Enjoying the Fruits of their Labor: Redirecting Exports to Asian Consumers

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Abstract: There has been an explosion of parts and components traded within East Asian production networks. China has emerged as the final assembly point for the goods produced. These goods then flow primarily outside of the region. When the Global Financial Crisis (GFC) occurred, the decrease in Western demand led to a synchronized decline in Asian exports. If more final goods flowed to Asian consumers, this would provide insurance against another slowdown in the rest of the world. This paper uses a gravity model to investigate if emerging Asia is importing fewer consumption goods than predicted. The results indicate that, after the GFC, China and ASEAN have imported more final goods than expected. Nevertheless, their consumption imports per capita are orders of magnitude lower than those of developed countries. This highlights the need for further growth in emerging Asia.

1. Introduction

The value of intermediate goods traded between East Asian countries increased 40 times between 1980 and 2012. In 2012 more than $450 billion in intermediate goods were traded within the region. This explosion in intra-regional trade reflects the development of intricate production networks. Firms have exploited comparative advantage by slicing up production processes and allocating the production modules to different locations based on differences in factor endowments across the fragmented production blocks.

This slicing up of the value chain began in earnest after the yen appreciated 60% following the Plaza Accord in September 1985. Japanese multinational enterprises lost their price competitiveness and responded by shifting labor-intensive activities to the Republic of Korea (henceforth, Korea) and Taipei,China. However, in the late 1980s both wages and exchange rates in these economies skyrocketed. The locational advantage of assembling labor-intensive goods in the newly industrialized economies declined, and Japanese firms transferred production to the Association of Southeast Asian Nations **(**ASEAN) countries. Surplus labor in ASEAN held wages down, and exchange rates in these countries were pegged at competitive levels relative to the US dollar. After the People's Republic of China (henceforth, PRC) joined the World Trade Organization in 2001, there was a surge in foreign direct investment (FDI) and parts and components exports from East Asian countries to the PRC. The PRC's WTO accession gave foreign investors confidence that the PRC would sustain an FDI-friendly environment. The PRC quickly became the final assembly point of intricate production and distribution networks. It imported hundreds of billions of dollars of parts and components from East Asia and exported the final assembled products throughout the world.

The surge in final goods exports from the PRC has been breathtaking. Its exports of computers, consumer electronics goods, and telecommunications equipment increased more than 70 times between 1993 and 2012 and equaled $500 billion in 2012. In 1993 2.5 percent of the world's exports of these electronics goods came from the PRC whereas in 2012 43 percent of the world's exports of these goods came from the PRC. The next leading exporting country in 2012 exported only 5 percent of the world's final electronics goods.

Athukorala (2014) documented that, while intermediate goods trade in East Asia has exploded, demand for final goods produced within production networks comes primarily from outside of the region. He found that the PRC did not provide a cushion against export

contraction during the Global Financial Crisis (GFC). He also observed that the decrease in demand in the rest of the world during the GFC caused a synchronized trade contraction in East Asia.

Exports within Asian production networks are more sensitive to demand shocks caused by events such as the GFC then to supply shocks caused by events such as the Great East Japan Earthquake or the Thai flooding that began in 2011. This is clear in Figures 1a and 1b. The figures present data on the volume of Japanese exports of automobile parts and semiconductors. These are two of the main categories of Japanese parts and components exports within regional production networks. Following the GFC, exports of both categories fell by more than 70 percent and took almost two years to return to pre-crisis levels. By contrast, the drops in exports following the Great East Japan Earthquake and the Thai floods were an order of magnitude smaller and the recoveries rapid. Ando and Kimura (2012) have also noted that the GFC represented a demand shock and the 2011 earthquake a supply shock. They presented detailed evidence indicating that the GFC had a prolonged effect of Japanese exports whereas the earthquake did not.

One lesson of the GFC is that it would desirable for regional production networks to decouple from final demand in the West. The Ministry of Economy, Trade and Industry (METI) (2009) reported that there are 930 million people in Asia who are in the middle class or above. Thus, there is a huge potential for demand by Asian consumers to function as a second engine of growth. Channeling more final goods to the region would also allow Asian workers to enjoy more of the fruits of their own labor.

This paper investigates whether the countries involved in East Asian production networks are importing fewer final goods than one would expect. The key economies involved in these regional supply chains are Japan, Korea, Malaysia, the Philippines, the PRC, Singapore, Taipei,China, and Thailand. To examine whether they are importing fewer consumption goods than expected, the gravity model is employed. This model is a workhorse for estimating bilateral trade flows. Traditional gravity models, as developed by Tinbergen (1962), posit that bilateral trade between two countries is directly proportional to GDP in the two countries and inversely proportional to the distance between them. As Leamer and Levinsohn (1995) and Baltagi, Egger, and Pfaffermayr (2014) discussed, gravity models yield some of the clearest and most

robust findings not only in international economics but in all of economics. This model is thus used to predict consumption goods imports by Asian countries.

The results indicate that actual consumption imports into China and ASEAN have increased relative to their predicted values and in 2012 were more than predicted by the gravity model. Thus emerging Asia is redirecting final goods to the region.

The evidence reported below also indicates that more progress is necessary. This paper thus considers how growth and development in the region can continue.

The next section presents the data and methodology. Section 3 presents the results. Section 4 highlights the importance of investing in human capital to promote growth. Section 5 concludes.

2. Data and Methodology

The gravity model is a workhorse for estimating bilateral trade flows. As developed by Tinbergen (1962), gravity models posit that bilateral trade between two countries is directly proportional to GDP in the two countries and inversely proportional to the distance between them. In addition to GDP and distance these models typically include other factors affecting bilateral trade costs such as whether trading partners share a common language. The model takes the form:

$$Ex_{ijt} = \beta_0 + \beta_1 Y_{it} + \beta_2 Y_{jt} + \beta_3 DIST_{ij} + \beta_4 LANG_{ij} + \beta_5 RER_{ijt} + \partial_i + \Omega_j + \pi_t + \varepsilon_{ijt} \qquad (1)$$

where Ex_{ijt} represents real exports from country *i* to country *j*, *t* represents time, Y represents GDP, DIST represents the geodesic distance between the two countries, LANG is a dummy variables equaling 1 if the countries share a common language and 0 otherwise, RER is the bilateral real exchange rate between the two countries, and ∂i , Ωj , and π_t are country i, country j, and time fixed effects.[1]

Data on consumption exports are obtained from the CEPII-CHELEM database. These include the following goods: beverages, carpets, cars, cereal products, cinematographic

[1] Anderson, Vesselovsky, and Yotov (2013) have shown that exchange rates can exert real effects in the context of a gravity models when there is incomplete pass-through or scale effects.

equipment, clocks, clothing, consumer electronics, domestic electrical appliances, knitwear, miscellaneous manufactured articles, pharmaceuticals, photographic equipment, preserved fruit and vegetable products, preserved meat and fish products, soaps and perfumes (including chemical preparations), sports equipment, toiletries, toys, and watches.[2]

Gaulier, Lemoine, and Unal (2011) noted that automobile imports into China largely reflect purchases by rich Chinese consumers. Many of these are luxury cars imported from Germany. In one specification these predominantly high end imports are excluded.

Data on GDP and real exchange rates are obtained from the CEPII-CHELEM data base. The real exchange rate is the CPI-deflated bilateral real exchange rate between the exporting and importing countries measured in levels.

Data on distance and common language are obtained from www.cepii.fr. Distance is measured in kilometers and represents the geodesic distance between economic centers. Common language is a dummy variable equaling 1 if two countries share a common language and 0 otherwise.

The gravity model is estimated as a panel using annual data for 31 countries over the 1988-2012 sample period. The countries are Australia, Austria, Brazil, Canada, China, Denmark, Finland, France, Germany, India, Indonesia, Ireland, Italy, Japan, Malaysia, Mexico, the Netherlands, Norway, the Philippines, Poland, Saudi Arabia, Singapore, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, the United Kingdom, and the United States.

Equation (1) has often been estimated as a log-linear model using panel least squares methods. Santos Silva and Tenreyro (2006) showed that this approach can lead to biased estimates when there is heteroskedasticity in the data-generating process. They reported simulation results indicating that Poisson pseudo-maximum-likelihood (PPML) estimators perform better both in terms of bias and efficiency in several cases. PPML techniques are thus used to estimate (1).

Anderson and Van Wincoop (2003) have argued that exports should depend on outward and inward multilateral resistance terms. These terms capture the fact that exports and imports between two countries depend, not only on trade costs between the two countries, but also on

[2] The category optics is not included in consumption imports because, in the case of China, many optical imports are inputs into the production process rather than final consumption goods. These inputs include unworked lens blanks of plastic, unworked lens blanks of glass, fiber optic cable for live transmission of images, and photolithography equipment for the manufacture of semiconductors.

changing trade costs between third countries. For instance, exports from country *i* to country *j* can be affected if country *i* enters a preferential trade agreement with a third country *k*.

Models based on Anderson and Van Wincoop's (2003) approach can be estimated by the equation:

$$\ln Ex_{ijt} = \beta_0 + \beta_1 \ln DIST_{ij} + \beta_2 LANG_{ij} + \beta_3 RER_{ijt} + \partial_i + \Omega_j + \pi_t + \varepsilon_{ijt} \qquad (2)$$

where the variables are as defined above. Here the distance and language variables capture trade costs for exports between countries *i* and j and the exporter and importer fixed effects variables capture the multilateral resistance terms. Time-varying fixed effects can also be included. Equation (2) is estimated as a sensitivity check for the results from equation (1).

3. Results

Table 1 presents gravity estimates. Columns (1), (3), and (5) present results using consumer goods excluding cars and columns (2), (4), and (6) present results including cars. Columns (1) and (2) present results including importer and exporter GDP. Columns (3)-(6) present results excluding the GDP variables. In columns (3) and (4) time-varying exporter fixed effects and importer fixed effects are included. In columns (5) and (6) exporter and importer fixed effects are included.

The coefficients on exporter and importer GDP are large and statistically significant. They are larger in column (2) where the dependent variable includes cars than in column (1) where it excludes cars. This indicates that higher incomes tend to be associated with more car imports.

The coefficients on distance and common language are of the expected signs and statistically significant in all cases. The results in every specification indicate that distance is an important deterrent of trade and that sharing a common language is an important facilitator of trade. The coefficient on the real exchange rate is negative in four cases and positive in two. Overall the gravity models perform well.

In the discussion that follows the focus is on the estimation in columns (1) and (2) that includes exporter and importer GDPs. The relation between the size of GDP and the amount of consumption imports is something that will be discussed in the next section. The results in

columns (3) through (6) reveal similar patterns to those discussed below (viz., that consumption imports in emerging Asia are increasing relative to predicted values).

Figures 2a and 2b present the percent difference between actual and predicted imports for the PRC and the three emerging ASEAN countries that are most involved in regional production networks (Malaysia, the Philippines, and Thailand). Figure 2a presents results for consumption imports excluding cars and Figure 2b for consumption imports including cars. Both figures indicate that actual consumption imports have risen relative to predicted consumption imports between 2005 and 2012. For the ASEAN countries, in 2012 consumption imports excluding cars were 12-13 percent greater than predicted and consumption imports including cars were 12-15 percent greater. For the PRC, in 2012 consumption imports excluding cars were 10 percent greater than predicted and consumption imports including cars were 20 percent greater. For all four countries actual imports have been growing relative to predicted imports since the Global Financial Crisis.

Figures 3a and 3b present the percent difference between actual and predicted imports for ASEAN, the PRC, Japan, Korea, and Taipei,China. Figure 3a presents results excluding car imports and Figure 3b including car imports. In both figures imports into Japan and Korea are close to their predicted values and imports into the PRC and ASEAN are well above their predicted values. For Taipei,China, on the other hand, consumption imports in every year and in both figures are far below their predicted values. For 2012 in Figure 3a they are 18 percent below their predicted value and in Figure 3b they are 22 percent below.

The important implication of the results presented here is that emerging Asian countries involved in regional production networks are rebalancing. More and more final goods are flowing to consumers in these countries.

On the other hand, as Figure 4 indicates, more progress is necessary. The figure shows consumption imports per capita. For Germany in 2012 they were $2026, for France $1755, for ASEAN $198, and for the PRC $36.

4. Discussion

Figure 4 indicates that emerging Asia's consumption imports are orders of magnitude smaller than consumption imports in advanced economies. On the other hand, the results in Section 3 indicate that, controlling for factors such as the size of their GDPs, China's and

ASEAN's consumption imports are more than one would predict. These findings imply that, in order for citizens in China and ASEAN to consume more, their economies need to grow and develop. This section considers a few steps towards achieving this goal.

Figures 3a and 3b indicate that China and ASEAN in 2012 imported much more than predicted and Taipei,China imported much less. One reason for the divergent results between China and ASEAN and Taipei,China is presented in Figure 5. The figure shows that real effective exchange rates (REER) have appreciated 34 percent in ASEAN and 38 percent in the PRC since 2005 while the REER of Taipei,China has depreciated 21 percent during this time.[3] The exchange rate appreciations increased the purchasing power of Asian citizens and allowed them to import more consumption goods (see Thorbecke, 2011).

The depreciation in Taipei,China occurred despite the fact that its current account surplus averaged almost 9 percent of GDP between 2005 and 2013. Foreign exchange reserve accumulation by the Taipei,China central bank kept the NT dollar from appreciating. The PRC also increased its holdings of foreign reserves by $508 billion in 2013 and by $3 trillion between 2006 and 2013. Rates of returns on these external reserves are low compared to the private and social rates of return available for investments in the domestic economy. Summers (2006) reported that the returns on U.S. Treasury securities measured in Asian currencies are close to zero. Fang et al. (2012), on the other hand, reported that the return to an additional year of education in China equaled 20 percent per year.

Investing in education is especially crucial in the rural sector. Chinese rural sector students will be the urban workers of the future. Their families are often poor and cannot afford to send their children to school. Making education available to them would yield high returns to society.

Investing in education is also necessary because the appreciation of the renminbi and ASEAN currencies that is shown in Figure 5 causes a large decrease in labor-intensive exports such as furniture, footwear, toys, and sporting goods (see Thorbecke and Zhang, 2009). To offset this, emerging Asia needs to assimilate new technologies and move up the value chain. Urata, Matsuura, and Wei (2006) reported that technology transfer from multinational companies to workers in emerging countries increases when the workforce becomes better educated.

[3] The depreciation occurred despite the fact that Taipei,China ran current account surpluses averaging almost 9 percent of GDP between 2005 and 2013.

Investing in education will help companies in emerging Asia to assimilate new technologies and move up the value chain.

Rozelle (2010) underscored the importance of education in promoting innovation and productivity growth. To accomplish this goal, he noted that students in China need to acquire skills in mathematics, science, English, and computers.

Rozelle (2010) also observed that China should begin investing when the children are young. Most rural children cannot afford pre-school, and elementary school attendance is hampered by poor accessibility and long, dangerous commutes. Bad health, sanitation, nutrition, and psychology management also restricts students' ability to learn. Problems such as anemia, vitamin deficiencies, visual difficulties, and worms are prevalent and can be remedied easily.

High school tuition in China is expensive (20 times the per capita annual income of the rural poor) and little financial aid is available. Because of this only one in four rural students finishes high school. In neighboring economies such as Japan, Korea, and Taipei,China, almost 100 percent of students finish high school. College tuition is prohibitively expensive (60 times the annual per capita income of the rural poor). Only three percent of rural students are able to attend a tier 1 or tier 2 university (Rozelle, 2010). Facilitating education would help China to keep climbing the ladder of comparative advantage.

Investing in human capital in ASEAN countries is also essential to foster creative industries. These countries need to progress from labor-intensive assembly operations to the engineering and design aspects of production. To achieve this it is necessary for children to receive adequate nutrition, healthcare, and primary education. It is also desirable that high school students receive a high quality education in science and math and also that university students receive scientific and engineering training. The educational system should focus on providing students with marketable skills that businesses need. ASEAN governments can help coordinate this process.

Thus, there is a significant need to invest in education. Rather than channeling trillions of dollars into investments in U.S. securities, the returns to Asia and its people would be higher if they invested in rural education, nutrition, and healthcare. In addition, as the Asian Development Bank has often argued, consumption would grow if precautionary reasons for savings such as inadequate provision of education and health care were remedied.

The investment climate in ASEAN is also plagued by corruption. The World Economic Forum (2013) surveyed more than 10,000 executives, and they listed corruption as one of their two biggest concerns in doing business with Malaysia, the Philippines, and Thailand. For the Philippines they also singled out poor infrastructure as their biggest concern. Multinational corporations have shifted production out of the Philippines to other locations because of poor infrastructure and the high cost of electricity. Improving the investment climate in ASEAN could help attract and retain MNCs and lead to more technology assimilation by local workers. A detailed discussion on improving the investment climate in emerging Asia is available in Kawai and Lee (forthcoming).

4. Conclusion

East Asia is characterized by intricate production and distribution relationships. Japan, Korea, Taipei,China and multinational corporations in ASEAN produce sophisticated technology-intensive intermediate goods and ship them to the People's Republic of China (PRC) for assembly by lower skilled workers. The finished products are then exported disproportionately to the US and Europe.

The Global Financial Crisis showed the danger of depending on the West as an engine of growth. When demand in the US and Europe plummeted after 2008Q3, Asia's exports collapsed. Thus Asia was not able to decouple from the West.

The Asian Development Bank and others have noted the importance of channeling final goods, not only to the US and Europe but also to Asian consumers. This would provide a second locomotive and reduce the exposure of Asian economies to slowdowns outside of the region. It would also allow Asian workers to enjoy more of the fruits of their own labor.

This paper investigates whether Asian countries are importing fewer final consumption goods than one would expect. To do this it uses the gravity model. This model is a workhorse for estimating bilateral trade flows.

The results indicate that China and ASEAN are now importing more final goods than predicted by the model. On the other hand emerging Asia's consumption imports are far less than the imports of developed economies. To channel more goods to consumers in the region, Asia needs to continue developing.

One key step in accomplishing this would be to invest in human capital beginning at a young age. Private and social returns are much higher for these domestic investments than for further investments in U.S. Treasury securities. Further accumulation of foreign exchange reserves would thus lead to a misallocation of resources. If Asian central banks reduced their interventions in foreign exchange markets, any resulting exchange rate appreciations would increase the purchasing power of Asian citizens and allow them to consume more.

The Chinese character for country is a jade (a precious stone) surrounded by a boundary. We can think of the precious stone as representing the people of China and the boundary the borders of the country. China would receive a higher expected return and face lower risks in renminbi terms by investing in the health, education, and welfare of the people within its borders rather than by investing further in foreign exchange reserves. The government should focus especially on rural education and on remedying economic deficiencies in ways that benefit the non-tradable sector.

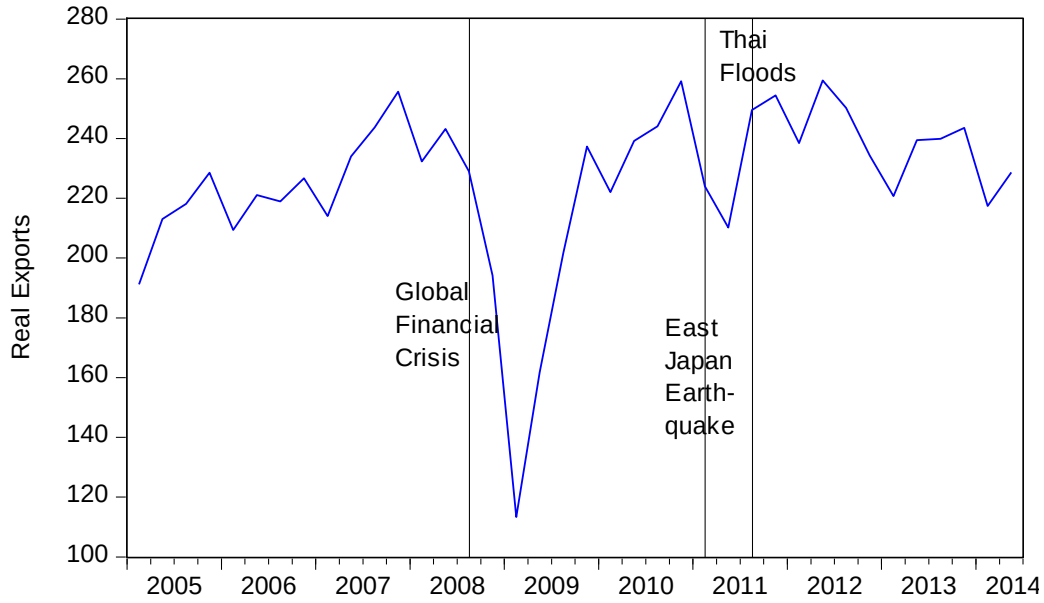

Figure 1a. Japanese Automobile Parts and Components Exports to the World

Source: CEIC Database.

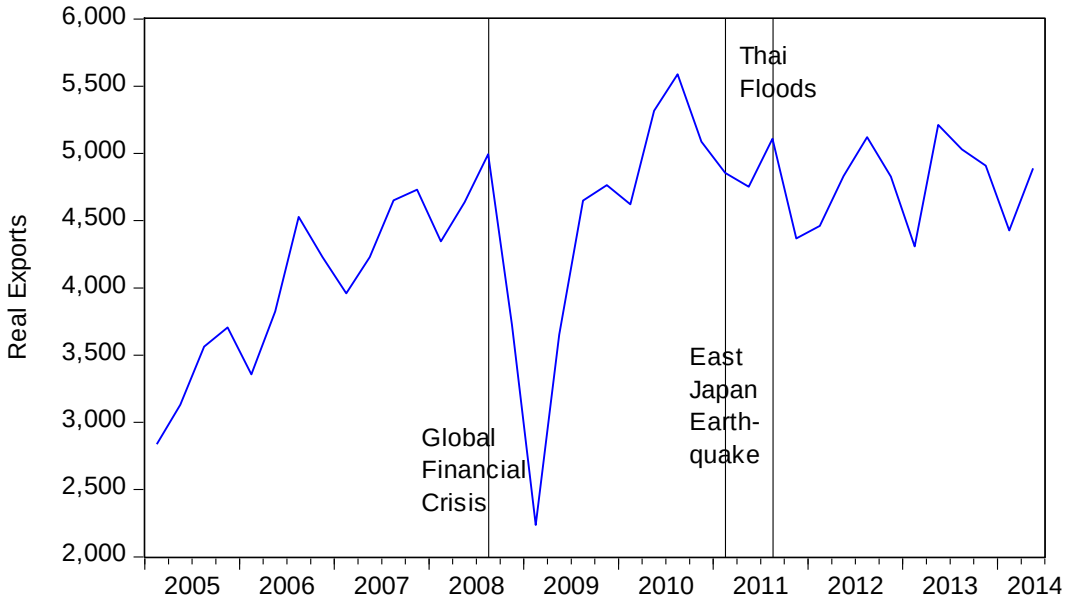

Figure 1b. Japanese Electronics Parts and Components Exports to the World

Source: CEIC Database.

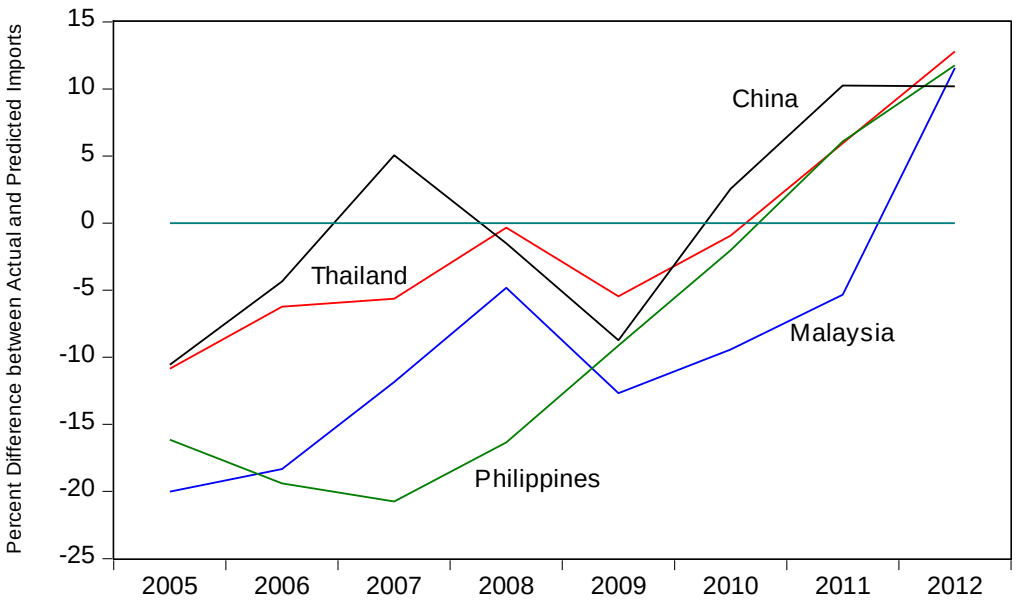

Figure 2a. Percent Difference between Actual Consumption Imports (excluding Cars) and the Values Predicted by a Gravity Model

Source: CEPII-CHELEM Database and calculations by the author.
Note: Consumption goods come from the following categories: beverages, cars, carpets, cereal products, cinematographic equipment, clocks, clothing, consumer electronics, domestic electrical appliances, knitwear, miscellaneous manufactured articles, pharmaceuticals, photographic equipment, preserved fruit and vegetable products, preserved meat and fish products, soaps and perfumes (including chemical preparations), sports equipment, toiletries, toys, and watches.

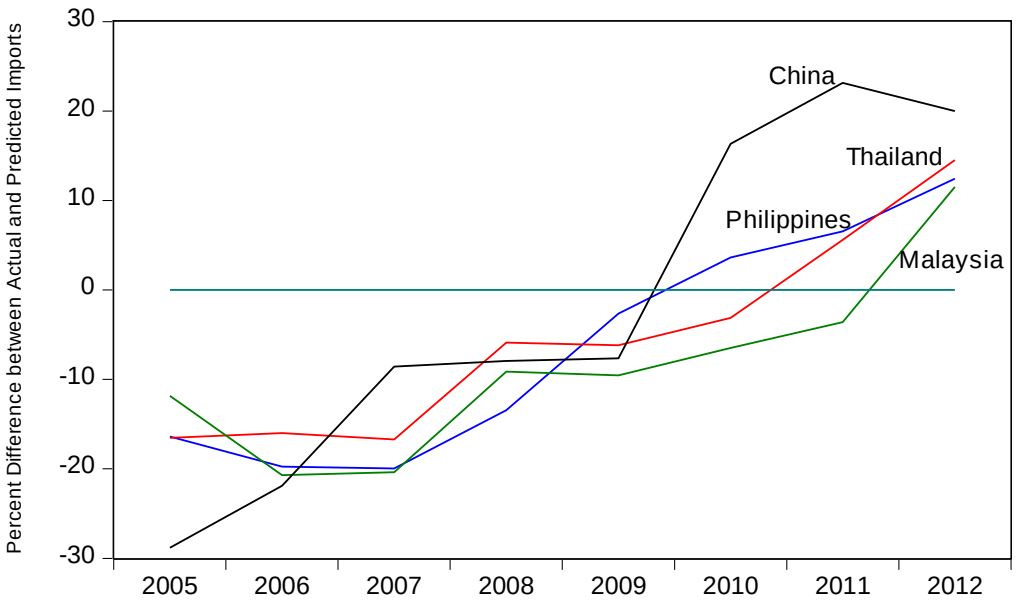

Figure 2b. Percent Difference between Actual Consumption Imports and the Values Predicted by a Gravity Model

Source: CEPII-CHELEM Database and calculations by the author.
Note: Consumption goods come from the following categories: beverages, cars, carpets, cereal products, cinematographic equipment, clocks, clothing, consumer electronics, domestic electrical appliances, knitwear, miscellaneous manufactured articles, pharmaceuticals, photographic equipment, preserved fruit and vegetable products, preserved meat and fish products, soaps and perfumes (including chemical preparations), sports equipment, toiletries, toys, and watches.

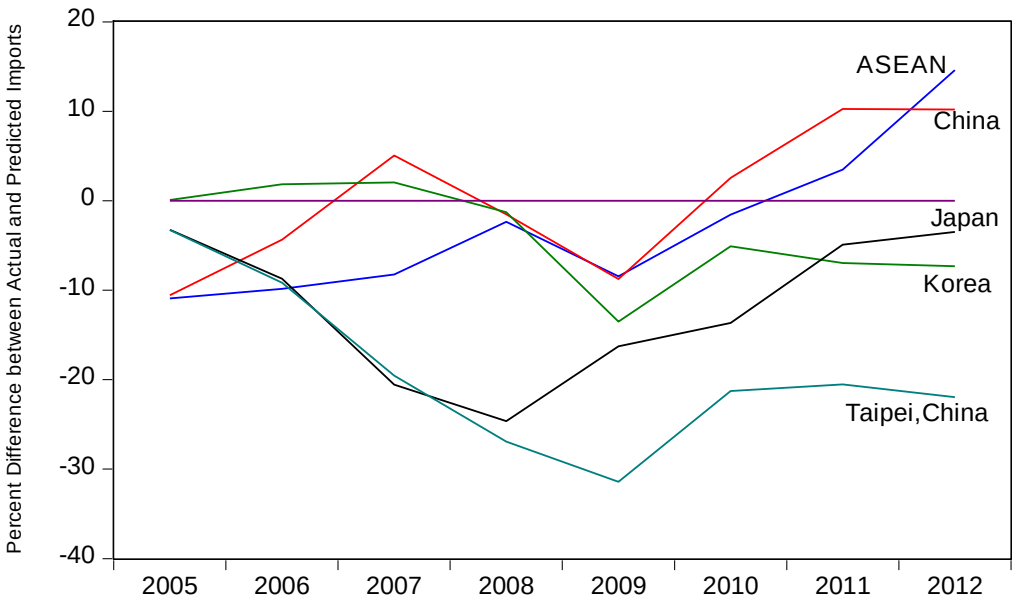

Figure 3a. Percent Difference between Actual Consumption Imports (excluding Cars) and the Values Predicted by a Gravity Model

Source: CEPII-CHELEM Database and calculations by the author.
Note: Consumption goods come from the following categories: beverages, cars, carpets, cereal products, cinematographic equipment, clocks, clothing, consumer electronics, domestic electrical appliances, knitwear, miscellaneous manufactured articles, pharmaceuticals, photographic equipment, preserved fruit and vegetable products, preserved meat and fish products, soaps and perfumes (including chemical preparations), sports equipment, toiletries, toys, and watches. ASEAN here represents ASEAN-4.

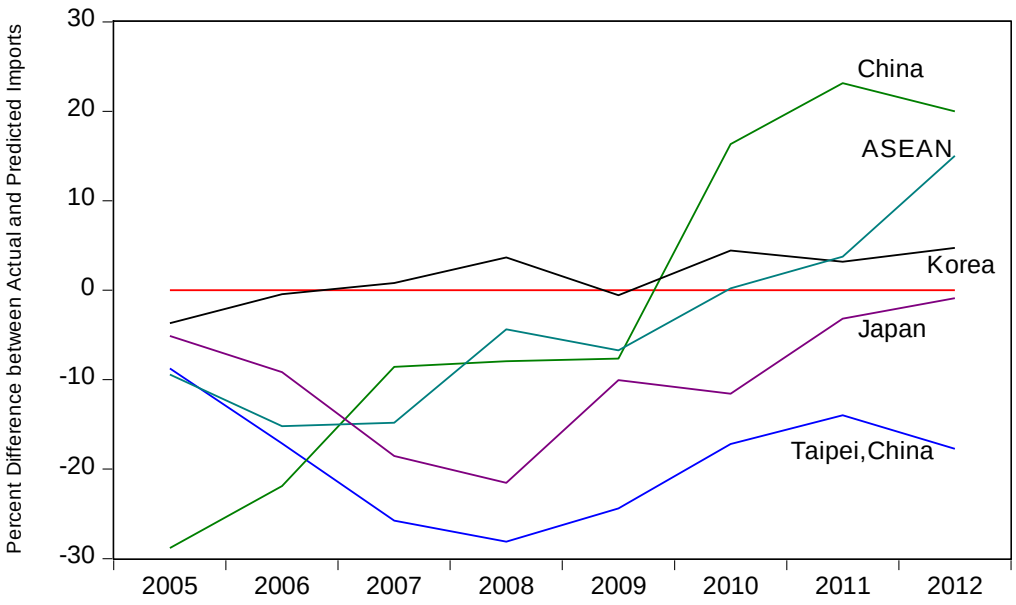

Figure 3b. Percent Difference between Actual Consumption Imports and the Values Predicted by a Gravity Model

Source: CEPII-CHELEM Database and calculations by the author.
Note: Consumption goods come from the following categories: beverages, cars, carpets, cereal products, cinematographic equipment, clocks, clothing, consumer electronics, domestic electrical appliances, knitwear, miscellaneous manufactured articles, pharmaceuticals, photographic equipment, preserved fruit and vegetable products, preserved meat and fish products, soaps and perfumes (including chemical preparations), sports equipment, toiletries, toys, and watches. ASEAN here represents ASEAN-4.

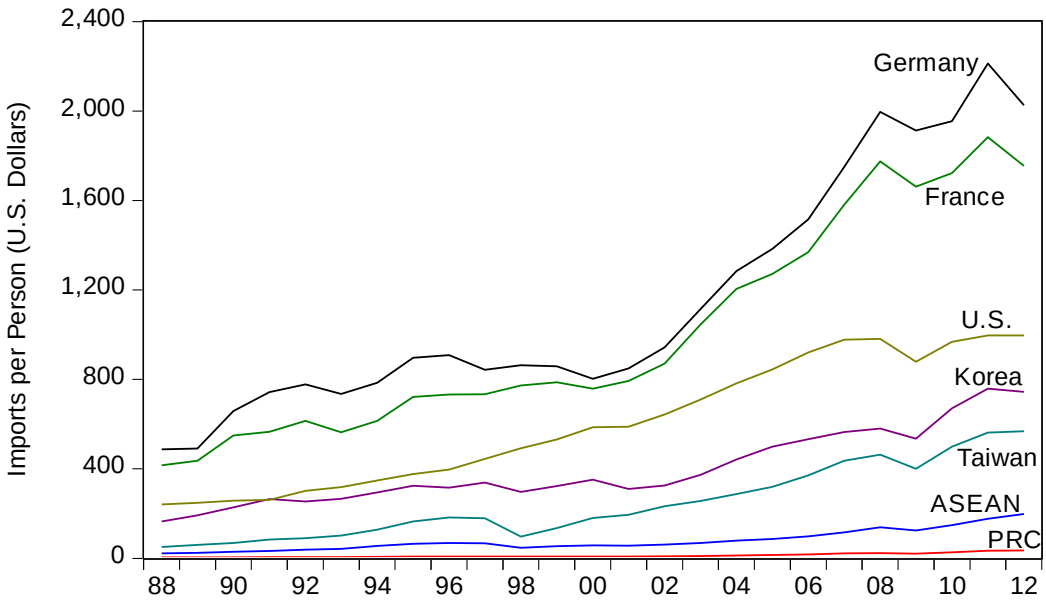

Figure 4. Consumption Imports Per Person (U.S. dollars)

Source: CEPII-CHELEM Database
Note: Consumption goods come from the following categories: beverages, carpets, cereal products, cinematographic equipment, clocks, clothing, consumer electronics, domestic electrical appliances, knitwear, miscellaneous manufactured articles, pharmaceuticals, photographic equipment, preserved fruit and vegetable products, preserved meat and fish products, soaps and perfumes (including chemical preparations), sports equipment, toiletries, toys, and watches.

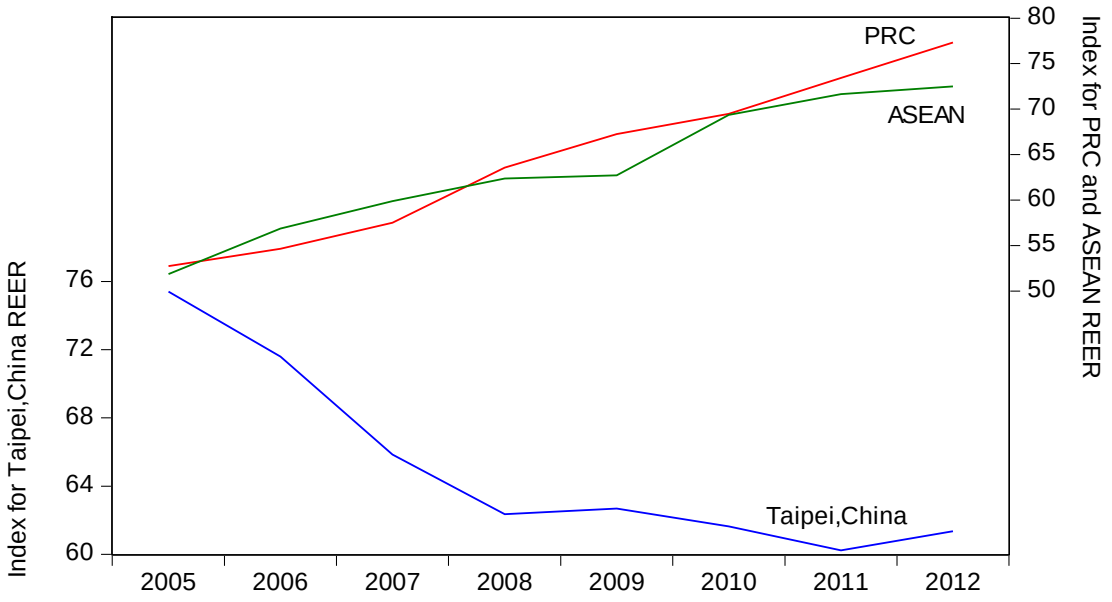

Figure 5. Real Effective Exchange Rates in ASEAN, the PRC, and Taipei,China

Source: CEPII-CHELEM Database.
Note: ASEAN includes Malaysia, the Philippines, and Thailand.

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Table 1 PPML gravity estimates, 1988-2012

	(1)	(2)	(3)	(4)	(5)	(6)
Exporter GDP	0.71***	0.87***				
	(0.05)	(0.04)				
Importer GDP	0.69***	0.84***				
	(0.05)	(0.03)				
Distance	-0.75***	-0.80***	-0.88***	-0.76***	-0.75***	-0.81***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Common Language	0.09***	0.08***	0.27***	0.27***	0.10***	0.09***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.03)	(0.03)
Bilateral Real Exchange Rate	-0.10*	-0.25***	-0.04***	-0.10***	0.16***	0.04***
	(0.06)	(0.06)	(0.00)	(0.00)	(0.06)	(0.07)
Constant	-5.68***	-9.98***	15.0***	15.0***	17.5***	18.3***
	(1.16)	(0.90)	(0.00)	(0.00)	(0.11)	(0.12)
Dependent Variable	Consumer Goods Excluding Cars	Consumer Goods	Consumer Goods Excluding Cars	Consumer Goods	Consumer Goods Excluding Cars	Consumer Goods
Fixed Effects Specification	Exporter, Importer, Time	Exporter, Importer, Time	Time-varying exporter, importer	Time-varying exporter, importer	Exporter, Importer, Time	Exporter, Importer, Time
No. of observations	23249	23249	23249	23249	23249	23249
Sample Period	1988-2012	1988-2012	1988-2012	1988-2012	1988-2012	1988-2012

Notes: The table contains Poisson Pseudo Maximum Likelihood (PPML) estimates of gravity models. Bilateral exports from 31 major exporters to each of the other 30 countries over the 1988-2012 period are included. Huber-White standard errors are in parentheses.
*** (**) denotes significance at the 1% (5%) level.

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