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The Effect of Exchange Rate Volatility on Fragmentation in East Asia: Evidence from the Electronics Industry[1]

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Keywords: Global supply chain; exchange rate volatility; East Asia

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The Effect of Exchange Rate Volatility on Fragmentation in East Asia: Evidence from the Electronics Industry

Abstract

East Asia is characterized by intricate production and distribution networks that allow fragmented production blocks to be allocated across countries based on comparative advantage. These networks have produced enormous efficiency gains. Exchange rate volatility, by increasing uncertainty, may reduce the locational benefits of cross-border fragmentation. This paper presents evidence that exchange rate volatility decreases the flow of electronic components within East Asia. Electronic components is by far the largest category of intermediate goods traded within these networks. These results imply that policy makers should consider how to maintain stable exchange rates in the region in order to provide a steady backdrop for East Asian production networks.

Keywords: Global supply chain; exchange rate volatility; East Asia

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1. Introduction

East Asia is characterized by intricate production and distribution relationships, constituting part of a global triangular trading network. Japan, South Korea, Taiwan and multinational companies located in ASEAN produce sophisticated technology-intensive intermediate goods and capital goods and ship them to China and ASEAN for assembly by lower-skilled workers. The finished products are then exported throughout the world. These production and distribution networks have promoted economic efficiency and helped to make East Asia the manufacturing center of the world.

This slicing up of the value-added chain in East Asia is particularly intricate and well-developed. It involves complicated combinations of intra-firm trade, arms-length transactions, and outsourcing (Kimura and Ando, 2005). These networks have allowed firms to exploit comparative advantage by breaking up long production processes and allocating the production blocks created in this way throughout Asia. The resulting production-distribution networks can be characterized as vertical intra-industry trade (VIIT).

This VIIT differs both from the exchange of final goods emphasized by traditional trade theory for vertical inter-industry trade between the North and the South (e.g., between capital goods and apparel) and for horizontal intra-industry trade between the North and the North (e.g., between two differentiated types of automobiles). As Fukao *et al.* (2002) discuss, the production processes of an industry (e.g., the electronics industry) have been split into fragmented production blocks that can be located in different countries and the new VIIT is essentially based on differences in factor endowments in the fragmented production blocks between developing, emerging, and developed economies in the region.

In order to decide on the optimal degree of fragmentation firms must weigh benefits and costs along the locational, ownership, and internalization dimensions (Kimura and Ando, 2005). Locational considerations include wage levels, factor endowments, technology transferability, physical and human infrastructure, and the existence of market-supportive institutions and political regimes. Ownership considerations are based upon technological and managerial differences between home and host country firms. The home country's advantage in this area must be sufficient to overcome the extra costs arising from differences in business customs, formal and informal norms, languages, etc. Internalization considerations refer to the net benefits obtained by FDI firms through more captive and integrated business activities conducted by parent firms. The optimal degree of internalization is determined by balancing the costs of asymmetric information, incomplete contracts, and ineffective dispute settlement mechanisms with the efficiency gains from complete outsourcing and deverticalization.

When considering how exchange rate changes affect a firm's incentive for cross-border fragmentation, locational considerations are central. Exchange rate volatility, by increasing uncertainty, may reduce the locational benefits of cross-border fragmentation. In addition, an appreciation in the level of the exchange rate in the home country may cause firms or affiliates abroad to source from the host country rather than the home country.

These effects have been discussed by the IMF (2005) and Yoshitomi (2007). The IMF argues that imports for processing will vary one-for-one with processed final exports, and that the exchange rate elasticity for imports for processing will be small (about 0.1). Yoshitomi argues that exchange rate volatility will hinder the expansion of East Asian production and distribution networks.

To understand Yoshitomi's argument the theoretical framework of Ando and Kimura (2007) is useful. They show that the service link cost for production blocks separated by national borders is an increasing function of risk and uncertainty. Kiyota and Urata (2004) note that exchange rate volatility may increase risk and uncertainty in East Asia. Thus volatility may interfere with the slicing up of the value-added chain in East Asia.

In the case of Japan, parts and components for assembly flow in approximately equal quantities to China, ASEAN-5, and South Korea and Taiwan.[1] Once a Japanese firm has invested in another East Asian country and established a cross-border production network it does not withdraw from that country. However, the volume of new FDI, capital goods, and parts and components that flows to a particular country may decrease if the country's locational advantages fall relative to other countries.[2] Exchange rate volatility could thus cause Japanese firms to redirect some of their assembly operations from one East Asian country to another or back to Japan.

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[1] According to the CEPII-CHELEM data base, Japan in 2005 shipped \$9.4 billion in electronic components to China, \$9.6 billion to ASEAN-5, and \$10.1 billion to South Korea and Taiwan. It shipped \$26.3 billion in intermediate goods to China, \$25.3 billion to ASEAN-5, and \$23.9 billion to South Korea and Taiwan.
[2] I am indebted to colleagues from the Ministry of Economy, Trade, and Industry for explaining this to me.

Previous research concerning the effects of exchange rate volatility on trade has been inconclusive. Theoretically the relationship between volatility and trade depends on a number of specific assumptions (see Clark *et al.*, 2004). Empirically the results have been mixed (see McKenzie, 1999).

Several studies have investigated how volatility affects East Asian trade. Ito and Yoshida (2006), seeking to explain East Asian exports in the context of a triangular trading model using annual data from 1990 to 2000, found that exchange rate volatility did not help to explain East Asian exports to the U.S. Poon, Choong, and Habibullah (2005), using an error-correction model and more than 20 years of quarterly data for five East Asian countries, reported that exchange rate volatility reduced total exports for Japan, South Korea, and Singapore. Bénassy-Quéré and Lahrèche-Révil (2003), using panel data techniques and annual data from 1984 to 2001, reported that exchange rate volatility did not affect exports from one East Asian country to other East Asian countries. Thorbecke (forthcoming), also using panel data techniques and annual data from 1982 to 2003, reported that volatility reduced East Asian intermediate goods exports to all countries (including East Asia and the rest of the world).

This paper differs from previous studies by investigating specifically how exchange rate volatility affects parts and components exports within East Asian production networks. To do this it investigates the determinants of electronic components exports within East Asia. As documented below, electronic components is the second most exported product category among East Asian economies and final electronic goods is the most exported category from East Asian countries to the world. The flow of electronic components thus plays a crucial role in regional production networks. The results presented here indicate that exchange rate volatility does reduce trade in electronic parts and components within the region.

The next Section discusses the data and methodology. Section 3 presents the results. Section 4 concludes.

2. Data and Methodology

Figure 1 disaggregates total exports from East Asian countries to other East Asian countries by product category in 2005. East Asian is defined as ASEAN-5 plus China, Japan, South Korea, and Taiwan. The data are taken from the CEPII-CHELEM database, which divides exports into 71 product categories. The product category 'electronic components' is the second leading export category in Figure 1.[3] More than 15% of intra-regional exports are electronic components.

Figure 2 disaggregates total exports from East Asia to the world in 2005. The product category 'final electronic goods' is easily the leading export category. Final electronic goods come from four individual categories: consumer electronics goods, computer equipment, telecommunications equipment, and electrical apparatuses.[4] More than 25% of exports from East Asia to the world are final electronic goods.

Electronic components thus represent the second most heavily traded product category within the region, and final electronic goods the most exported category to

[3] Electronic components, as defined by CEPII, correspond to the SITC classification number 776 and the HS classification numbers 8540, 8541, and 8542.

[4] Final electronic goods are in four product categories: consumer electronics goods, computer equipment, telecommunications equipment, and electrical apparatuses. As defined by CEPII, these categories correspond to the SITC classification numbers 75 (excluding 751.3 and 759.1), 761-4, 772, 773, 778, 813 and the HS classification numbers 8469-73, 8505-8508, 8511-13, 8517-22, 8525-39, 8543-48, 9505 (excluding .30).

the rest of the world. Given its prominence, the electronics industry should be a useful test case for examining how exchange rate volatility affects vertical intra-industry trade in East Asia.

Following the IMF (2005), electronic components and other imported inputs for processing to East Asian processor economies are assumed to vary one-for-one with the processed exports that they are used to produce. Thus income and exchange rate changes in the countries purchasing the final electronic goods are assumed to affect the flow of electronic components in the region by influencing the flow of final goods exports. In addition, following the IMF, the bilateral exchange rate between the countries exporting and importing electronic components is assumed to matter. Finally, following Yoshitomi (2007), exchange rate volatility is assumed to affect the flow of components for processing in East Asia.

Data on exports of electronic components are taken from the CEPII-CHELEM database and measured in U.S. dollars. They are deflated using the BLS price deflator for electronic components.

Real exchange rates are also obtained from CEPII. They are calculated using PPP standards and represent bilateral real exchange rates between the exporting and importing countries measured in levels.[5]

Following Bénassy-Quéré and Lahrèche-Révil (2003), exchange rate volatility is defined as the coefficient of variation of the nominal exchange rate during the year, calculated using monthly data. The monthly exchange rate data used to calculate

[5] The real exchange rate between countries i and j is calculated as the ratio for country i of GDP at international value (dollars and national current prices) to GDP on a PPP basis (dollars and international constant prices) divided by the same ratio for country j. This is meant to serve as an empirical proxy for the true real exchange rate.

volatility are obtained from the IMF, *International Financial Statistics*.[6] Volatility is also calculated using quarterly data as a robustness check. This measure contains more noise, though, because it is calculated using only four exchange rate changes per year.

When examining the effect of exchange rate volatility on trade flows timing issues are crucial.[7] Using exchange rate changes in a year to explain exports in the same year inevitably implies that exchange rates in later months would be used to explain exports in earlier months. However, exporters do not observe these changes in later months when making export decisions in earlier months. Using lagged volatility would help to resolve this problem. Lagged volatility also has the advantage that exporters are unlikely to respond immediately to increases in volatility but will rather adopt a "wait and see" approach (see Clark *et al.,* 2004).

One problem with lagged volatility is that it is already observed. It may thus be an inaccurate measure of uncertainty, since uncertainty is a forward-looking concept.

To account for issues of timing and uncertainty several measures are used. One is volatility lagged one year. A second is contemporaneous volatility. A third is volatility during the previous year and the current year. This measure would be appropriate if exporters respond to volatility partly with a lag but also anticipate to some extent volatility that is coming later in the year. A fourth measure uses volatility in the previous year, the current year, and the next year. The results reported below are robust to these various measures of volatility.

[6] In principle one should calculate volatility in real terms. However, data on the consumer price index are not available from *International Financial Statistics* for China at the beginning of the sample period. Over the period when the consumer price index data were available, results using real exchange rate volatility are similar to the results reported below using nominal exchange rate volatility.
[7] I am indebted to an anonymous referee for the discussion in the next few paragraphs.

Exports of goods assembled using electronic components are assumed to be in four product categories: consumer electronics goods, computer equipment, telecommunications equipment, and electrical apparatuses.[8] Data for exports in these four categories are measured in U.S. dollars and deflated using BLS price deflators for these four categories.

Annual data for China, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand are employed. The sample period extends from 1985 to 2005.

Panel A of Table 1 reports the results from a battery of unit root tests.[9] For electronic components exports and final electronic goods exports, the results in every case indicate that the series have unit roots. For the real exchange rate and exchange rate volatility variables there is some ambiguity in the results. The Hadri (2000) test permits rejection of the null hypothesis of no unit root while the Im, Pesaran, and Shin (1995) and ADF tests permit rejection of the maintained hypothesis of a unit root.

Panel B of Table 1 reports the results of Pedroni (1999, 2004) cointegration tests. The panel statistics assume common autoregressive coefficients and the group statistics assume individual autoregressive coefficients. In every case, the test statistics permit rejection of the null hypothesis of no cointegration.

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[8] Consumer electronics goods, computer equipment, telecommunications equipment, and electrical apparatuses, as defined by CEPII, correspond to the SITC classification numbers 75 (excluding 751.3 and 759.1), 761-4, 772, 773, 778, 813 and the HS classification numbers 8469-73, 8505-8508, 8511-13, 8517-22, 8525-39, 8543-48, 9505 (excluding .30).

[9] Table 1 reports results from the preferred monthly volatility measure. Results using the other volatility measures, available on request, are very similar.

Panel dynamic ordinary least squares (DOLS) estimation is thus employed.[10] This involves regressing the left hand side variable on a constant, the right hand side variables, and leads and lags of their first differences. The presence of lags and leads of the first differences of the right hand side variables corrects for endogeneity and serial correlation problems. DOLS estimators and t-statistics have better small sample properties and provide better approximations to the normal distribution than estimators and t-statistics obtained using panel OLS or panel fully modified OLS methods (Kao and Chiang, 2000).

Several studies have used DOLS techniques to address questions in international economics. Faruqee (2004) employs panel DOLS techniques to investigate how the reduction in exchange rate volatility due to the EMU affects bilateral trade flows. Bayoumi *et al.* (2005) use panel DOLS estimation to investigate the factors affecting exchange rates in the medium run. McDonald and Ricci (2007) use panel DOLS methods to test the theoretical implications for the real exchange rate of a trade theory model with imperfect substitution. Aziz and Li (2007) use DOLS techniques to estimate China's trade elasticities.

Electronic components exports from country i to country j are modeled using the following specification:

$$ex_{ij,t} = \beta_0 + \beta_1 fex_{jW,t} + \beta_2 lrer_{ij,t} + \beta_3 Vol_{ij,t} + \sum_{k=-p}^{p} \alpha_{fex,k} \Delta fex_{jW,t+k} + \sum_{k=-p}^{p} \alpha_{lrer,k} \Delta lrer_{ij,t+k} + \sum_{k=-p}^{p} \alpha_{Vol,k} \Delta Vol_{ij,t+k} + \mu_{ij} + \pi_t + u_{ij,t}, \quad (1)$$

$$t = 1,\cdots,T; \qquad i = 1,\cdots,N; \qquad j = 1,\cdots,N.$$

[10] Because of ambiguities with panel unit root tests, the model was also estimated by OLS. The results are qualitatively similar to those reported below, although some of the coefficient values are smaller. These results are available on request.

where $ex_{ij,t}$ represents real electronic components exports from East Asian country i to East Asian country j, $fex_{jW,t}$ represents real final electronic goods exports from East Asian country j to the world, $lrer_{ij,t}$ is the bilateral real exchange rate between countries i and j, $Vol_{ij,t}$ is the volatility of the bilateral exchange rate between countries i and j, and μ_{ij} and π_t are country pair and time fixed effects. Since the data set contains exports from all nine East Asian countries to each of the other eight, there are a total of 72 cross sections in the panel.

3. Results

Table 2 presents the results from estimating equation (1) with volatility calculated using monthly data. The coefficients on volatility and final electronics exports are of the expected signs and statistically significant.[11] Focusing first on exchange rate volatility, the results indicate that a one standard deviation increase in volatility lagged one year would reduce electronic components exports between East Asian countries by an average of $300 million.[12] Over the sample period the mean value of electronic components exports from one East Asian country to another was $700 million. Thus an increase in exchange rate volatility would have an economically significant effect on the flow of electronic components. A one standard deviation increase in contemporaneous volatility would reduce electronic components

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[11] The results, available on request, are robust to i) using more than one lead and lag in equation (1), ii) clustering standard errors at the country pair level, iii) ignoring the time dimension and calculating the between estimator, and iv) using intermediate goods instead of electronic components as the dependent variable and final goods instead of final electronic goods as the corresponding independent variable.
[12] All of the dollar figures are measured in 2000 dollars.

exports by an average of \$200 million. A one standard deviation increase in the other volatility measures would be associated with a fall in electronics components exports of about \$100 million.

For final goods exports to the rest of the world, the results indicate that a one standard deviation increase in $fex_{jW,t}$ would increase $ex_{ij,t}$ by \$1.1 billion. Thus again the effect is economically important.

For the exchange rate level, there is no relationship between exchange rate changes and electronic components exports.

Table 3 presents the results from estimating equation (1) with volatility calculated using quarterly data. Qualitatively the results are very close to those reported in Table 2. The absolute values of the coefficients on volatility are somewhat smaller than in Table 2. This probably reflects the fact that the quarterly volatility measure is noisy because it is calculated using only four exchange rate changes per year.

It is possible that the findings in Tables 2 and 3 are driven partly by the Asian crisis, as exchange rate volatility was exceptionally large during this period. To test for this, the model was re-estimated excluding the years 1997, 1998, and 1999. The results, presented in Table 4, are again qualitatively very close to those reported in Table 2. The absolute values of the coefficients on exchange rate volatility are about twice as large though. Thus, exchange rate volatility exerts an even larger impact on electronic component exports when the Asian Crisis years are excluded.

Another possibility is that the results would differ if the sample of countries receiving imports for processing includes only those specializing in assembly. Over the sample period used here these countries would be China, Indonesia, Malaysia, the Philippines, Singapore and Thailand. Table 5 presents the DOLS results for electronic components exports from all nine East Asian countries to the six specializing in assembly. The results in Table 5 are very close qualitatively and quantitatively to those presented in Table 2.

The IMF (2005) states that the crucial factor determining the inflow of parts and components to Asian processor economies is the final exports of assembled products from these economies. The IMF also states that the exchange rate elasticity for these processed goods is negligible. The results presented here bear out these statements. In addition, the results indicate that exchange rate volatility deters the flow of imports for processing in the region.

4. Conclusion

East Asia is characterized by intricate production and distribution networks that allow fragmented production blocks to be allocated across countries based on comparative advantage. These networks have produced enormous efficiency gains.

The second largest category of goods traded between East Asian countries is electronic components. In 2005 more than 15% of the goods exported between East Asian countries were electronic components.

The IMF (2005) argues that the flow of parts and components to processor economies in East Asia should vary one-for-one with the export of the final assembled goods from the processor economies. The IMF also argues that the flow of these goods should not be very sensitive to bilateral exchange rates between exporting and importing countries. Yoshitomi (2007) argues that exchange rate volatility, by increasing uncertainty, may reduce the locational benefits of cross-border fragmentation.

The results presented here are consistent with the arguments of the IMF (2005) and Yoshitomi (2007). The flow of electronic components to processor economies in East Asia is very sensitive to the exports of final electronic goods to the rest of the world and to exchange rate volatility but not to the bilateral real exchange rate.

There are at least two policy implications of the results presented here. One follows from the fact that 70% of final electronics goods exports from East Asian countries in 2005 went outside the region and 30% went to the U.S. alone. Thus, a slowdown in the rest of the world (especially the U.S.) that decreased final electronics goods exports from East Asia would also curtail the flow of electronic components within the region. Policy makers should be prepared for this.

The second policy implication is that exchange rate volatility deters the flow of intermediate goods and thus the slicing up of the value-added chain. One way to maintain stable exchange rates would be for countries in the region to adopt a common basket of Asian currencies as their reference rate and establish wide bands around the central rate. Stable intra-regional exchange rates would not only maintain the flow of intermediate goods but also allow East Asian currencies to appreciate together if the dollar started to depreciate. Since intra-regional trade accounts for about 55% of total trade, concerted appreciations against the dollar would cause effective exchange rates in the region to appreciate by less than half as much.

Fragmentation in East Asia is particularly sophisticated and well-developed. The production processes of the electronics industry and other industries have been split into fragmented production blocks that can be located in different countries based on differences in factor endowments. The resulting efficiency gains have been enormous. Yoshitomi (2007) argues that exchange rate volatility, by increasing uncertainty, may reduce firms' incentives for cross-border fragmentation. The results presented here for the electronics industry support his assertion. Policy makers should thus consider how to maintain stable exchange rates in the region in order to provide a steady backdrop for East Asian production networks.

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Table 1. Unit Root and Cointegration Tests

Panel A. Unit Root Tests

Variable	(1)	(2)	(3)
Real Electronic Components Exports from Country i to Country j	21.7**	22.6	43.7
Real Final Electronic Goods Exports from Country j to the World	24.7**	32.4	4.1
Log of the Real Exchange Rate	7.42**	−8.0**	302.6**
Exchange Rate Volatility Calculated using Monthly Data	3.30**	−19.9**	634.7**

(1) Hadri (2000) heteroscedaticity-consistent test.
(2) Im, Pesaran, and Shin (1995) test.
(3) ADF test.
**denotes significance at the 5 percent level.

Panel B. Cointegration Tests

Variable	(1)
Panel v−statistic	2.2**
Panel ρ −statistic	4.8**
Panel Phillips−Perron statistic	6.0**
Panel ADF−statistic	13.5**
Group ρ −statistic	6.2**
Group Phillips−Perron statistic	2.5**
Group ADF statistic	13.7**

(1) Pedroni (1999, 2004) panel cointegration tests.
**denotes significance at the 5 percent level.

Table 2. Panel DOLS Estimates of Electronics Components Exports in East Asia over the 1985-2005 Period

VOL monthly lagged one year	-69.0*** (19.0)			
VOL monthly current year		-48.5*** (16.3)		
VOL monthly lagged and current year			-23.7*** (8.6)	
VOL monthly lagged, current and next year				-26.9*** (8.5)
Final Electronic Goods Exports	0.029*** (0.006)	0.031*** (0.006)	0.031*** (0.006)	0.028*** (0.007)
Log of the Real Exchange Rate	0.78 (2.66)	1.56 (2.41)	1.14 (2.64)	1.66 (2.64)
Adjusted R-Squared	0.75	0.74	0.75	0.76
No. of Observations	1224	1296	1224	1152

Notes: Panel DOLS(1,1) estimates of electronic components exports from China, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand to each of the other eight East Asian economies.
Serial correlation robust standard errors are in parentheses.
*** (**) [*] denotes significance at the 1% (5%) [10%] level.

Table 3. Panel DOLS Estimates of Electronics Components Exports in East Asia over the 1985-2005 Period

VOL quarterly lagged one year	-34.2** (14.4)			
VOL quarterly current year		-20.0* (12.2)		
VOL quarterly lagged and current year			-16.6*** (7.2)	
VOL quarterly lagged, current and next year				-9.9* (5.2)
Final Electronic Goods Exports	0.031*** (0.006)	0.033*** (0.006)	0.032*** (0.006)	0.030*** (0.007)
Log of the Real Exchange Rate	1.16 (2.70)	1.81 (2.43)	1.25 (2.74)	1.99 (2.65)
Adjusted R-Squared	0.75	0.74	0.75	0.75
No. of Observations	1224	1296	1224	1152

Notes: Panel DOLS(1,1) estimates of electronic components exports from China, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand to each of the other eight East Asian economies.
Serial correlation robust standard errors are in parentheses.
*** (**) [*] denotes significance at the 1% (5%) [10%] level.

Table 4. Panel DOLS Estimates of Electronic Components Exports in East Asia excluding the 1997-1999 Period

VOL monthly lagged one year	-112.5*** (28.4)			
VOL monthly current year		-97.6*** (27.0)		
VOL monthly lagged and current year			-52.6*** (20.1)	
VOL monthly lagged, current and next year				-46.0*** (17.7)
Final Electronic Goods Exports	0.030*** (0.007)	0.032*** (0.007)	0.032*** (0.007)	0.029*** (0.007)
Log of the Real Exchange Rate	-0.22 (3.20)	0.04 (2.89)	-0.32 (3.41)	0.60 (3.07)
Adjusted R-Squared	0.75	0.74	0.74	0.74
No. of Observations	1008	1080	1008	936

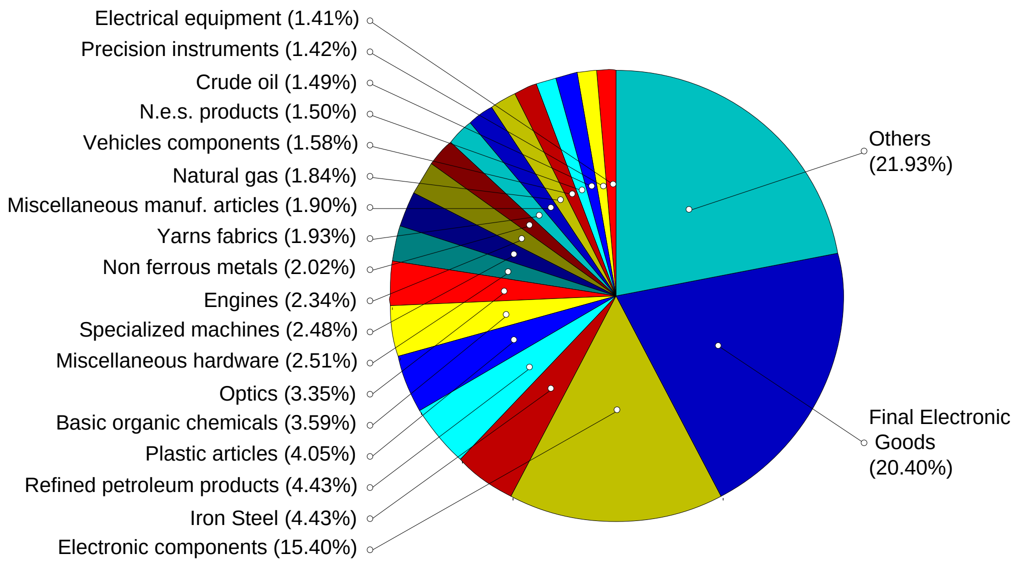
Notes: Panel DOLS(1,1) estimates of electronic components exports from China, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand to each of the other eight East Asian economies.
Serial correlation robust standard errors are in parentheses.
*** (**) [*] denotes significance at the 1% (5%) [10%] level.

Table 5. Panel DOLS Estimates of Electronic Components Exports from East Asian Countries to China and ASEAN 5 over the 1985-2005 Period

VOL monthly lagged one year	-63.2*** (23.1)			
VOL monthly current year		-41.3** (19.7)		
VOL monthly lagged and current year			-21.9** (10.4)	
VOL monthly lagged, current and next year				-24.7** (10.3)
Final Electronic Goods Exports	0.032*** (0.012)	0.036*** (0.013)	0.035*** (0.013)	0.032*** (0.013)
Log of the Real Exchange Rate	-0.40 (3.15)	0.20 (2.89)	0.11 (3.16)	0.93 (3.29)
Adjusted R-Squared	0.73	0.72	0.72	0.72
No. of Observations	816	864	816	768

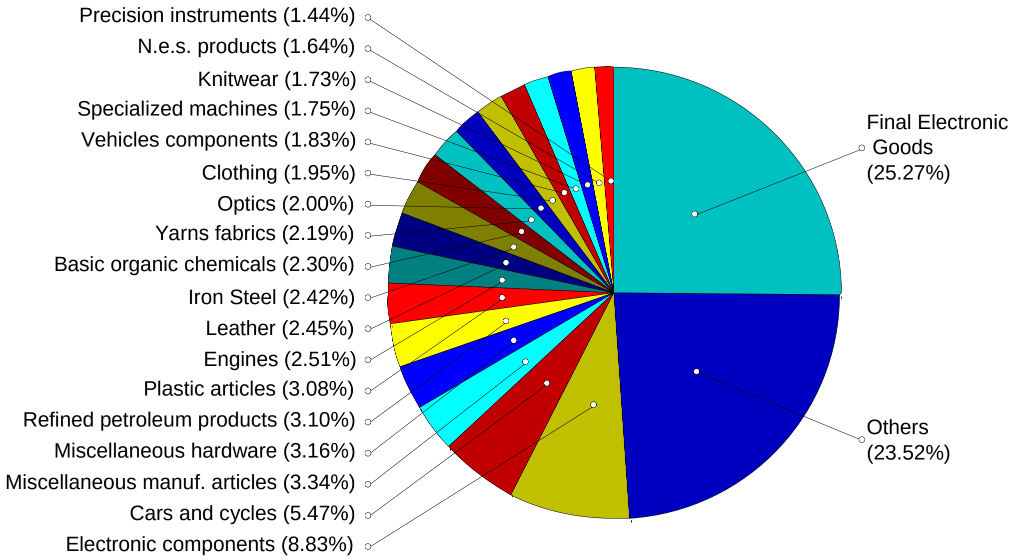
Notes: Panel DOLS(1,1) estimates of electronic components exports from China, Indonesia, Japan, Malaysia, the Philippines, Singapore, South Korea, Taiwan, and Thailand to China, Indonesia, Malaysia, the Philippines, Singapore, and Thailand.
Serial correlation robust standard errors are in parentheses.
*** (**) [*] denotes significance at the 1% (5%) [10%] level.

Figure 1. Exports between East Asian Countries by Product Category, 2005



Source: CEPII-CHELEM Database

Figure 2. Exports from East Asian Countries to the World by Product Category, 2005



Source: CEPII-CHELEM Database