Chapter 4
The Changing Nature of the Production Network in East Asia

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Abstract Over the past two decades, East Asia has been the most successful region in the world in building up and joining regional or global supply chains and it has been described as Factory Asia (Baldwin, *Singapore Economic Review* 53(3): 449–478, 2008). We argue that East Asia, apart from being the center of global manufacturing, is emerging as one of the world's leading final markets for consumption goods. This reorientation has nontrivial implications. First, the average lead time for the region's exporters will fall, translating into lower transportation and inventory costs. And second, East Asia will host more high value-added downstream value chain activities.

Keywords Empirical studies of trade • Economic integration • Asia

4.1 Introduction

Over the past decades, East Asia[1] has been the most successful region in the world to build up cross-border supply chains and has earned the title of Factory Asia (Baldwin 2008). In a form of "triangle trade," advanced countries in East Asia, such as Japan and the Republic of Korea, export sophisticated parts and components to less developed countries in the region, where these intermediate goods are assembled into final consumption goods and then shipped to rich-nation markets, especially the European Union (EU) and the United States (US) (Baldwin 2008). However, in recent years, market observers have noticed that East Asia itself has

[1] In our sample, East Asia refers to the 10 member states of the Association of Southeast Asian Nations (ASEAN)—Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam—and further includes the People's Republic of China, Japan, the Republic of Korea, and Hong Kong, China.

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become an increasingly important marketplace for final goods. For example, in 2014, Apple for the first time sold more iPhones in the People's Republic of China (PRC) than in the US (Financial Times 2015). The question arises, therefore, whether East Asia is becoming a new "Global Mall" where a large share of final goods is purchased.

4.2 Evolution of East Asia's Trade Patterns: When the Supporting Actor Becomes the Lead

4.2.1 East Asia's Changing Trade Patterns

East Asia has experienced tremendous growth in its trade in the last decade and as a consequence has increased its weight in international trade. Between 2002 and 2012, East Asia's trade within the region and with the rest of the world increased from $2.5 trillion to $9.9 trillion, increasing East Asia's share of world trade from 23 % in 2000 to 31 % in 2012. However, not all commodity groups have increased equally.

In order to better discern the main trends, we divide exports into four broad commodity groups (ADB 2012):

(i) *Primary goods*, including food and beverage, fuel, lubricants, and primary industrial supplies for industry.
(ii) *Intermediate goods*, including processed goods mainly for industry, and parts and components for capital goods and transport equipment.
(iii) *Capital goods*, including machinery and equipment used by producers as inputs for production.
(iv) *Consumption goods*, including durable and nondurable household goods as well as nonindustrial transport equipment, such as automobiles.

These commodity groups are based on the United Nations classification by Broad Economic Categories (BEC) (United Nations 2002). The exact definition of the four commodity groups can be found in Appendix Table 4.6.

Bilateral trade data in terms of import data for these four commodity groups were downloaded from the United Nations Comtrade database for 1999–2012. Import data are used to increase the reliability of the data, as is commonly done in the trade literature. The main sample consists of 58,585 positive trade flows, which are the bilateral trade flows between the 14 East Asian economies in our sample and 190 economies (including East Asia) for the 14 years in our sample.

Table 4.1 presents the value of East Asia's exports within the region, to the EU-27 and US (combined), and to the rest of the world.[2] The first striking observation is that intermediate goods constitute the largest share of East Asia's exports. In 2011/12, intermediate goods equaled close to half of all exports, and their total value more than tripled almost fourfold compared to 1999/2000. The high share of

[2] To enhance readability, 2-year averages were constructed.

Table 4.1 Destination of East Asia's exports by commodity group, 1999–2012 ($ billion)

Commodity group	Destination	1999/2000	2001/02	2003/04	2005/06	2007/08	2009/10	2011/12
Primary goods	East Asia	72.6	79.9	106.9	157.3	226.2	233.4	356.0
	EU-27&US	18.2	18.7	25.1	38.4	56.1	52.5	65.3
	ROW	22.4	24.8	36.2	55.0	90.4	93.5	134.7
Intermediate goods	East Asia	333.8	363.3	547.7	745.3	947.4	973.4	1,285.5
	EU-27&US	212.4	190.2	242.3	330.3	414.6	378.1	481.3
	ROW	113.4	112.2	158.0	240.2	361.4	386.7	535.9
Capital goods	East Asia	87.0	102.2	161.6	226.8	300.8	335.7	474.8
	EU-27&US	133.5	130.7	177.6	249.4	315.7	298.3	359.3
	ROW	60.5	55.8	83.2	126.3	204.2	225.2	294.1
Consumption goods	East Asia	82.8	91.6	122.4	147.6	193.4	203.2	271.4
	EU-27&US	201.8	210.7	263.8	338.1	392.8	359.4	416.1
	ROW	62.8	66.5	98.5	146.9	232.5	224.1	310.2
All goods	East Asia	576.2	637	938.6	1,277.1	1,667.8	1,745.6	2,387.6
	EU-27&US	566.0	550.3	708.8	956.1	1,179.3	1,088.4	1,322.1
	ROW	259.1	259.3	375.9	568.3	888.5	929.6	1,274.8

Source: Authors' calculations using United Nations Comtrade data
EU European Union, *ROW* Rest of the World, *US* United States

intermediate exports illustrates that Factory Asia is well established, with value chains spanning across the region (Baldwin 2008).

East Asia's trade pattern has often been described as "triangle trade" (Baldwin 2008; Baldwin and Kawai 2008), where advanced economies in Asia export sophisticated parts and components to developing countries in the region where these are assembled into final goods and shipped to developed countries, especially the EU, Japan, and the US. In Table 4.1, we see that the largest share of consumption goods is exported to the EU-27 and the US. However, we observe that East Asia as well as the rest of the world are becoming increasingly important destinations for consumption goods. In 1999/2000, they received only 42 % of East Asia's consumption goods exports. In 2011/12, however, consumption goods exports to both regions accounted for almost 60 %. One reason for the drastic decline in consumption goods exports to the EU and the US is certainly related to a drop in demand due to the global financial and economic crisis. However, the fall might also indicate a more structural change in which the traditional markets for final goods are being replaced by markets in emerging economies.

As for intermediate goods, we observe that East Asia has increased its exports to the EU-27 and the US, but those to East Asia and the rest of the world have increased much more rapidly. As a consequence, the share of exports of intermediate goods that went to the EU-27 and the US has fallen by 11 % between 1999 and 2012, while the exports within the region and toward the rest of the world have increased by over 5 % over the same period.

Factory Asia also implies that capital goods need to be shipped from developed countries in Asia to developing countries. It is therefore no surprise to see that the share of capital goods traded within East Asia has increased from 15 % in 1999/2000 to almost 20 % in 2011/12. In the case of primary goods, trade within East Asia remained large, accounting for almost two-thirds. One reason might be that trade costs of primary goods are often high and shipping over large distances is less common, except for goods such as oil.

The descriptive analysis of trade data presented in Table 4.1 suggests that over the last decade "triangle trade" has become less relevant and has substantially diversified East Asia's trade. In Table 4.1, we can also see that, despite the global financial crisis, all export flows within East Asia constantly increased. In contrast, exports to the EU-27 and the US declined in all commodity groups and the decline was particularly strong in consumption goods and in intermediate goods.

Having explored East Asia's changing export patterns, we consider more sophisticated analytical tools to better understand the trends and underlying determinants.

4.3 Measuring Trade Distance

In order to gauge the reorientation of East Asia's exports beyond a simple analysis of export values and destinations, we follow the new quantitative tool developed by Helble and Ngiang (2014) to measure the distance of trade. In other words, we attempt to estimate how far East Asia's exports "travel" every year.

Distance is a key variable in the trade literature, as it is considered to be a good proxy for trade costs (Hummels 2007). Helble und Ngiang (2014) suggest a new method to measure the average distance that a traded good travels. The idea is to better understand how the geography of trade changes. If East Asia's trade is reorienting toward itself, then we should observe the trade distance to fall. Another reason for falling distance could be a lowering of trade costs within the region which might generate additional trade.

The basic equation for this measurement is:

$$D_i = \frac{\sum_{j=n}^{n} (d_{ij} \times x_{ij})}{X_i}$$

where d_{ij} stands for economy i's geographical distance from the trade partner j, x_{ij} denotes economy i's exports in terms of value (measured in current US dollars) to destination economy j, X_i represents the sum of economy i's total export flows, and D_i thus gives an estimate economy i's average distance traveled per US dollar exported.

Modifying the above equation and applying it to the context of East Asia, we get:

$$D_i = \frac{\sum_{row=n}^{n} (d_{irow} \times x_{irow}) + \sum_{asia=n}^{n} (d_{iasia} \times x_{iasia})}{X_i}$$

where x_{irow} stands for East Asian economy i's exports to a country outside East Asia, x_{iasia} is East Asian economy i's exports to a country within East Asia, d_{irow} measures East Asian economy i's distance to a country outside East Asia, and d_{iasia} is East Asian economy i's distance to a country within East Asia. Given d_{irow} and d_{iasia} are constant and d_{irow} larger than d_{iasia}, it must hold that when x_{irow} increases, then D_i will increase. When x_{iasia} increases, then D_i will fall.

Using this simple formula, we can obtain more accurate information on the geographical pattern of trade rather than simply looking at trade values and destinations. The limitation is that it is not a demand-based model and is purely a trade-distance measurement without any supply or demand components. Applying this formula to the East Asian economies, one obtains 13 coefficients for each year. Subsequently, we calculate a simple average distance for East Asia by weighting the coefficients of each economy with its respective economic weight. Finally, to observe changing trade patterns over time, the average distance is computed for all four commodity types (primary goods, intermediate goods, capital goods, and consumption goods) for 2000–2012.

4.3.1 Results of Trade Distance

The results of these calculations are illustrated in Fig. 4.1. The first observation of interest is that the average distance traveled by each commodity type increases with

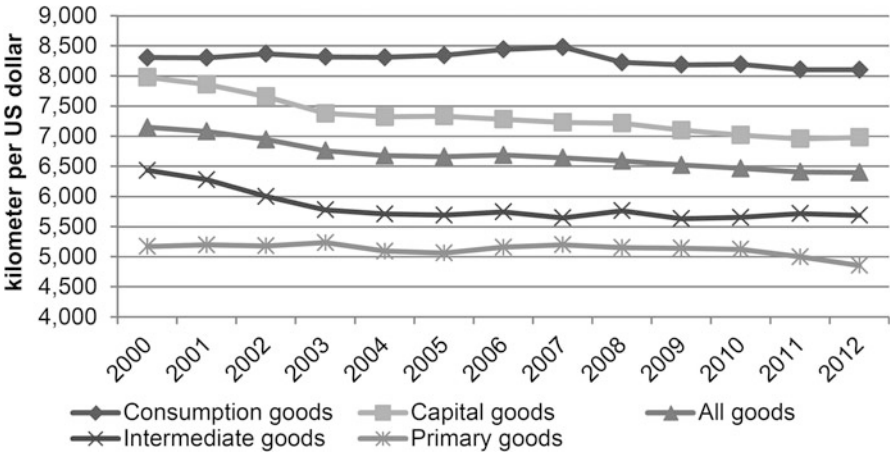

Fig. 4.1 Average distance traveled by East Asia's exports, 2000–2012 (Source: Helble and Ngiang 2014)

the stage in the production chain. Primary goods and intermediate goods are shipped over rather short distances of about 4,900 kilometers (km) and 5,700 km in 2011/12, respectively. In contrast, capital and consumption goods traveled much further, about 7,000 km and 8,100 km, respectively. The average distance traveled by each commodity type seems to be positively related to the production stage. Commodities that go into the early production process, such as primary and intermediate goods, are traded over shorter distances, while capital and consumption goods are exported farther to final markets.

Studying the trends over the sample period, we observe that the average distance for primary goods was relatively stable for most of the years. However, East Asia's trade in intermediate goods fell until 2004 and has been relatively stable since then. In addition, more capital goods are staying in the region and supplying Factory Asia with the necessary equipment. Why East Asia is labeled the "Global Factory" becomes clear by the distance traveled by consumption goods exports. Over the past decade, East Asia's consumption goods exports traveled over 8,000 km on average before reaching their final markets. In comparison, the EU exports of consumption goods traveled less than 3,000 km and North American Free Trade Agreement (NAFTA) exports well below 5,000 km.[3]

Over the entire period, we observe overall that the average distances of the four groups have fallen. However, this occurred at different points in time and at different speeds. The average distance for primary goods was relatively stable (around 5,200 km) and only declined below 5,000 km in the last 2 years of the sample period. In contrast, the distance of East Asia's trade in intermediate goods showed a strong decline at the beginning of the period. It fell from almost 6,500 km

[3] The distances for EU and NAFTA exports are not reported in this chapter but have been calculated following the same methodology as indicated above.

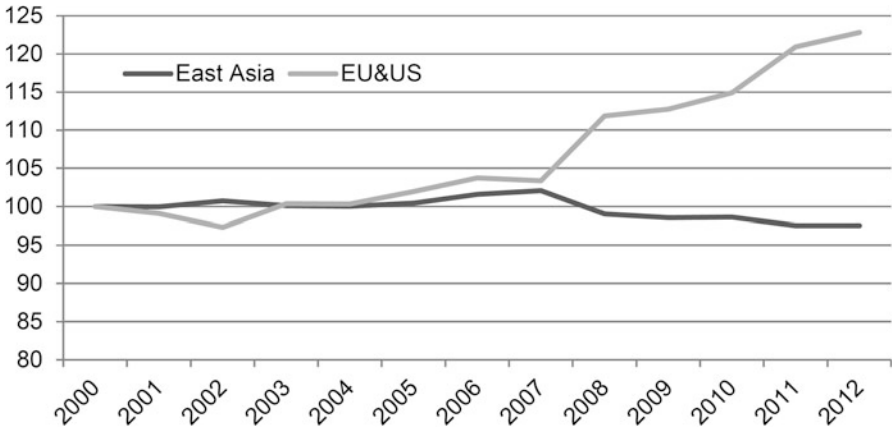

Fig. 4.2 Average distance traveled by East Asia's exports, 2000–2012 (indexed on base year 2000). *EU* European Union, *US* United States (Source: Helble and Ngiang 2014)

in 2000 to 5,700 km in 2004, but has been stable since. These results suggest that the main trade links for primary and intermediate goods trade that support Factory Asia were established in the early 2000s. The distance of capital goods has continuously fallen from more than 8,000 km at the start of the period to less than 7,000 km at the end of the period.

As for consumption goods, we observe that the distance has been more or less stable between 2000 and 2007 and decreasing slightly thereafter. If East Asia were predominantly a Global Factory, one would expect the distance coefficient to increase, as more consumption goods are produced in East Asia and shipped out to final markets mostly in the developed world. However, as we can see, the distance coefficient has been on a slight decline, especially since the aftermath of the global financial crisis. This finding confirms that of Athukorala (2014) who observes that the intraregional integration of consumption goods is not rapid.

However, the falling coefficient for consumption goods exports in the case of East Asia contrasts starkly with the increasing distance coefficient of the combined exports of consumption goods to the EU and the US (Fig. 4.2). East Asia is thus absorbing an increasing share of the world's consumption goods. If this trend continues for the next decade, it seems very plausible that East Asia will evolve into a Global Mall. Anecdotal evidence already suggests that for several consumption products, East Asia is already by far the largest destination market. For example, it was estimated that out of one billion smartphones sold worldwide in 2013, almost 50 % were sold in East Asia, whereas Europe and North America accounted for about 30 % of total sales.[4]

[4] For market share of smartphone shipments worldwide by region in 2013 and 2017, see http://www.statista.com/statistics/283325/market-share-smartphone-shipments/ (accessed 19 January 2015).

4.4 The Gravity Model Approach

In this section, we introduce another empirical approach to gauge the changing trends of East Asia's trade, namely the gravity model to predict international trade flows, which was developed by the late Nobel laureate Jan Tinbergen (1962). The gravity model has since become a highly popular tool for trade economists. It assumes that international trade flows are subject to the law of gravity—the closer and the bigger two countries are, the more they trade.

The gravity model received its first theoretical backing by Anderson (1979). Over time, it was further refined by the seminal contributions of Eaton and Kortum (2002) as well as Anderson and van Wincoop (2003). More recently, it was shown that the gravity approach can also be applied in the context of heterogeneous firms, for example by Chaney (2008). Thanks to this strong microeconomic foundation and its strong predictive power, the gravity model still enjoys great popularity among trade economists. Following the approach by McCallum (1995), the gravity model can also be used to establish a benchmark and thus to assess whether a country or region is trading "too much" or "too little" with itself.

4.4.1 Additional Data

Estimating a gravity equation requires several additional data. The mass of an economy is usually approximated by the gross domestic product (GDP) and the corresponding data were obtained from the World Development Indicators (World Bank) for 1999–2012. In addition to geographical distance, as used in Sect. 4.3, we control for other factors that increase or decrease trade costs between two economies. For example, sharing a common language or being part of the same regional trade agreement typically enhances trade. The data for these bilateral determinants were taken from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) and from De Sousa (2012). (See Appendix Table 4.5 for more details.)

Finally, two simple dummy variables have been calculated to single out certain trade flows:

- a dummy variable (EA) for trade flows within the region of East Asia (unity for every trade flow between one of the 14 economies); and
- a dummy variable (EU&US) for trade flows between East Asia and the EU or the US (unity for every trade flow between one of the East Asian economies and an EU economy or the US).

4.4.2 Methodology

We model the gravity equation similar to Head and Mayer (2014). Their gravity model takes the following form:

$$X_{ni} = GS_iM_n\phi_{ni}$$

where X_{ni} denotes the trade flows from economy i to the destination market n, S_i gauges the capacity of economy i to export to all destinations, and M_n measures all characteristics of the destination market n. Bilateral trade costs and their impact on trade flows between the destination market n and economy i are denoted by ϕ_{ni}, where $0 \leq \phi_{ni} \leq 1$. G is a constant.

Taking logs of the above equation, we get:

$$\ln X_{ni} = \ln G + \ln S_i + \ln M_n + \ln \phi_{ni}$$

The logs of the economic size (GDP) of the exporting and importing country were traditionally used as proxies for S_i and M_n. However, since the seminal work by Anderson and van Wincoop (2003), most trade economists use fixed effects for importers and exporters instead.[5] One limitation of the fixed effects estimation method is that it does not allow for the inclusion of monadic variables, such as GDP per capita and population, as well as time-fixed dyadic variables as regressors. Furthermore, dummies controlling for regional trade flows are collinear with importer fixed effects. As a compromise, we include importer, exporter, and time-fixed effects only when the standards of collinearity for the variables of interest are not contravened (e.g., variance inflation factor of above 3.0).

Our strategy is to first estimate the gravity model using a dynamic ordinary least squares (DOLS) regression following Stock and Watson (1993) on pooled panel data of all years stretching from 1999 to 2012. The DOLS estimator aims to correct for the possible nonstationarity and co-integration of dependent and explanatory variables. We then estimate separately cross-sectional regressions on biannual data using seemingly unrelated regression (SUR), in order to better understand the evolving relationship between time-invariant explanatory variables (e.g., East Asia to East Asia trade flow dummies) and trade patterns over time. The SUR estimator controls for the existence of contemporaneous correlation among the cross-section equations.

[5] Another solution suggested in the literature is the so-called ratio-type estimation (Head and Mayer 2000; Head et al. 2010).

4.4.3 Results of the Gravity Model Approach

4.4.3.1 Baseline Pooled Regression

The baseline estimation results are shown in Table 4.2. As our data span from 1999 to 2012, all years are pooled.[6] For the sake of readability, only variables of interest are listed. The results confirm our analysis that the distance coefficient is different for all four commodity groups. Our econometric results in Sect. 4.3 show that primary goods face the highest trade costs as measured by the distance coefficient. Doubling the distance between exporters and importers decreases the trade in primary goods by more than half. High distance coefficients for trade in primary goods appear regularly in the trade literature (e.g., Cheng and Fukumoto 2010). One reason for the high trade costs of primary goods is that they include perishable agricultural goods. Another reason is that their weight-to-value ratio tends to be high. The distance coefficient for intermediate goods is lower, but exceeds that for capital goods. Given the fact that East Asia has been labeled "Factory Asia," the relatively high distance coefficient is surprising and seems to suggest that trade in intermediate goods could be further facilitated. The distance coefficients for capital and consumption goods are of similar magnitude and about half of the coefficient for primary goods. Both commodity groups are thus sold across the world with relatively modest trade costs.

In our baseline regression in Table 4.2, we introduce two dummy variables to control for the final destination of the export flow. The first variable becomes unity if the trade flow is between East Asian economies (EA dummy); the second one captures all bilateral trade flows between East Asian economies and the EU and the US (EU&US dummy). In the case of primary goods, the EA dummy is positive and highly statistically significant, indicating a bias to trade more in primary goods within East Asia compared to the predictions of the gravity model. For intermediate goods, this regional bias is even stronger. A coefficient of 1.16 means that compared to the benchmark established by the gravity model, trade in intermediate goods within East Asia is three times higher ($\exp[1.16] = 3.19$). The EA dummy is again significant for capital goods, highlighting that increasingly the capital goods that enter Factory Asia are produced within the region. A coefficient of 0.66 means that East Asia is sourcing almost twice as many capital goods within the region compared to the predictions of the gravity equation. Finally, the EA dummy for consumption goods is positive, but not significant. If consumption goods were shipped out of East Asia to a higher degree than predicted by the gravity equation, the coefficient would be negative and statistically significant.

The coefficients of the EU&US dummy reveal more information that completes the picture. The EU and the US as trading partners for East Asia are less important than predicted by the gravity equation. However, the EU and US are important markets for intermediate goods exported from East Asia. For capital goods exports, the regressions did not yield any particular bias. For the exports of consumption goods, we detected a

[6] The results of the nonstationarity tests indicate that all time-varying variables are nonstationary at the 95 % confidence level, except for population.

Table 4.2 Gravity model results (dynamic OLS), East Asia's exports, 1999–2012

Variable	Primary	Intermediate	Capital	Consumption
Log (distance)	−1.15***	−0.90***	−0.63***	−0.51***
	(0.10)	(0.08)	(0.08)	(0.07)
EA dummy	0.88***	1.16***	0.66***	0.26
	(0.26)	(0.20)	(0.19)	(0.18)
EU&US dummy	−0.28**	0.44***	0.09	0.40***
	(0.13)	(0.10)	(0.10)	(0.09)
RTA dummy	0.77***	0.51***	0.35**	0.57***
	(0.24)	(0.18)	(0.17)	(0.18)
Contiguity	−0.15	0.14	0.39	0.25
	(0.25)	(0.30)	(0.29)	(0.29)
Common language	0.31	0.69***	0.44***	0.39**
	(0.19)	(0.13)	(0.12)	(0.14)
Common colonizer	1.34***	1.06***	0.66***	1.00***
	(0.18)	(0.14)	(0.13)	(0.14)
Time dummies	Yes	Yes	Yes	Yes
Centered R^2	0.56	0.77	0.73	0.76
Number of obs.	13,754	15,082	13,952	15,797

Source: Authors' calculations

Notes: Estimated using dynamic OLS with one lead and one lag on first-differenced explanatory variables; standard errors are in parentheses and are robust to heteroskedasticity and autocorrelation; ***, **, and * indicate significance levels of 1 %, 5 %, and 10 %, respectively

EA East Asia, *EU* European Union, *OLS* ordinary least squares, *RTA* regional trade agreement, *US* United States

strong bias toward the EU and US markets. Approximately 1.5 times (exp[0.40] = 1.49) more consumption goods are shipped to the EU and the US than predicted by the gravity equation. The regional dummies included in our estimations thus confirm the economic structure labeled "Factory Asia" (Baldwin 2008): primary, intermediate, and capital goods are traded intensively across borders in East Asia, whereas consumption goods are predominantly sold to the EU and the US.

The other variables in the regression yield further interesting results. Being part of bilateral or regional trade agreements (RTAs) increases East Asia's exports of all commodity groups. The effect is particularly strong for primary goods (0.77), which might be explained by the fact that the markets for agricultural products are still rather closed and few market access commitments have been made at the multilateral level. It seems that for members of RTAs in which East Asian economies participate, market access for primary goods has improved markedly. Compared to primary goods, the beneficial RTA effect for intermediate goods and consumption goods is lower, but still high (0.51 and 0.57, respectively). The relatively high coefficient for consumption goods might be an indication that tariff escalation still remains within World Trade Organization (WTO) commitments, which can be effectively overcome by RTAs. The RTA effect is lowest for capital goods (0.35). One reason might be that the multilaterally agreed tariffs for capital goods are already low and thus RTA membership can only provide limited additional market access.

A surprising result is that the dummy variable for sharing a land border (contiguity) is not significant; that is, sharing a land border in East Asia does not boost trade. In other regions,[7] this dummy variable is typically positive and significant, since sharing a land border typically lowers trade cost drastically. The nonsignificant result might be interpreted as evidence that cross-border infrastructure remains underdeveloped in East Asia. Further development of the cross-border infrastructure in Asia could certainly boost regional and international trade.[8]

Also included is a dummy variable that controls for the fact that two trading partners share a common official language. For primary goods trade, sharing the same official language does not seem to have an effect on East Asia's trade. Two explanations might be put forward. First, trade in primary goods is sometimes influenced by different natural endowments or climate conditions. Identifying a trading partner might thus be determined by availability of the product, rather than speaking the same language. Second, primary goods typically are relatively homogenous and can thus be traded without the need to explain the exact content and quality of a product.

In contrast, intermediate goods typically are heterogeneous and not traded at organized markets (Rauch 1999). As a consequence, it is important for trading partners to be able to communicate easily, which is reflected in the high coefficient for sharing a common language in intermediate goods trade. For capital goods, the language coefficient remains highly statistically significant, but is smaller (0.44) compared to the coefficient estimated for intermediate goods (0.69). For consumption goods, the language coefficient is even lower, which indicates that communication is less important for trade in consumption goods compared to capital or intermediate goods.

Finally, another dummy variable measures the effect of sharing a common colonizer, such as having been a British or French colony. The trade of East Asian economies still seems to be subject to this colonial bias in all four commodity groups. The bias is largest for primary goods (1.34) and smallest for capital goods (0.66). One possible reason for the high coefficient for primary goods could be that the colonies served as a source for primary goods, mostly natural resources, not available elsewhere. These old trade patterns might still be in play today.

4.4.3.2 Time Trends

As observed in Table 4.1, the composition, value volume, and geographical orientation of East Asia's trade continue to change. To better understand the determinants of these changes, we estimate the changing nature of variables of interest over time. As our main commodity groups of interest are intermediate goods and

[7] For the EU case, see Fidrmuc and Fidrmuc (2014).

[8] A recent ADBI study highlighted that infrastructure quality is particularly lagging among Cambodia, the Lao People's Democratic Republic, Myanmar, and Viet Nam (CLMV countries) (ADBI 2014). It is noteworthy that these countries are situated centrally within Asia. They share significant land borders with each other as well as with a number of major East Asian economies.

consumption goods, we focus on the estimations for these two groups only (Tables 4.3 and 4.4, respectively).[9]

Table 4.3 shows the results of a SUR regression for intermediate goods on a biannual basis from 1999 to 2012. We observe that the distance coefficient has been falling over time, highlighting that trade costs for intermediate goods have been decreasing as well. The dummy capturing trade within East Asia has decreased over the period 1999–2008 but has increased in the last 4 years of our sample. One explanation might be that the demand for intermediate goods from the EU and the US fell in the aftermath of the global financial crisis, while the demand for those products remained stable in East Asia. The dummy to measure the bias of intermediate goods trade with the EU and the US increased up to 2003/04, but has gradually become less important and finally lost its significance in 2011/12.

The other variables listed also show interesting changes over time. Sharing a common border had no impact at the beginning of the period, but has become statistically significant by the end of the period, which indicates that cross-border infrastructure in East Asia has improved and started to show an effect on international trade. Furthermore, sharing a common language is still an important determinant of trade in the region. However, the influence has seemingly become weaker. Similarly, sharing a common colonizer is still shaping bilateral trade flows, but again, the influence seems to be waning.

Table 4.4 shows the results of the SUR model for consumption goods. In contrast to intermediate goods, the weight of distance in exports increased toward 2003/04, but decreased to levels similar to the beginning of the period. The dummy measuring the bias of trade in consumption goods within East Asia, though statistically significant, fell from 1999/2000 to 2003/04 and lost significance thereafter until 2011/12 when it became significant again. The EU&US dummy was rather stable (around 0.8) for the first three time periods. It then dropped significantly to 0.60 in 2005/06 and to 0.31 in 2007/08. In the aftermath of the global financial crisis, it turned insignificant. One reason for the patterns of these dummy variables could be that prior to the global financial crisis, economies outside the EU and the US were growing quickly (United Nations 2007). As a consequence, East Asia's consumption goods were increasingly directed toward these dynamic markets. With the global financial crisis, this trend slowed, while the economies in East Asia continued their growth momentum or at least suffered less than in many other world regions. As a result, the bias in exports of consumption goods toward East Asia increased again in 2009/10 and became significant again in 2011/12.

Similar to the results for intermediate goods, contiguity has become increasingly important for consumption goods exports. While the coefficient for sharing a common land border was low and statistically insignificant, it increased and became significant from 2007/08 onward, which suggests that the cross-border infrastructure in East Asia has been improving in recent years. Furthermore, the dummy variable for sharing a common language exhibits a falling trend, similar to the regressions for intermediate goods. Finally, the dummy variable for a common

[9] Again, we have only listed the coefficients of interests to make the table easier to read.

Table 4.3 Gravity model results (SUR), East Asia's intermediate goods exports, 1999–2012

Variables	1999/2000	2001/02	2003/04	2005/06	2007/08	2009/10	2011/12
Log (distance)	**−1.01*** **	**−1.11*** **	**−1.13*** **	**−1.04*** **	**−0.95*** **	**−0.95*** **	**−0.80*** **
	(0.10)	(0.10)	(0.09)	(0.10)	(0.11)	(0.10)	(0.11)
EA dummy	**1.38*** **	**1.23*** **	**1.21*** **	**1.09*** **	**1.08*** **	**1.26*** **	**1.46*** **
	(0.22)	(0.23)	(0.22)	(0.24)	(0.24)	(0.22)	(0.22)
EU&US dummy	**0.24***	**0.33** **	**0.50*** **	**0.31** **	**0.36*** **	**0.23***	**0.11**
	(0.33)	(0.32)	(0.31)	(0.32)	(0.30)	(0.29)	(0.27)
Contiguity	**0.03**	**0.08**	**0.14**	**0.34**	**0.54**	**0.49**	**0.65***
	(0.36)	(0.35)	(0.32)	(0.34)	(0.36)	(0.33)	(0.36)
Common language	**1.22*** **	**0.88*** **	**1.03*** **	**1.01*** **	**0.94*** **	**0.68*** **	**0.72*** **
	(0.19)	(0.20)	(0.18)	(0.19)	(0.17)	(0.19)	(0.19)
Common colonizer	**1.17*** **	**1.30*** **	**1.29*** **	**1.16*** **	**1.02*** **	**1.01*** **	**0.34*** **
	(0.18)	(0.18)	(0.17)	(0.18)	(0.18)	(0.19)	(0.20)
N	1,636	1,664	1,718	1,779	1,789	1,739	1,699

Source: Authors' calculations

Notes: Estimated using SUR with coefficients held constant across time periods for real gross domestic product per capita, population, and regional trade agreements; White cross-section standard errors are in parentheses; ***, **, and * indicate significance levels of 1 %, 5 %, and 10 %, respectively

EA East Asia, *EU* European Union, *SUR* seemingly unrelated regression

Table 4.4 Gravity model results (SUR), East Asia's consumption goods exports, 1999–2012

Variables	1999/2000	2001/02	2003/04	2005/06	2007/08	2009/10	2011/12
Log (distance)	**−0.60*****	**−0.64*****	**−0.79*****	**−0.70*****	**−0.63*****	**−0.59*****	**−0.61*****
	(0.10)	(0.10)	(0.09)	(0.08)	(0.09)	(0.10)	(0.11)
EA dummy	**0.71*****	**0.70*****	**0.49****	**0.33**	**0.19**	**0.25**	**0.51****
	(0.24)	(0.23)	(0.20)	(0.21)	(0.22)	(0.22)	(0.22)
EU&US dummy	**0.74*****	**0.79*****	**0.84*****	**0.60*****	**0.31****	**0.05**	**0.01**
	(0.12)	(0.12)	(0.11)	(0.12)	(0.13)	(0.13)	(0.13)
Contiguity	**0.07**	**0.41**	**0.19**	**0.42**	**0.68****	**0.65***	**0.71****
	(0.45)	(0.33)	(0.31)	(0.32)	(0.33)	(0.34)	(0.33)
Common language	**0.66*****	**0.64*****	**0.54*****	**0.58****	**0.51****	**0.44****	**0.33**
	(0.21)	(0.20)	(0.19)	(0.21)	(0.20)	(0.19)	(0.19)
Common colonizer	**1.16*****	**1.27*****	**1.21*****	**1.01*****	**0.86*****	**0.80*****	**0.80*****
	(0.18)	(0.17)	(0.16)	(0.17)	(0.17)	(0.17)	(0.17)
N	1,697	1,710	1,745	1,835	1,837	1,799	1,736

Source: Authors' calculations

Notes: Estimated using SUR with coefficients held constant across time periods for real gross domestic product per capita, population, and regional trade agreements; White cross-section standard errors are in parentheses; ***, **, and * indicate significance levels of 1 %, 5 %, and 10 %, respectively

EA East Asia, *EU* European Union, *SUR* seemingly unrelated regression

colonizer has been declining over time, indicating that in a globalizing world, the importance of colonial links is losing its relevance.[10]

4.5 Summary and Discussion

4.5.1 Summary

The objective of this chapter was to retrace the changing trade patterns of East Asia over the past years. Dividing all of East Asia's trade into four commodity groups, we studied the trends from 1999 to 2012. We found that the share of intermediate goods in East Asia's export basket remains predominant. The trade within regional production networks is thus boosting intraregional trade, as discussed in other chapters of this book. However, the trade data have also revealed that consumption goods are decreasingly exported to the traditional markets in Europe and the US. More and more of East Asia's consumption goods end up staying within the region or being exported to markets in other parts of the rest of the world.

We then used a new tool to measure the distance of trade. Applying this tool on the four commodity groups over the entire sample period, we observed that the distance over which East Asia's export are traded has been shrinking for all groups. However, we noticed that the rate of decline is different for each commodity group and in different years. While the decline in trade distance for intermediate goods happened in the first half of the 2000s, that for consumption goods trade has fallen only recently.

Finally, the chapter presented a gravity model to test our hypotheses. The regression results of the gravity equation confirm the findings of our simpler tools: We find a strong intraregional bias of East Asia's exports of intermediate goods. In contrast, consumption goods are exceedingly exported to the EU and the US. When analyzing the changes over time, we find that the intraregional bias for trade in intermediate goods remained substantial over the entire time period. However, fewer consumption goods are exported to the EU and the US compared to other markets. Our conclusion is that the triangular trade pattern has started to erode. We predict that, assuming further sustained growth in East Asia, the region will not only produce the lion's share of the world's manufactured goods, but also become itself one of the largest destinations for final goods.

4.5.2 East Asia as a Global Mall: Possible Drivers and Implications

The speed of reorienting the global trade flows of consumption goods toward East Asia will be determined by factors internal to the region as well as those external.

[10] Head et al. (2010) confirm that trade with former colonizers and their former colonies is gradually decreasing over time.

The most important internal factor is continued economic growth. Recent growth forecasts predict that economic growth in East Asia will remain strong, despite a possible slight slowdown in the PRC. Barring major economic shocks or negative geopolitical events, it is expected that the current growth rates can be sustained in the foreseeable future. Externally, the global financial and economic crisis seems to have favored a sea change in the geography of international trade flows. More of East Asia's consumption goods are being exported increasingly to markets other than the EU or the US. Even a rapid recovery of the US economy will most probably not lead to a full rebalancing. Taking a long-term perspective, it seems reasonable to conjecture that East Asia, besides being a Global Factory, will become a Global Mall.

First, as more consumption goods stay within the region, the average lead times for East Asia's exports to reach end consumers will fall. For example, it takes about a month for newly assembled automobiles to be shipped from Japan to the US (New York Times 2012). For automakers, shipping more automobiles over long distances implies substantial transportation and inventory costs. To keep these costs low, several Japanese automakers have decided to relocate their plants directly to the US (Financial Times 2014). As East Asia grows in importance as a final market and intraregional trade grows further, increased exports to closer destinations will mean that the region's exporters enjoy lower transportation and inventory costs and eventually higher margins for producers or lower prices for consumers. One caveat is that the cross-border transportation infrastructure in East Asia does not allow in all cases for low transportation costs. However, major efforts are under way to improve the cross-border connectivity between a number of Asian countries (ADBI 2015). Falling intraregional transportation costs might not only accelerate intraregional trade in consumption goods, but also attract more final assembly facilities to be established in the region. In the best scenario, this could further spur growth and thus further accelerate East Asia's evolution to becoming a Global Mall.

Second, as East Asia evolves into a Global Mall, one can speculate about its implications for the region's economies. Currently, East Asia mainly hosts manufacturing services and only to a limited extent higher value-added downstream value chain activities, such as distribution, marketing, and customer service. The iPhone value chain is an illustration of this pattern. While it is predominantly manufactured in East Asia and exported to final markets all over the world, several recent papers have shown that East Asia captures only a relatively small fraction of the value added (about 18 %) derived from iPhone sales (Xing and Detert 2010; Inomata 2013). As it evolves into a Global Mall, East Asia will likely start hosting an increasing proportion of higher value-added downstream value chain activities, as these activities need to be located in proximity to end consumers.[11] As a consequence, East Asia will be able to capture an increasing share of global production value added.

[11] For a discussion on the distribution of value added across value chain activities, see Inomata (2013).

Appendix

Table 4.5 Description of variables

Variable	Unit	Description
Imports	Current US dollars	Imports of economy *i* to economy *j* in year *t*
Exports	Current US dollars	Exports of economy *i* to economy *j* in year *t*
Real GDP per capita	Constant 2005 US dollars	Real GDP per capita in year *t*
Population	Total	Population in year *t*
RTA	0 or 1	Unity if two economies are members of a bilateral or regional trade agreement, zero otherwise
EA dummy	0 or 1	Unity if Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, Viet Nam, PRC, Japan, Republic of Korea, or Hong Kong, China; zero otherwise
EU dummy	0 or 1	Unity if Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, or UK; zero otherwise
NAFTA dummy	0 or 1	Unity if Canada, Mexico, or US; zero otherwise
Distance	kilometer	Geographical distance between the two economies' most populated cities
Contiguity	0 or 1	Unity if two economies share a land border; zero otherwise
Common official language	0 or 1	Unity if two economies share an official or primary language; zero otherwise
Common ethnic language	0 or 1	Unity if a common language is spoken by at least 9 % of the population in both economies; zero otherwise
Colony	0 or 1	Unity if the economy pair has ever been in a colonial relationship; zero otherwise
Common colonizer	0 or 1	Unity if the two economies share a common colonizer; zero otherwise
Current colonial relation	0 or 1	Unity if the two economies are currently in a colonial relationship; zero otherwise
Colony post-1945	0 or 1	Unity if two economies had a common colonizer post 1945; zero otherwise
Same economy	0 or 1	Unity if two economies were or are the same economy; zero otherwise

Source: Authors' compilation
EA East Asia, *EU* European Union, *GDP* gross domestic product, *Lao PDR* Lao People's Democratic Republic, *NAFTA* North American Free Trade Agreement, *PRC* People's Republic of China, *RTA* regional trade agreement, *UK* United Kingdom, *US* United States

Table 4.6 Broad economic category classification

Commodity	Broad economic category (BEC) code
Primary	111–Primary food and beverages, mainly for industry
	112–Primary food and beverages, mainly for household consumption
	121–Processed food and beverages, mainly for industry
	122–Processed food and beverages, mainly for household consumption
	21–Primary industrial supplies not elsewhere specified
	31–Primary fuels and lubricants
	321–Processed fuel and lubricants, motor spirit
	322–Processed fuel and lubricants, others
Intermediate	22–Processed industrial supplies not elsewhere specified
	42–Parts and accessories of capital goods (except transport equipment)
	53–Parts and accessories of transport equipment
Capital	41–Capital goods (except transport equipment)
	521–Industrial transport equipment
Consumption	51–Passenger motor cars
	522–Non-industrial transport equipment
	61–Durable consumer goods
	62–Semi-durable consumer goods
	63–Non-durable consumer goods
	7–Others (e.g., government final product purchases)

Source: Authors' compilation

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