asian production networks. 40% of the exports from Malaysia, Philippines, and Thailand in 2007 were electronic goods. In addition, 13% of Thailand's exports were automotive products. These goods were produced using parts and components coming from Japan, Republic of Korea (hereafter Korea), and Taipei, China. Demand for sophisticated manufactured goods produced within East Asian supply chains has plummeted. Can labor-intensive manufacturing exports take their place as an engine of growth?

To answer this question it is necessary to examine the factors affecting the demand for labor-intensive exports. How will slower growth in the rest of the world affect spending on clothing, furniture, and footwear produced in ASEAN countries? Is it true, as policymakers in Asia often argue, that profit margins for labor-intensive goods are razor-thin and, thus, that exchange rate appreciations could decimate these industries? How much competition is there between ASEAN and countries such as the People's Republic of China (PRC) and Viet Nam in the export of low-technology products to third markets?

Previous work investigating these questions has yielded mixed results. Ahearne et al. (2003), using a vector autoregression and annual data from 1981 to 2001, found that income growth in importing countries is a much more significant determinant of exports from East Asia than exchange rate changes. Bénassy-Quéré and Lahrèche-Révil (2003), using panel data techniques and annual data from 1984 to 2001, reported that a 10% appreciation in one East or Southeast Asian country reduces exports to the rest of the world by 5.5%. Thorbecke (2006), using dynamic ordinary least squares (DOLS) estimation and quarterly data from 1987 to 2005, presented evidence indicating that a 10% depreciation of ASEAN currencies against the United States (US) dollar would decrease the PRC's exports to the US by 7.5%. Cheung, Chinn, and Fujii (2009), on the other hand, using DOLS estimation and quarterly data from 1993 to 2006, did not find a statistically significant relationship between the PRC's exports to the US and exchange rates in third countries.

This paper takes up these issues by investigating labor-intensive exports from Indonesia, Malaysia, Philippines, and Thailand to the rest of the world. Results using DOLS estimation and annual data from 1983 to 2007 indicate that exports are very sensitive to income in the importing countries, the exchange rate between ASEAN countries and the importing countries, and the exchange rates between other exporters such as the PRC and the importing countries.

These results imply that labor-intensive exports may not be able to promote recovery in ASEAN countries. The high estimated income elasticities indicate that if the recovery in the rest of the world is slow, demand for ASEAN's exports will also be constrained. In addition, the high estimated exchange rate elasticities support the claim that profit margins for labor-intensive goods are thin. It may thus be difficult for Indonesia, Malaysia, Philippines, and Thailand to compete with lower-wage economies in the region such as the PRC and Viet Nam.

From a policy perspective, these findings imply that ASEAN countries should promote domestic and regional demand to compensate for weak demand abroad. They should also seek to assimilate new technologies and move up the value chain rather than engaging in price competition with low-wage economies. Finally, they should consider exchange rate coordination with their Asian neighbors to avoid "beggar-thy-neighbor" policies and other unpleasant outcomes.

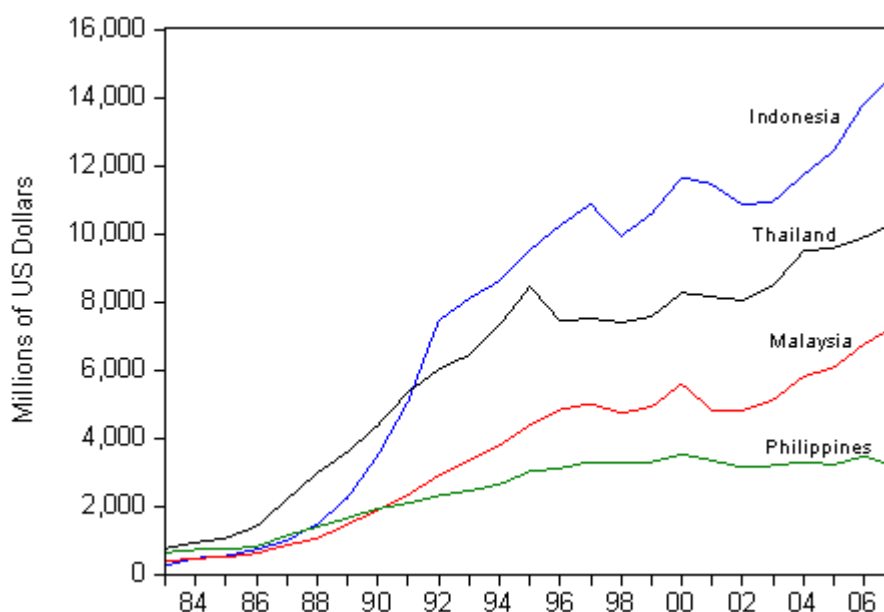
The next section presents the data and methodology employed in this paper. Section 3 contains the results. Section 4 concludes.

## 2. DATA AND METHODOLOGY

### 2.1 ASEAN's Labor-Intensive Manufacturing Exports

Figure 1 shows the value of ASEAN's labor-intensive exports over time. Labor-intensive exports include carpets, clothing, fabrics, furniture, knitwear, leather, and yarns. Exports of these goods increased very rapidly during the ten years preceding the 1997–1998 Asian financial crisis. Beginning in 2002, exports from Indonesia, Malaysia, and Thailand began increasing rapidly again. The figure also indicates that labor-intensive exports are especially important in Indonesia.

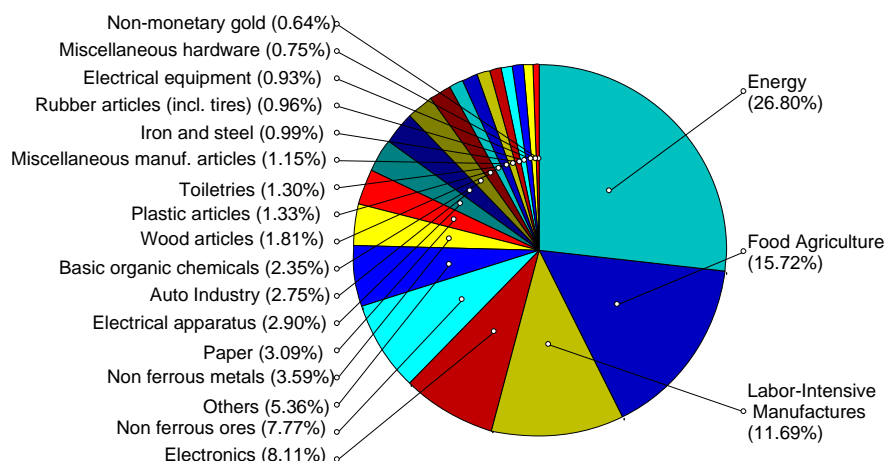
**Figure 1: The Value of Labor-Intensive Exports from ASEAN Countries**



Source: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>).

These findings are confirmed in Figure 2. The figure shows Indonesia's exports in 2007 broken down by product category. The data come from the Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII)-CHELEM database. Labor-intensive manufactures (LIM) were the third largest export category. 12% of Indonesia's exports were in this category.

**Figure 2: Indonesia's Exports by Product Category, 2007**



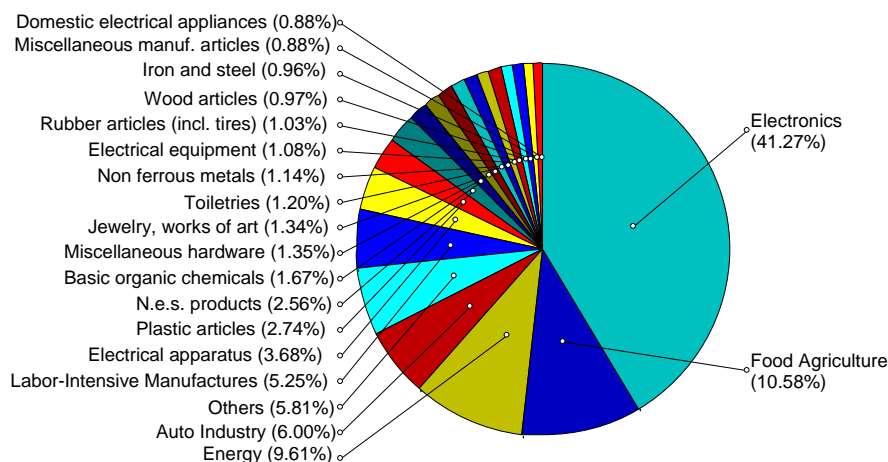
Notes:

1. Labor-Intensive Manufactures includes carpets, clothing, fabrics, furniture, knitwear, leather goods, and yarns.
2. Electronics includes consumer electronics, telecommunication equipment, computer equipment, electronic components, optics, clockmaking, and precision instruments.

Source: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>).

Figure 3 shows exports disaggregated by product category for Malaysia, Philippines, and Thailand. LIM make up only 5% of exports from these three countries. For Malaysia alone they make up 3% of exports, for the Philippines alone 5%, and for Thailand alone 7%.

**Figure 3: Exports from Malaysia, Philippines, and Thailand by Product Category, 2007**



N.e.s. = Not elsewhere specified.

Notes:

1. Labor-Intensive Manufactures includes carpets, clothing, fabrics, furniture, knitwear, leather goods, and yarns.
2. Electronics includes consumer electronics, telecommunication equipment, computer equipment, electronic components, optics, clockmaking, and precision instruments.

Source: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>).

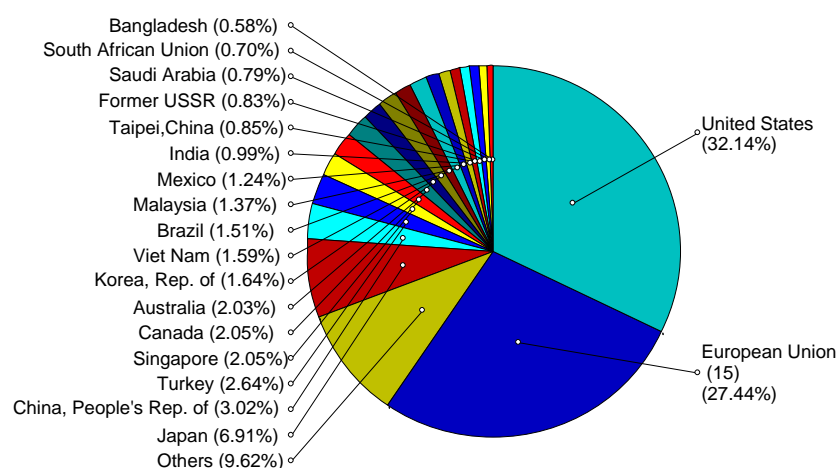
Figure 3 indicates that electronics goods are especially important for Malaysia, Philippines, and Thailand. Electronic goods include computer equipment, consumer electronics, telecommunication equipment, electronic components, optics, clockmaking, and precision instruments. 41% of exports from these countries are electronic goods. For Malaysia alone they make up 46% of exports, for the Philippines alone 58%, and for Thailand alone 28%.

Electronic goods are produced largely within East Asian production and distribution networks. Japan; Korea; Taipei,China; and multinational companies located in ASEAN

countries export sophisticated technology-intensive intermediate goods to ASEAN countries for assembly and re-export. Agarwalla (2005) reports that the Philippines' value-added in the electronics industry is small. In a comprehensive study, he finds that the local value-added is less than 15%. Austria (2008) similarly concludes, based on a detailed analysis of import and export data, that ASEAN's electronics exports are highly import-dependent and that the domestic content is minimal. Labor-intensive exports, on the other hand, have much higher domestic value-added.

Figure 4 shows the countries and regions that purchased ASEAN's labor-intensive exports. In 2006, 32% went to the US, 27% went to the European Union (EU)-15,<sup>1</sup> 7% went to Japan, and the remainder went to the rest of the world.

**Figure 4: Share of ASEAN's Labor-Intensive Exports Going to Individual Countries and Regions in 2007**



ASEAN = Association of Southeast Asian Nations, USSR = Union of Soviet Socialist Republics.

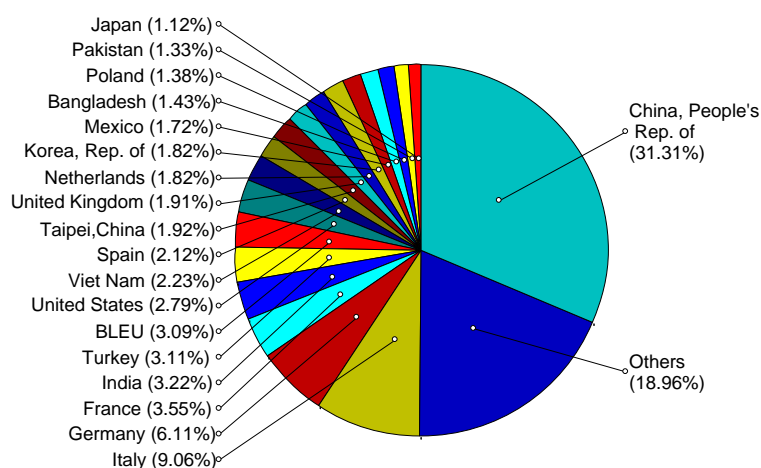
Notes:

1. ASEAN includes Indonesia, Malaysia, Philippines, and Thailand.
2. Labor-Intensive Manufactures includes carpets, clothing, fabrics, furniture, knitwear, leather goods, and yarns.

Source: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>).

Figure 5 shows the leading exporters of labor-intensive goods in 2007, excluding the ASEAN countries. The PRC is the leader, exporting more than 30% of the total. Next come Italy, Germany, and France. Together, the eurozone countries export about 28% of total world exports. Viet Nam exports about 2% of the world total.

<sup>1</sup> EU-15 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

**Figure 5: Major Exporters of Labor-Intensive Goods to the World, 2007**

BLEU = Belgium and Luxembourg.

Notes:

1. The figure excludes Indonesia, Malaysia, Philippines, and Thailand.

2. Labor-Intensive Manufactures includes carpets, clothing, fabrics, furniture, knitwear, leather goods, and yarns.

Source: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>).

ASEAN thus produces LIM largely using domestic inputs and sells these products throughout the world. Key regional competitors include the PRC and Viet Nam.

## 2.2 The Imperfect Substitutes Model

This paper investigates how exchange rate changes affect ASEAN's exports of labor-intensive manufacturing goods. To do this it uses data on ASEAN's real exports of these goods to 25 countries. There has been substantial variation, both cross-sectionally and over time, in ASEAN exchange rates relative to these countries. This approach should thus help to identify in an econometric sense how exchange rate changes affect the export of LIM.

According to the imperfect substitutes model of Goldstein and Khan (1985), exports can be represented as:

$$ex_t = \alpha_0 + \alpha_1 rer_t + \alpha_2 rgdp_t + \varepsilon_t \quad (1)$$

where  $ex_t$  represents real exports,  $rer_t$  represents the real exchange rate,  $rgdp_t$  represents foreign real income, and the variables are measured in natural logs. Equation (1) can be obtained by assuming that the quantity of ASEAN's exports demanded by other countries depends on income in the other countries and the price of ASEAN's exports relative to the price of domestically produced goods in those countries and that the quantity of exports supplied by ASEAN depends on the export price relative to ASEAN's price level. By equating demand and supply one can derive equation (1).

## 2.3 Dependent and Independent Variables

The dependent variable is the log of labor-intensive manufacturing exports. These goods come from six product categories: clothing, furniture, leather, carpets, yarns and fabrics, and knitwear.<sup>2</sup> Data for exports of these goods measured in US dollars are obtained from the

<sup>2</sup> As defined by CEPII, these categories correspond to the Standard International Trade Classification (SITC) numbers 61, 65, 82, 83, 841, 842, 843, 844, 845, 846.1, .2, .91, .92, .93, .94, .99, 848.1, .2, .3, .4, 85, and 894.77.

CEPII-CHELEM database and are deflated using the US Bureau of Labor Statistics price deflators for these six categories.

The panel data set includes exports from Indonesia, Malaysia, Philippines, and Thailand to 25 countries over the 1983–2007 period. These countries are Australia; Austria; Belgium; Bangladesh; Canada; PRC; Denmark; Finland; France; Germany; India; Italy; Japan; Netherlands; New Zealand; Norway; Poland; Saudi Arabia; Korea; Spain; Sweden; Switzerland; Taipei,China; United Kingdom; and US.

The independent variables include the bilateral real exchange rate ( $rer$ ) between ASEAN and the importing country and real income in the importing country ( $rgdp$ ), both obtained from the CEPII-CHELEM database. A weighted exchange rate ( $wrer$ ) of the 27 other leading exports of LIM relative to the importing country is also included.

To calculate the weighted exchange rate for the countries that compete with ASEAN, the share of exports from the 27 leading exporters of LIM is employed. For every year between 1983 and 2007, weights are calculated based on the percentage of LIM coming from the 27 leading exporters to the world. For instance, if in 2007 the PRC provided 30% of the LIM exports from the 27 leading exporters, then the PRC would have a weight of 0.30. When trying to explain exports to Germany in 2007, the bilateral real exchange rate between the PRC and Germany in 2007 would be multiplied by 0.30 (i.e.,  $0.30 * rer_{PRC, Germany, 2007}$ ). The same approach can then be used for the other 26 leading exporters, giving a weighted exchange rate for Germany in 2007 that can be written:

$$wrer_{Germany,2007} = \sum_{i=1}^{27} w_{i,2007} * rer_{i,Germany,2007} \quad (2)$$

In the same way, weighted exchange rates can be calculated for the other 24 importers in 2007. The procedure can then be repeated for every year going back to 1983, yielding new values of  $w_i$  and  $wrer$  for each year.

To calculate weighted exchange rates in this way, it is necessary to measure exchange rates using a common numeraire. This can be done by employing the real exchange rate variables constructed by CEPII. The CEPII real exchange rate between countries  $i$  and  $j$  is calculated by first dividing gross domestic product in US dollars for country  $i$  by gross domestic product in purchasing power parity for country  $i$  and doing the same for country  $j$ . The resulting ratio for country  $i$  is then divided by the ratio for country  $j$ . This variable measures the units of consumer goods in country  $i$  needed to buy a unit of consumer goods in country  $j$ . It can be compared across countries as well as across time. Because it is comparable across countries, it can be used in equation (2) to calculate  $wrer$ . Higher values of  $wrer$  represent stronger exchange rates among countries competing with ASEAN countries and higher values of  $rer$  represent stronger exchange rates in ASEAN countries.

## 2.4 Econometric Methodology

The model is estimated using DOLS. DOLS involves regressing the left-hand side variable on a constant, the explanatory variables, and lags and leads of the first difference of the explanatory variables. The individual export equations have the form:

$$\begin{aligned}
 ex_{j,t} = & \beta_0 + \beta_1 rer_{j,t} + \beta_2 wrer_{j,t} + \beta_3 rgdp_{j,t} + \sum_{k=-p}^p \alpha_{1,k} \Delta rer_{j,t-k} \\
 & + \sum_{k=-p}^p \alpha_{2,k} \Delta wrer_{j,t-k} + \sum_{k=-p}^p \alpha_{3,k} \Delta rgdp_{j,t-k} + u_{j,t}, \quad (3)
 \end{aligned}$$

$$t = 1, \dots, T; \quad j = 1, \dots, N.$$

Here  $ex_{j,t}$  represents real exports from Indonesia, Malaysia, Philippines, and Thailand to country  $j$ ;  $rer_{j,t}$  represents the bilateral real exchange rate between the ASEAN country and importing country  $j$ ;  $wrer_{j,t}$  represents the weighted exchange rate between the 27 leading exporters of LIM and country  $j$ ; and  $rgdp_{j,t}$  equals real income in country  $j$ .

The data set extends from 1983 to 2007. One lead and lag is used in the DOLS estimation.

## 3. RESULTS

Table 1 presents the results from estimating equation (3). The results are robust to using either country-pair fixed effects (see columns (1) and (2)) or exporter and importer fixed effects (see columns (3) and (4)). They are also robust to including a time trend (see columns (1) and (3)) or period fixed effects (see columns (2) and (4)).

**Table 1: Panel DOLS Estimates of ASEAN's Exports of Labor-Intensive Manufactures to 25 Countries over the 1983–2007 Period**

	(1)	(2)	(3)	(4)
	Country- Pair Fixed Effects	Country- Pair Fixed Effects	Exporter and Importer Fixed Effects	Exporter and Importer Fixed Effects
Bilateral RER	-2.05*** (0.57)	-2.14*** (0.50)	-1.99*** (0.59)	-2.06*** (0.51)
Competitor's RER	1.44*** (0.54)	1.14*** (0.43)	1.39*** (0.56)	1.06** (0.43)
Real GDP	2.34*** (0.22)	2.45*** (0.20)	2.37*** (0.23)	2.49*** (0.21)
Time	-0.001 (0.01)		-0.001 (0.01)	
Adjusted R- squared	0.85	0.87	0.89	0.90
No. of observations	2180	2180	2180	2180

\*\*\* (\*\*\*) = significance at the 1% (5%) level, ASEAN = Association of Southeast Asian Nations, BLS = United States Bureau of Labor Statistics, DOLS = dynamic ordinary least squares, GDP = gross domestic product, R-squared = coefficient of determination, RER = real exchange rate.

Notes:

1. DOLS(1,1) estimates.
2. Heteroskedasticity-consistent standard errors are in parentheses.
3. Exports are deflated using BLS price deflators.
4. The data extend from 1983 to 2007.
5. As the DOLS estimation uses one lead and lag of the first difference of the right-hand side variables the actual sample period is from 1985–2006.
6. Period fixed effects are also included except when a time trend is employed.

Sources: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>), United States Bureau of Labor Statistics.

The first row reports the coefficients on the bilateral exchange rate between the ASEAN exporting country and the importing country. The coefficients are statistically significant in every specification and approximately equal to -2. These findings indicate that a 10% appreciation in an ASEAN country would reduce its exports of labor-intensive goods by about 20%.

The second row reports the coefficients on the weighted exchange rate between the leading exporters of labor-intensive goods and the importing countries. The coefficients are again statistically significant in every case and range from 1.06 to 1.44. These results indicate that, controlling for exchange rates in ASEAN countries, a 10% appreciation among competitors would increase labor-intensive exports from ASEAN countries by 11–14%.

The third row reports the coefficients on income. The coefficients are statistically significant in every specification and range from 2.34 to 2.49. These values indicate that a 10% drop in income in the rest of the world would decrease labor-intensive exports from ASEAN countries by about 24%.

Tables 2 through 4 provide sensitivity checks. Table 2 reports the results of estimating a DOLS(1,2) model. Table 3 reports the results of estimating a DOLS(2,1) model. Table 4 reports the results of estimating a DOLS(1,1) model with exports deflated using the US consumer price index instead of the US Bureau of Labor Statistics price deflators. In every case the results reported in Table 1 are robust to these changes in specification.

**Table 2: Panel DOLS Estimates of ASEAN's Exports of Labor-Intensive Manufactures to 25 Countries over the 1983–2007 Period**

	(1)	(2)	(3)	(4)
	Country- Pair Fixed Effects	Country- Pair Fixed Effects	Exporter and Importer Fixed Effects	Exporter and Importer Fixed Effects
Bilateral RER	-2.02*** (0.53)	-2.23*** (0.48)	-1.95*** (0.54)	-2.12*** (0.48)
Competitor's RER	1.45*** (0.44)	1.37*** (0.38)	1.41*** (0.46)	1.27*** (0.38)
Real GDP	2.52*** (0.22)	2.58*** (0.21)	2.55*** (0.22)	2.61*** (0.22)
Time	-0.02** (0.01)		-0.02** (0.01)	
Adjusted R- squared	0.86	0.87	0.90	0.91
No. of observations	2081	2081	2081	2081

\*\*\* (\*\*\*) = significance at the 1% (5%) level, ASEAN = Association of Southeast Asian Nations, BLS = United States Bureau of Labor Statistics, DOLS = dynamic ordinary least squares, GDP = gross domestic product, R-squared = coefficient of determination, RER = real exchange rate.

Notes:

1. DOLS(1,2) estimates.
2. Heteroskedasticity-consistent standard errors are in parentheses.
3. Exports are deflated using BLS price deflators.
4. The data extend from 1983 to 2007.
5. As the DOLS estimation uses one lead and two lags of the first difference of the right-hand side variables the actual sample period is from 1986–2006.
6. Period fixed effects are also included except when a time trend is employed.

Sources: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>), United States Bureau of Labor Statistics.

**Table 3: Panel DOLS Estimates of ASEAN's Exports of Labor-Intensive Manufactures to 25 Countries over the 1983–2007 Period**

	(1)	(2)	(3)	(4)
	Country- Pair Fixed Effects	Country- Pair Fixed Effects	Exporter and Importer Fixed Effects	Exporter and Importer Fixed Effects
Bilateral RER	-2.14*** (0.55)	-2.29*** (0.50)	-2.06*** (0.57)	-2.19*** (0.51)
Competitor's RER	1.34*** (0.53)	1.10*** (0.36)	1.27*** (0.56)	0.99*** (0.36)
Real GDP	2.47*** (0.24)	2.53*** (0.23)	2.52*** (0.25)	2.58*** (0.24)
Time	-0.003 (0.01)		-0.004 (0.01)	
Adjusted R- squared	0.85	0.87	0.89	0.91
No. of observations	2080	2080	2080	2080

\*\*\* = significance at the 1% level, ASEAN = Association of Southeast Asian Nations, BLS = United States Bureau of Labor Statistics, DOLS = dynamic ordinary least squares, GDP = gross domestic product, R-squared = coefficient of determination, RER = real exchange rate.

Notes:

1. DOLS(2,1) estimates.
2. Heteroskedasticity-consistent standard errors are in parentheses.
3. Exports are deflated using BLS price deflators.
4. The data extend from 1983 to 2007.
5. As the DOLS estimation uses two leads and one lag of the first difference of the right-hand side variables the actual sample period is from 1985–2005.
6. Period fixed effects are also included except when a time trend is employed.

Sources: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>), United States Bureau of Labor Statistics.

**Table 4: Panel DOLS Estimates of ASEAN's Exports of Labor-Intensive Manufactures to 25 Countries over the 1983–2007 Period**

	(1)	(2)	(3)	(4)
	Country- Pair Fixed Effects	Country- Pair Fixed Effects	Exporter and Importer Fixed Effects	Exporter and Importer Fixed Effects
Bilateral RER	-2.20*** (0.62)	-2.16*** (0.50)	-2.15*** (0.64)	-2.07*** (0.51)
Competitor's RER	1.65*** (0.59)	1.16*** (0.43)	1.61*** (0.61)	1.08** (0.44)
Real GDP	2.36*** (0.22)	2.48*** (0.20)	2.39*** (0.23)	2.52*** (0.30)
Time	-0.02 (0.01)		-0.02 (0.01)	
Adjusted R-squared	0.84	0.86	0.88	0.90
No. of observations	2180	2180	2180	2180

\*\*\* = significance at the 1% level, ASEAN = Association of Southeast Asian Nations, CPI = consumer price index, DOLS = dynamic ordinary least squares, GDP = gross domestic product, R-squared = coefficient of determination, RER = real exchange rate, US = United States.

Notes:

1. DOLS(1,1) estimates.
2. Heteroskedasticity-consistent standard errors are in parentheses.
3. Exports are deflated using the US CPI.
4. The data extend from 1983 to 2007.
5. As the DOLS estimation uses one lead and lag of the first difference of the right-hand side variables the actual sample period is from 1985–2006.
6. Period fixed effects are also included except when a time trend is employed.

Sources: Centre D'Etudes Prospectives et D'Information Internationales-Comptes Harmonisés sur les Echanges et l'Economie Mondiale (CEPII-CHELEM) database (<https://chelem.bvdep.com/>), United States Bureau of Labor Statistics.

An important implication of the results presented here is that exports of labor-intensive goods are very sensitive to exchange rate changes in ASEAN countries and to exchange rate changes in countries that compete with ASEAN in third markets. This supports the claim that is often made that profit margins for labor-intensive goods are thin. If this is the case it may be difficult for ASEAN countries to compete with lower-wage countries such as the PRC and Viet Nam based on cost.

A better strategy for ASEAN companies exporting labor-intensive goods would be to advance from simple to complex production activities—from low-skilled assembling to participating in the engineering and design aspects of production (Wie 2006). One way to do this would be for ASEAN countries to reduce corruption and improve infrastructure in order to attract foreign direct investment. Foreign direct investment could then be leveraged to expand the technological base (Yoshitomi, Azis, and Thorbecke 2003). Assimilating new technologies and moving up the value chain would be a far more promising way to raise living standards than engaging in price competition with low-wage economies.

A second important implication of the results presented here is that labor-intensive exports from ASEAN countries are sensitive to changes in income in importing countries. If the slowdown in the rest of the world is protracted, ASEAN's exports of labor-intensive goods will also be constrained.

Thus, exports may not be able to play as large a role as an engine of growth as they did before the crisis. ASEAN policymakers should therefore redouble their efforts to increase

domestic demand. To do this, they could strengthen social safety nets, improve infrastructure, and reduce intra-regional impediments to trade.

## 4. CONCLUSION

Exports from ASEAN countries soared between the 1997–1998 Asian financial crisis and the 2008–2009 global financial crisis. Many of these exports were electronic goods or automotive products produced within regional production networks.

Exporting such large quantities of sophisticated manufactured goods produced within East Asian supply chains poses several problems. The share of domestic content in these exports is small, implying that ASEAN's value-added is also small. Concentrating so much activity in a single sector also exposes countries in the region to the risk of a downturn in that sector. In the current crisis, demand for electronic goods assembled in ASEAN countries has plummeted.

This paper thus investigates whether LIM exports can function as an engine of growth for ASEAN countries. To do this, it investigates the factors affecting the demand for labor-intensive exports. Results using DOLS indicate that exports are very sensitive to income in the importing countries, the exchange rate between ASEAN countries and the importing countries, and the exchange rates between other exporters such as the PRC and importing countries.

The results imply that labor-intensive exports may not be able to promote recovery in ASEAN countries. High income elasticities indicate that if growth in the rest of the world remains slow, demand for ASEAN's exports will also be curtailed. In addition, the high estimated exchange rate elasticities support the claim that profit margins for labor-intensive goods are thin. It may thus be difficult for Indonesia, Malaysia, Philippines, and Thailand to compete with lower-wage economies in the region such as the PRC and Viet Nam based on cost.

Several policy implications flow from these findings. First, ASEAN countries should seek to assimilate new technologies and move up the value chain rather than engaging in price competition with low-wage economies. Second, countries in the region should attempt to promote domestic demand to replace weak demand abroad. They could do this by improving healthcare, education, and pension systems in order to reduce precautionary saving and by improving infrastructure to promote growth and development in the region. Finally, the evidence that competition in third markets is strong indicates that there might be a role for exchange rate coordination in Asia to mitigate "beggar-thy-neighbor" policies, "free-rider" problems, and other unpleasant outcomes.

## REFERENCES

- Agarwalla, G. 2005. Philippines: Electronic Equipment Production and Manufacturing. World Bank Working Paper. <http://siteresources.worldbank.org/INTPHILIPPINES/Resources/Agarwalla-word.pdf> (accessed 22 July 2009).
- Ahearne, A., J. Fernald, P. Lougani, and J. Schindler. 2003. China and Emerging Asia: Comrades or Competitors? Federal Reserve International Finance Discussion paper 789. Washington, DC: Federal Reserve Board.
- Austria, M. 2008. Recent Developments in the Electronics Production Networks in Southeast Asia. De La Salle University-Angelo King Institute Working Paper Series 2008-05. <http://www.dlsu.edu.ph/research/centers/cberd/pdf/papers/2008/WorkingPaper-2008-05-Austria.pdf> (accessed 25 July 2009).
- Bénassy-Quéré, A., and A. Lahrière-Révil. 2003. Trade Linkages and Exchange Rates in Asia: The Role of China. Centre D'Etudes Prospectives et D'Informations Internationales (CEPII) Working Paper 2003-21. Paris: CEPII.
- Cheung, Y.-W., M. Chinn, and E. Fujii. 2009. China's Current Account and Exchange Rate. National Bureau of Economic Research (NBER) Working paper 14673. Cambridge, MA: NBER.
- Goldstein, M., and M. Khan. 1985. Income and Price Effects in Foreign Trade. In *Handbook of International Economics, Vol. 1*, edited by R. Jones and P. Kenen. Amsterdam: North-Holland.
- Thorbecke, W. 2006. How Would an Appreciation of the Renminbi Affect the U.S. Trade Deficit with China? *The B.E. Journal of Macroeconomics, Topics in Macroeconomics* 6(3): 1–15.
- Wie, T. W. 2006. Technology and Indonesia's Industrial Competitiveness. ADBI Research Paper 72. Tokyo: ADBI.
- Yoshitomi, M., I. Azis, and W. Thorbecke. 2003. *Post-crisis Development Paradigms in Asia*. Tokyo: ADBI.