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Cross-Border Price Differentials and Goods Market Integration in East Asia

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Abstract

As cross-border movements of goods, capital, and labor are intensifying, it is likely that goods markets in East Asia will become increasingly integrated. This study investigates the current state of goods market integration in East Asia by measuring the extent of cross-border price differentials. Specifically, this study shows that compared with the European Union (EU), East Asian markets are neither sufficiently integrated nor are they showing any price convergence over time. Examining the factors and hurdles that prevent East Asian countries from approaching the European level of market integration, this study also shows that such wide price differentials could be explained largely by greater exchange rate volatilities and wider intra-regional income gaps, together with insufficient regionalization efforts. This result highlights the importance of a three-pronged integration strategy covering trade, money, and development policies, and of East Asia-wide regional institutions which, incorporating both developed and developing Asian countries, help promote more free trade agreements (FTAs) and prevent financial crises.

JEL Classification: F15, F36

Contents

1. INTRODUCTION

One of the essential features of East Asian economic integration is that it is market-driven, and lags behind institutionalization. Indeed, despite temporary disruptions caused by the currency crisis in 1997, East Asian economies have seen intra-trade continue to grow and their economies become increasingly interdependent. The extent of intra–regional trade among East Asian economies has become higher and the openness of some East Asian economies is even greater than that of the European Union (EU) countries. Together with these trade linkages, financial linkages have accelerated and labor movements are also active among East Asian countries. The cross border movements of goods, capital, and labor are thus making East Asian markets increasingly interdependent and integrated.

Along with such market-driven integration, the economies of East Asia are planning to accelerate their institutional cooperation, to catch up with the global trend towards regionalism. Many multilateral and bilateral trade arrangements between East Asian economies have been established and monetary and financial co-operation is being strengthened.

Given the increasing economic interdependence and emerging regionalism among East Asian countries, it is appropriate to ask about how closely their goods markets are integrated. For instance, Capannelli et al. (2008) examined the extent of market integration in East Asia, using quantitative measures such as intra-regional trade, capital flows, and tourist shares. This study is not sufficiently rigorous, however. Unlike the numerous studies dealing with global and European market integration, there have been few serious efforts to examine the extent of integration in East Asia. Generally speaking, there are two types of approach for dealing with market integration. The first approach measures the extent of market integration, using trade volumes and a gravity model (MaCallum 1995; Wei 1996; Rose 2000; Wang et al. 2003; Razan et al. 2004). But it is likely that this approach overestimates the extent of goods market integration when the goods of two countries are highly substitutable. Also, these studies often insufficiently reflect the impact of exchange rate volatility on market integration (Razan et al. 2004). These weaknesses led some scholars to adopt a price-based approach. Using the law of one price, this second approach tries to test the validity of the purchasing power parity. As emphasized by Parsley and Wei (2001) and Adam et al. (2002), this approach can be used to measure the level of market integration to complement such quantity-based methods. For instance, by looking at the cross-border differences in price levels, Bergin and Glick (2006), Parsley and Wei (2001), and Engel and Rogers (1995) examined the extent of global market integration, while Haffner (2002) and Deutsche Bundesbank (2009) focused on the European market. According to these studies, price convergence was the output of increasing globalization or deepening European integration. In particular, complete market integration occurred in Europe with the introduction of the euro in 2000.

Following the second approach, this paper investigates the extent of cross-border price differentials among 10 East Asian economies to assess how closely their markets are integrated and how their market integration evolved over time. It subsequently tries to identify the factors that can explain these price differences in East Asia and draw implications for economic integration in the region. Extending the earlier work conducted by Moon and Rhee (2005), this paper tries to fill in the knowledge gap on East Asian market integration.

This paper shows that compared with the EU, East Asian countries are far behind in their goods market integration and there is little evidence of price convergence over time. This paper found that wide price differentials in East Asia are due more to variables such as exchange rate variability and intra-national income disparity than to tariff liberalization or reductions. Indeed, these factors are the two most important barriers preventing further integration in East Asia

compared to the EU. Furthermore, designing the necessary regional institutions to prevent financial crises as well as to promote free trade agreements (FTAs) and foreign direct investment (FDI) flows is important.

The organization of this paper is as follows. In Section 2, the methods and data to measure market integration as cross-border price differentials are examined. In particular, the trend of cross-border price differentials in East Asia and in Europe are compared, using the mean and standard deviation of price differentials as the (inverse) measures of goods market integration. In Section 3, the determinants of these cross-border price differentials among the East Asian countries are investigated. Section 4 presents implications for furthering Asian economic and financial integration. Section 5 concludes.

2. MEASURING MARKET INTEGRATION IN EAST ASIA

The increasing economic linkages among East Asian countries suggest that the markets among East Asian countries are integrating over time.

Although there are few official regional arrangements for East Asian countries, these countries have been relying on globalization and strengthening their cross-border transactions. For instance, pursuing market opening as an engine of economic growth and development, East Asian countries have been reducing their tariffs and trade barriers unilaterally. Table 1 shows the trend of tariff rates for non-agricultural and non-fuel products in East Asia since 1990. According to Table 1, the tariff rates for most East Asian countries have continued to decline over the last 20 years. In the case of the Republic of Korea (henceforth, Korea), for instance, the tariff rate declined from 12.38% in 1990 through 7.67% in 2001 and to 7.21% in 2011. In the case of the People's Republic of China (PRC), the tariff rate, marking 43.31% in 1992, dropped to 14.9% in 2001 on joining the World Trade Organisation (WTO) and it fell further to 8.89% in 2011. The same trend is observed even for a country like Japan where the tariff rate had long remained relatively low. The tariff rate in Japan declined to 3.45% in 2011 from 5.16% in 1990. Similarly the tariff rates in the members of the Association of Southeast Asian Nations (ASEAN) show a declining pattern. While the tariff rates have tended to decline over time, however, they still remain quite large except for Hong Kong, China; Singapore; and Japan. The tariff rates are especially high for the PRC, Malaysia, and Thailand.

Table 1: Tariff Rates in East Asia (Simple Average)

	Rep. of Korea	Japan	PRC	Taipei,China	Indo-nesia	Malay-sia	Philip-pines	Singa-pore	Thailand	Hong Kong, China
1990	12.46	4.95	-	10.64	20.54	17.13	19.2	0.57	40.02	0
1991	12.46	4.89	-	10.64	20.54	17.27	19.2	0.57	40.06	0
1992	10.59	4.91	43.56	6.77	20.54	17.27	19.19	0.57	40.06	0
1993	10.59	4.9	40.52	6.77	19.59	14.87	21.78	0.57	45.61	0
1994	10.59	4.91	36.44	6.77	19.59	14.87	21.14	0.57	45.61	0
1995	7.63	4.71	36.44	6.77	17.14	14.87	19.23	0	21.09	0
1996	8.26	4.51	22.34	6.53	12.72	11.45	19.23	0	21.09	0
1997	8.26	4.35	16.91	6.53	12.72	11.51	19.23	0	21.09	0
1998	8.26	4.23	16.81	6.53	12.72	11.51	10.05	0	21.09	0
1999	7.67	4.04	16.39	6.57	11.46	11.51	9.12	0	21.09	0
2000	7.67	3.93	16.00	6.27	9.29	11.51	7.11	0	16.01	0
2001	7.67	3.77	14.93	6.24	7.34	13.78	6.75	0	16.47	0
2002	7.68	3.74	14.93	6.1	7.41	13.88	5.11	0	16.47	0
2003	7.68	3.63	10.57	5.36	7.44	13.81	4.25	0	15.09	0
2004	7.14	3.39	9.72	5.36	10.05	13.81	7.1	0	15.09	0
2005	7.14	3.47	10.24	4.16	10.05	11.38	7.08	0	10.53	0
2006	7.14	3.43	8.96	4.11	10.05	11.02	7.05	0	10.48	0
2007	7.29	3.6	9.22	4.00	7.66	11.09	7.5	0	9.01	0
2008	7.29	3.44	8.83	4.32	7.66	10.78	6.41	0	9.03	0
2009	7.2	3.45	8.88	4.46	7.42	10.78	6.7	0	9.09	0
2010	7.21	3.55	8.94	4.46	7.71	10.78	6.7	0	9.09	0
2011	7.21	3.45	8.89	4.46	7.7	10.78	6.7	0	9.09	0

Note : For non-agricultural and non-fuel products only (Manufactured goods, ores and metals), Most favored nation rate (MFN rate), Simple average.

Source : UNCTAD (http://unctadstat.unctad.org/ReportFolders/reportFolders.aspx).

Table 2: Trade Openness for East Asian Economies

(as a % of GDP)

	Rep. of Korea	Japan	PRC	Taipei,China	Indo-nesia	Malay-sia	Philip-pines	Singa-pore	Thai-land	Hong Kong, China
1990	57.0	19.7	29.2	85.6	49.1	147.0	60.8	344.8	75.8	252.8
1991	55.3	18.2	31.7	87.4	49.9	159.3	62.2	325.9	78.5	261.6
1992	54.3	17.4	36.1	82.3	52.9	150.6	63.2	312.0	78.0	270.3
1993	52.7	15.9	42.0	84.2	50.5	157.9	71.2	314.1	80.2	263.4
1994	54.0	16.0	41.2	83.5	51.9	179.9	74.0	318.2	82.6	266.7
1995	58.7	16.8	38.8	91.9	54.0	192.1	80.5	349.3	90.4	290.4
1996	59.2	18.9	38.1	89.7	52.3	181.8	89.8	340.3	84.8	274.2
1997	65.4	20.4	39.0	92.7	56.0	185.7	108.3	328.4	94.6	262.0
1998	79.5	19.7	36.4	93.1	96.2	209.5	98.7	316.4	101.9	248.0
1999	71.4	18.8	37.7	91.8	62.9	217.6	94.9	343.1	104.0	248.9
2000	74.3	20.3	44.2	103.3	71.4	220.4	104.7	371.8	124.9	279.1
2001	69.2	20.3	43.1	94.1	69.8	203.4	98.9	360.1	125.2	269.6
2002	64.8	21.2	47.7	97.0	59.1	199.4	102.4	360.1	121.7	286.6
2003	68.5	22.1	56.9	104.3	53.6	194.2	101.9	387.0	124.6	327.2
2004	77.6	24.5	65.4	118.8	59.8	210.4	102.6	412.9	136.5	364.6
2005	75.8	27.2	68.6	119.4	64.0	203.9	97.9	430.0	148.3	377.1
2006	78.0	31.1	70.6	129.0	56.7	202.6	94.9	437.4	143.8	392.4
2007	82.3	33.8	68.0	135.0	54.8	192.5	86.6	404.7	138.5	396.8
2008	107.2	35.2	62.2	140.7	58.6	176.7	76.3	460.5	150.3	407.4
2009	95.8	25.0	49.0	116.0	45.5	162.6	65.6	421.6	126.2	374.3
2010	102.0	29.2	57.3	139.3	47.6	170.3	71.4	385.9	135.1	432.3
2011	110.3	31.4	58.7	144.5	51.2	167.2	67.0	391.2	149.4	447.0

Source: World Bank.

As a consequence, the shares of trade in many East Asian countries have increased significantly, leading their economic growth. As Table 2 shows, East Asian economies are some of the most open in the world.

Table 3: Intra-Regional Trade for Individual East Asian Economies

	Rep. of Korea	Japan	PRC	Taipei,China	Indonesia	Malay-sia	Philip-pines	Singa-pore	Thai-land	Hong Kong, China
1990	34.0	28.7	57.1	39.2	58.1	55.8	42.1	47.3	48.5	58.7
1991	38.9	31.2	60.3	41.8	57.7	58.1	43.8	49.8	48.1	61.1
1992	39.8	32.4	58.7	43.2	55.2	57.6	42.8	49.0	49.1	62.2
1993	40.2	35.0	47.4	45.1	54.7	57.1	44.4	52.9	49.7	63.6
1994	41.4	36.9	49.7	47.1	55.8	55.7	47.1	55.4	51.1	64.4
1995	42.3	39.3	50.8	49.4	56.4	55.8	47.3	56.1	48.0	65.0
1996	41.2	39.8	50.2	48.5	53.1	57.9	46.3	54.2	50.0	65.6
1997	41.2	38.7	50.8	47.3	53.8	56.9	48.5	53.6	49.5	65.9
1998	39.4	34.7	47.3	46.4	51.7	53.2	49.5	50.5	46.6	65.2
1999	42.6	37.4	46.9	50.2	54.3	54.3	50.8	53.0	50.2	66.6
2000	44.1	40.7	46.7	52.5	57.5	58.1	53.3	55.7	52.4	67.8
2001	43.7	40.3	45.5	52.1	55.3	56.8	53.8	54.4	51.1	68.3
2002	45.9	42.4	46.5	55.5	56.3	58.4	56.9	56.1	53.1	70.8
2003	48.2	44.7	46.6	57.8	58.5	58.8	60.1	59.1	54.8	71.3
2004	48.5	46.0	45.9	59.1	59.0	58.5	62.1	58.9	55.6	71.8
2005	48.1	45.7	44.1	60.0	62.1	58.3	61.4	58.5	55.9	72.0
2006	47.4	44.5	42.3	59.8	61.8	57.8	59.9	58.7	55.1	73.0
2007	47.0	44.5	40.8	59.1	61.5	58.4	61.4	58.9	55.3	73.4
2008	45.4	43.6	38.5	57.0	63.5	58.9	61.1	57.1	53.5	72.0
2009	46.8	47.9	38.6	60.4	61.5	60.7	61.8	57.7	54.9	72.6
2010	48.2	49.2	38.2	60.8	63.5	62.3	67.6	58.5	56.7	73.8
2011	47.6	48.5	37.2	60.1	63.7	61.8	66.1	56.8	56.5	72.6

Source : ADB (www.adb.org).

Table 4: Share of Intra-Regional Trade in East Asia, EU, and NAFTA

	EA15	EU15	NAFTA
1990	41.1	62.7	37.2
1991	44.3	62.9	38.9
1992	45.6	63.4	39.7
1993	46.4	56	41
1994	48.2	56.6	42.4
1995	49.4	57.2	42
1996	49.4	56.3	43.4
1997	49.2	57.5	44.4
1998	46.6	58.5	45.7
1999	48.4	57.4	46.8
2000	50.5	55.5	46.8
2001	50	55.1	46.6
2002	51.9	55.2	46
2003	53	55.8	44.8
2004	53.2	55	43.7
2005	52.6	53.4	43
2006	51.6	52.8	42
2007	50.9	52.7	41
2008	49.2	51.2	40
2009	50.5	51	39.4
2010	51	50.8	40
2011	49.9	49.8	40.3

Note : EU = European Union; NAFTA = North American Free Trade Agreement; EA15 = ASEAN10+3; Hong Kong, China; and Taipei,China.

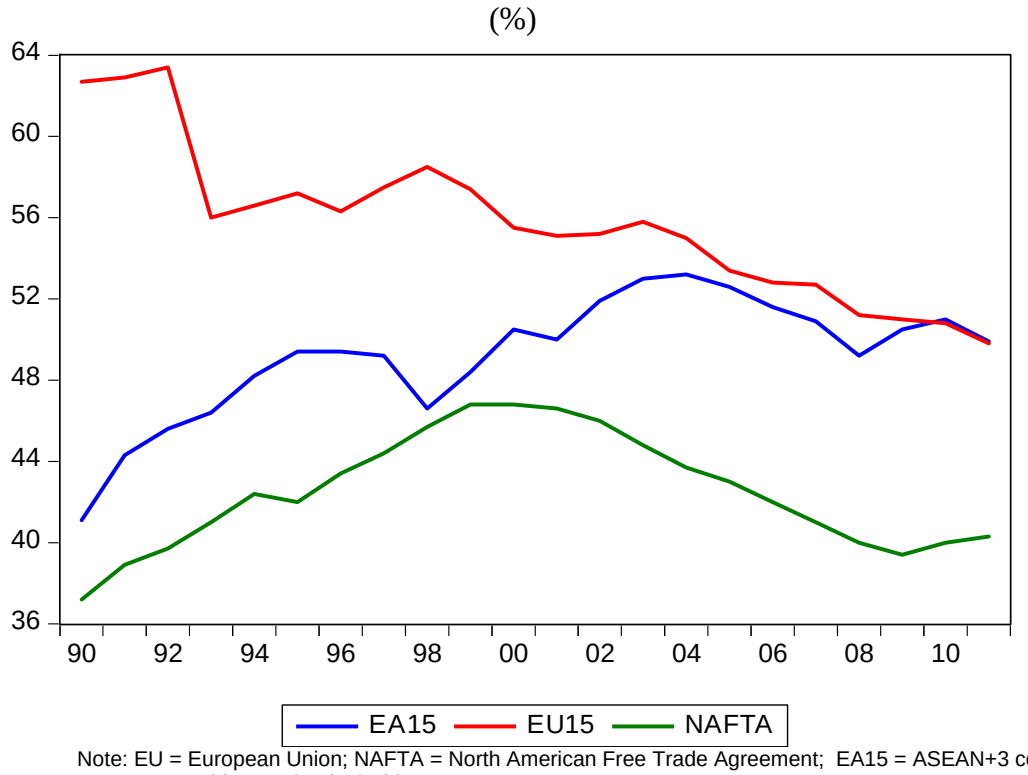
Source: ADB for East Asian 15 countries and Direction of Trade, IMF for EU 15 countries and NAFTA.

Together with globalization, regional economic linkages and intra-regional economic interactions have also been strengthened. Currently, the intra-regional trade share in East Asia makes up 50% of these countries' total external trade. As indicated in Table 3 and Table 4, the share of intra-regional trade for 15 East Asian countries (ASEAN+3; Hong Kong, China; and Taipei,China), which was 41.1% in 1990, increased to 50.0% in 2001, despite a temporary setback during the 1997 currency crisis period. Since then, however, the share of intra-regional trade has stagnated at around 50%. This is due to the sharply declining intra-regional trade share of the PRC. The share of intra-regional trade in the PRC's total foreign trade continued to decline from the early 1990s on because it was increasing its trade with extra-regional trading partners such as the US and the EU more than with East Asian countries. With the exception of the PRC, all other individual East Asian countries show a similar trade pattern. Their intra-regional trade share continued to increase over the last two decades. In the case of Korea, for example, the share of intra-regional trade increased from 34% in 1990 to 43.7% in 2001 and to 47.6% in 2011. In the case of Japan, this trend is more evident because its share of intra-

regional trade, which remained the lowest in East Asia at 28.7% in 1990, rose to 40.3% in 2001 and to 48.5% in 2011, which means it caught up with Korea. In the case of individual ASEAN countries, their shares of intra-regional trade are much higher than those of Northeast Asian countries such as Korea and Japan. This may be attributable to the establishment of a regional FTA arrangement to facilitate free trade among members.

Measured by the degree of intra-regional trade share, the degree of market integration in East Asia as a whole has managed to catch up with that seen in the EU. Table 4 and Figure 1 show that their shares of intra-regional trade were almost equal in 2011.

Figure 1: Intra-Regional Trade in East Asia, EU, and NAFTA



Note: EU = European Union; NAFTA = North American Free Trade Agreement; EA15 = ASEAN+3 countries; Hong Kong, China; and Taipei,China.

Source: Author.

Measured by the price indicator, however, the degree of goods market integration in East Asia has not always been comparable to that of the EU. Following Engel and Rogers (1995), Parsley and Wei (2001), and Moon and Rhee (2006), we calculate the extent of market integration by measuring cross-border price differentials in East Asian countries, to ascertain whether they tended to decline over time.

It is expected that there will be price convergence in a perfectly integrated market. This expectation is based on the law of one price, under which the purchasing power parity condition holds. Any violation of this condition suggests that related markets are not well integrated. As Engel (2004) rightly pointed out, however, the purchasing power parity condition may fail due to several shocks; deviations from the law of one price for traded goods, terms of trade shocks, and shocks to the relative prices of non-tradable goods. Deviations from the law of one price can occur due to transport costs, tariffs, other barriers to trade and so on. Terms of trade shocks occur because the weights in the price indexes are different across countries. Shocks to the relative price of non-tradable goods can be brought out by the differences in productivity

changes (the so-called Balassa-Samuelson effect) and the impediments to factor movements. This explains why the conventional method to test the validity of purchasing power parity by looking at the real exchange rate could not be used. Thus, we focus on cross-border price differentials as a measure of goods market integration in East Asia.

Now let *P(i,k,t)* be the United States (US) dollar price of a commodity *k* in an East Asian capital city *i* at a given time *t*. For a given city pair (*i,j*) and a given good *k* at a time *t*, we define the absolute log price difference as:

$$Q(i, j, k, t) = |\ln P(i, k, t) - \ln P(j, k, t)|$$

where $\ln P(i, k, t)$ is the log price of commodity *k* at time *t* in city *i* and $\ln P(j, k, t)$ is the log price of commodity *k* at time *t* in city *j*.

Different indicators could be used to measure the price convergence. For example, Haffner (2002) defined the price difference on the basis of an intra-industry index[1]. To measure the price convergence, we focus on the means and standard deviations of the absolute log price differences across all commodities.

$$M[Q(i, j, t)] = \sum_{k}^{K} Q(i, j, t) / K$$

$$V[Q(i, j, t)] = (\sum_{k} \{|Q(i, j, t)| - E[Q(i, j, t)]\}^2 / K)^{1/2}$$

Equations (2) and (3) define the mean and standard deviation price differentials, respectively. Parsley and Wei considered only the standard deviation price differentials to examine the price convergence pattern. We use both the mean and standard deviation price differentials over all the items of commodities. The reason is that if only the standard deviation price differentials are considered, as in Parsley and Wei, it does not take into account cases where the means of the price differentials are reduced without any change in volatilities (See Moon and Rhee 2006 for more details).

This paper uses raw price data compiled by the Economist Intelligence Unit (EIU). EIU publishes disaggregated price data for about 160 commodities and services in 123 cities of the world under the name of EIU City Data. These data were first used by Hufbauer et al. (2000) to calculate the welfare benefit that could arise if national prices converge to the world price. Since then, they have been used by many economists, including Rogers (2001), Parsley and Wei (2001), and Bergin and Glick (2006).

Naturally, price data are not available for all commodities and cities. Dropping commodities with missing data, this paper focuses on 111 tradable goods. Non-tradable goods and services are excluded. The entire sample of goods used in our data is listed in the Appendix. Given that these prices are denominated in different national currencies, these national prices are converted to the US dollar price on the basis of the market exchange rate. We calculate bilateral price differentials for 45 pairs of countries in ten East Asian countries, which include Korea; Japan; the PRC; Hong Kong, China; Taipei,China; and five of the most developed ASEAN countries namely Singapore, the Philippines, Thailand, Malaysia, and Indonesia. The data covers 22 observation years, from 1990 to 2011. Thus, the data use a 3-dimensional panel of 111 disaggregated prices from 10 Asian capitals for 22 years.

[1] Haffner defined this price similarity index as $100 - 100 \times \sum_{k} w_k \frac{|P(i,k,t) - P(j,k,t)|}{|P(i,k,t) + P(j,k,t)|}$.

To see the trend of the cross-border price differentials for the whole East Asian region and for some sub-groups, we take the average values over the 45 country pairs of the means and standard deviations of the price differentials. Thus, we define the average means and standard deviations of the price differentials for the East Asian region during the period 1990 to 2011 as:

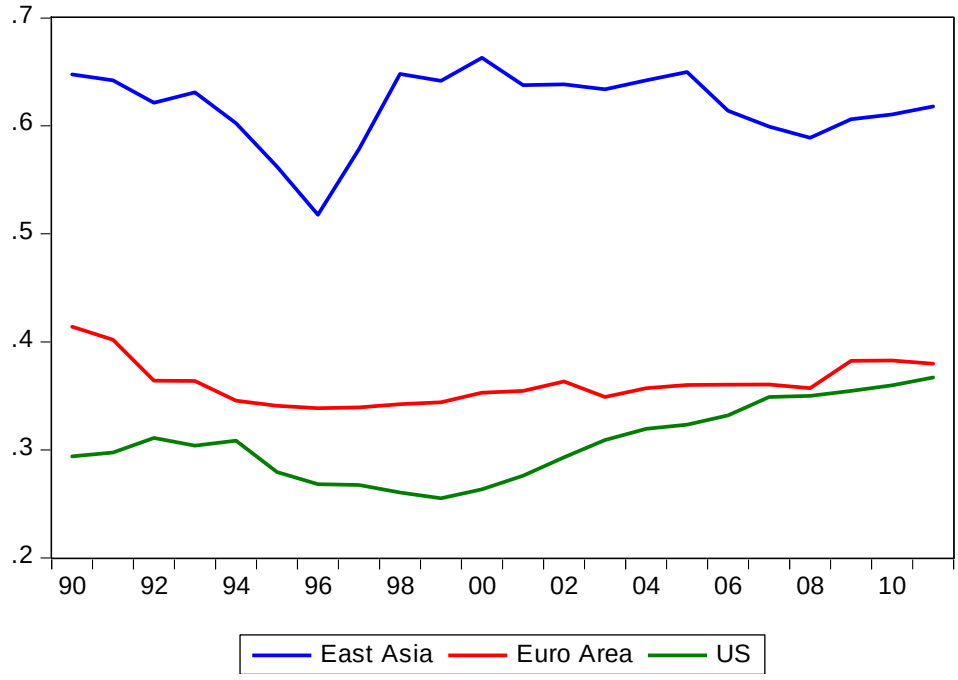
(4) $AE[Q(t)] = \sum_{i=1} \sum_{j \neq i} E[Q(i, j, t)] / N$

(5) $AV[Q(t)] = \sum_{i=1} \sum_{j \neq i} V[Q(i, j, t)] / N$

To understand the extent of market integration in East Asia, we compare it with that of other regions, especially the EU (in particular, the eurozone) and the US. To this end, we calculate the average mean and standard deviations of the bilateral price differentials over all city or country pairs in the EU and the US. For the EU, the price date include 12 cities in the eurozone: Vienna (Austria), Brussels (Belgium), Helsinki (Finland), Berlin (Germany), Paris (France), Athens (Greece), Luxembourg (Luxembourg), Amsterdam (Netherlands), Lisbon (Portugal), Dublin (Ireland), Madrid (Spain), and Rome (Italy). For the US, the data include 14 cities (Atlanta, Boston, Chicago, Cleveland, Detroit, Honolulu, Houston, Los Angeles, Miami, New York, Pittsburgh, San Francisco, Seattle, and Washington, DC).

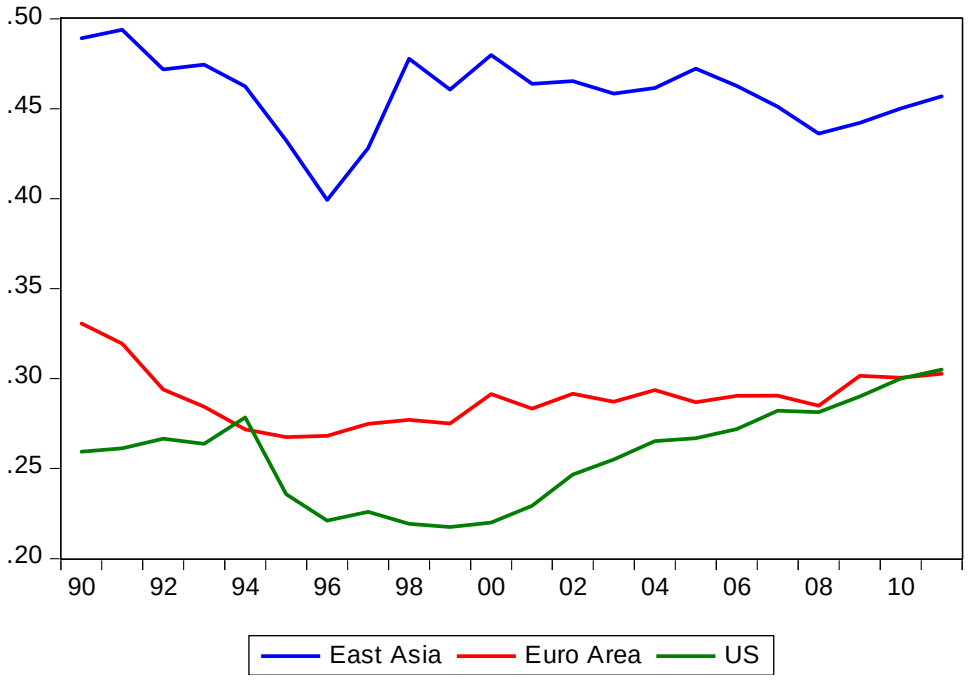
Figure 2(a) and 2(b) show these results. According to these figures, there is no general trend toward price convergence in East Asia. Although there was a marked decrease in cross-border price differentials approximately until the outbreak of the Asian currency crisis in 1997, they bounced back and remained quite important thereafter. This trend is more or less consistent with the observations by Bergin and Glick (2006). Similar conclusions are derived for the eurozone (see for example Deutsche Bundesbank 2009).

Figure 2a: Mean Price Differentials



Source: Author.

Figure 2b: Standard Deviation Price Differentials



Source: Author.

We also observe that the degree of market integration is approximately twice or one and half times as weak in East Asia as in Europe and the US. Generally speaking, the US market is a benchmark for a fully integrated market. There are no barriers at all to the movements of goods, capital, and labor among the US cities because they all belong to a common federation. Compared to the US, EU markets are still incompletely integrated. Although European countries launched a Single Market Program in 1986, many regulatory barriers have remained. Furthermore, labor mobility among European cities was significantly restricted due to language, cultural, and other barriers. The exchange rates of many European currencies also fluctuated quite substantially until the introduction of the single currency, the euro, in 1999. In short, substantial institutional barriers have remained despite economic integration among the EU member countries. Nevertheless, the degree of European market integration parallels that of the US as European market integration managed to catch up with US market integration. Unlike the European markets, however, East Asian markets are far from integrated.

There might be several institutional factors that help to explain the wide difference in price-based market integration between East Asia and Europe. Although tariff rates have been declining for most East Asian countries, they have not yet been completely removed. In the EU or the US, in contrast, no such tariff barriers are left. Also, while there were no inter-country or inter-state exchange rates at all for the eurozone and for the US from 1999, East Asian countries had different national currencies and their exchange rates fluctuated widely. Certainly, exchange rate stability in East Asia will help to ease price comparison and thereby create a more competitive regional goods market. The increase in price transparency will bring about price convergence through the increased pressure for arbitrage transactions. According to Rose (2000), who first studied the effects of a common currency on goods market integration, for instance, the existence of a common currency increases bilateral trade by as much as 300%. More importantly, Parsley and Wei (2001, 2002) examine the effect of instrumental and institutional stabilization of the exchange rate on the integration of the goods market and

conclude that goods market integration was increasing over time and was inversely related to exchange variability. Finally, inter-country or inter-state income differentials turn out to be far larger in East Asia than in the eurozone or the US. Given that East Asia is characterized by wider regional differences in national income levels and these differences explain an important part of the cross-border price differentials, it is essential to consider the price catch-up effect. That is, due to the lagging productivity in the non-tradable sector, especially in services, countries with a relatively higher income tend to have a relatively higher price level. For instance, Rogers (2000), on the basis of the so-called Balassa-Samuelson effect, examined such effects and found the same evidence of price convergence. Tables 5a and 5b summarize the trend of tariff rates, exchange volatilities, and national income differentials along with the mean and standard deviation price differentials in the East Asian region, the EU, and the US.

Table 5a: Mean and Standard Deviation Price Differentials in East Asia, EU, and US

	Mean			Standard deviation		
	E A	EU	US	EA	EU	US
1990	0.6475	0.4140	0.2940	0.4891	0.3307	0.2594
1991	0.6422	0.4020	0.2974	0.4939	0.3194	0.2613
1992	0.6214	0.3640	0.3109	0.4718	0.2940	0.2666
1993	0.6312	0.3638	0.3040	0.4744	0.2843	0.2637
1994	0.6027	0.3455	0.3085	0.4624	0.2718	0.2784
1995	0.5623	0.3407	0.2796	0.4324	0.2675	0.2357
1996	0.5178	0.3386	0.2681	0.3992	0.2683	0.2211
1997	0.5787	0.3393	0.2674	0.4280	0.2749	0.2259
1998	0.6482	0.3423	0.2606	0.4778	0.2771	0.2194
1999	0.6416	0.3439	0.2551	0.4606	0.2750	0.2175
2000	0.6632	0.3529	0.2634	0.4798	0.2915	0.2200
2001	0.6379	0.3547	0.2761	0.4638	0.2833	0.2293
2002	0.6384	0.3634	0.2931	0.4653	0.2916	0.2467
2003	0.6337	0.3490	0.3089	0.4584	0.2872	0.2551
2004	0.6421	0.3572	0.3193	0.4615	0.2936	0.2653
2005	0.6498	0.3599	0.3234	0.4722	0.2869	0.2668
2006	0.6142	0.3603	0.3320	0.4626	0.2904	0.2720
2007	0.5993	0.3606	0.3490	0.4511	0.2906	0.2821
2008	0.5890	0.3572	0.3500	0.4362	0.2849	0.2814
2009	0.6063	0.3825	0.3547	0.4421	0.3015	0.2902
2010	0.6106	0.3828	0.3597	0.4501	0.3005	0.3001
2011	0.6179	0.3797	0.3669	0.4569	0.3026	0.3050

Source: Author.

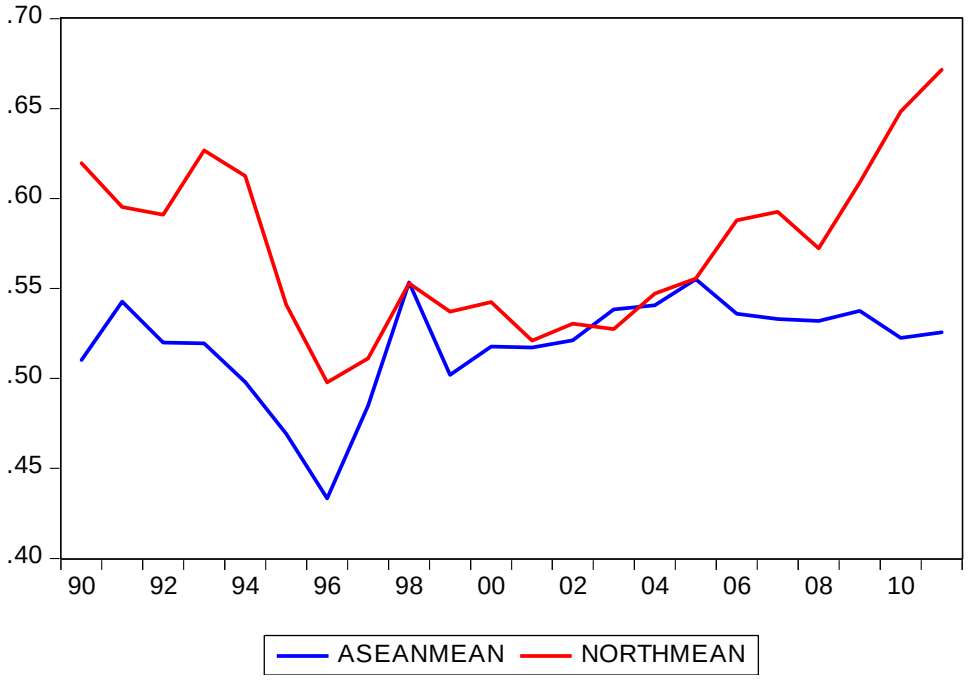
Table 5b: Tariff Rate, Exchange Rate Volatility, and Income Differentials in East Asia, EU, and US

	Tariff	Exchange volatility		Income Differential		
	EA	EA	EU	EA	EU	US
1990	27.9	0.019	0.007	1.800	0.482	0.303
1991	27.9	0.010	0.009	1.838	0.449	0.297
1992	32.7	0.013	0.017	1.847	0.420	0.303
1993	33	0.013	0.021	1.884	0.476	0.302
1994	32.1	0.011	0.009	1.851	0.488	0.303
1995	25.6	0.019	0.018	1.804	0.489	0.306
1996	21.2	0.007	0.008	1.742	0.448	0.318
1997	20.1	0.060	0.006	1.754	0.406	0.316
1998	18.2	0.067	0.007	1.884	0.401	0.334
1999	17.6	0.028	0.000	1.800	0.409	0.342
2000	15.6	0.021	0.000	1.794	0.419	0.357
2001	15.4	0.029	0.000	1.759	0.415	0.353
2002	15.1	0.015	0.000	1.688	0.418	0.344
2003	13.6	0.014	0.000	1.653	0.416	0.336
2004	14.3	0.015	0.000	1.649	0.413	0.351
2005	12.8	0.013	0.000	1.620	0.424	0.379
2006	12.4	0.013	0.000	1.540	0.432	0.396
2007	11.9	0.016	0.000	1.478	0.440	0.397
2008	11.6	0.034	0.000	1.393	0.423	0.389
2009	11.6	0.020	0.000	1.391	0.401	0.375
2010	11.7	0.015	0.000	1.351	0.417	0.384
2011	11.7	0.013	0.000	1.322	0.440	0.383
Mean	18.82	0.02	0	1.67	0.43	0.34

Source: UNCTAD, IMF and World Bank.

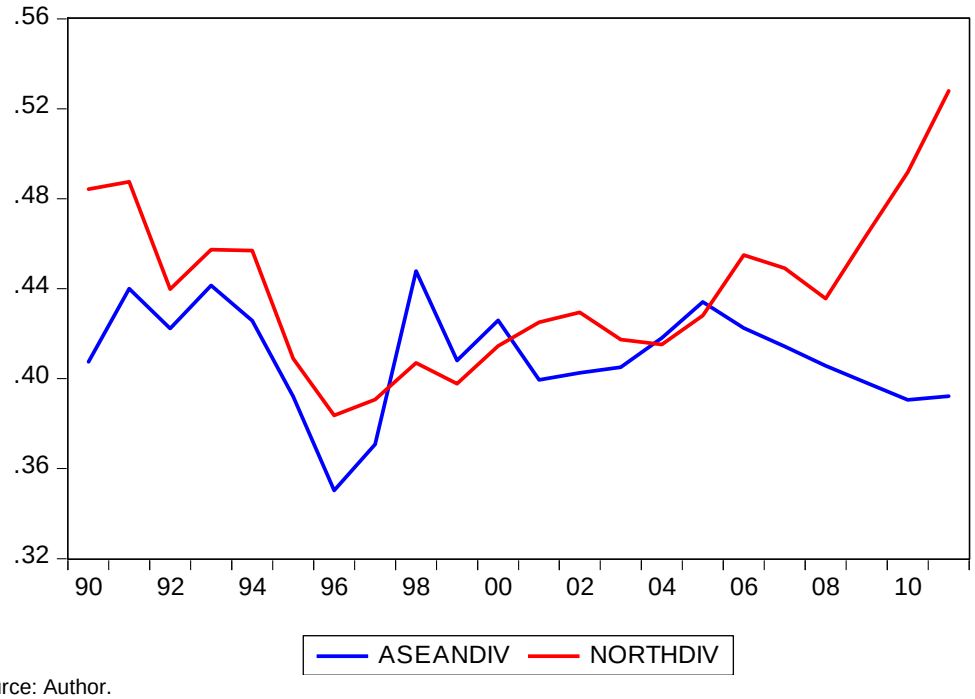
The East Asian region is composed of diverse groups with different cultures and stages of development. In particular, it is divided into two groups of countries, ASEAN and the Northeast Asian economies (the PRC; Hong Kong, China; Taipei,China; Japan; and Korea). Forming ASEAN in 1968, the Five Southeast Asian countries (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) maintained close economic and political ties with each other and led Asian regionalism, while there was no such closer relationship between Northeast Asian countries. We therefore need to examine goods market integration for two subsets of countries.

Figure 3a: Mean Price Differentials in ASEAN and Northeast Asian Economies



Source: Author.

Figure 3b: Standard Deviation Price Differentials in ASEAN and Northeast Asian Economies



Source: Author.

As Figure 3 shows, ASEAN countries as a group had higher price differentials than Northeast Asian countries until the mid-1990s. After the 1997 currency crisis, however, ASEAN countries are found to have lower price differentials. One possible reason for the reversal of the trend is the increasing regional integration among ASEAN member countries including the launch of the ASEAN Free Trade Area (AFTA) in 1993.

3. DETERMINANTS OF PRICE DIFFERENTIALS

3.1 Model

We begin our formal investigation of factors affecting price differentials (or inversely price convergence) in East Asia by estimating the following equation:

$$(6)\ D(Q(i,j,t)) = \beta_0 + \beta_1 Dis(i,j) + \beta_2 Tariff(i,j,t) + \beta_3 Exvol(i,j,t)$$
$$+ \beta_4 Income(i,j,t) + \beta_5 FTA(t) + \beta_6 CRISIS(t) + \beta_7 DEVELOP(t)$$

In this equation, the variable $D(Q(i,j,t))$ is the price differential measured either by the mean $M[Q(i,j,t)]$ or by the standard deviation $V[Q(i,j,t)]$ of $Q(i,j,t)$ at a given time *t*. $Dis(i,j)$ is the log of the distance between cities *i* and *j*. $Tariff(i,j,t)$ is the sum of the tariff rates between two cities *i* and *j* at time *t*. $Exvol(i,j,t)$ is the standard deviation of log changes in the monthly bilateral exchange rates between two cities at time *t*. $Incom(i,j,t)$ is the absolute value of the log difference in the income level (per capita income) between two cities at time *t*. *FTA(t)* is the dummy variable taking the value 1 from time t for all country pairs having no bilateral or multilateral FTAs at time *t*. Otherwise, *FTA(t)* will have a value 0. *CRISIS(t)* is the dummy variable taking the value 1 for any country pair from time *t* if one country has experienced a financial crisis (either 1997 Asian currency crisis or 2008 global currency crisis) and the other has not. Otherwise, it has a value of 0. Finally, *DEVELOP(t)* is the dummy taking 1 for all country pairs from time *t* if both countries belong to an advanced country group or developing country group at time *t*, and zero if one country is considered as an advanced country and the other a developing country at time *t*.

The estimation equation was based on Parsley and Wei (2001) and Bergin and Glick (2006). They considered as factors that affect the means or the standard deviations of the price differentials, the distance between two cities, tariff rates, exchange volatilities, and regional exchange arrangement dummy variables. Because of the absence of any regional exchange rate arrangement in East Asia, we omit the exchange rate arrangement dummy variable and instead add the income gap *INCOME* and three new dummy variables, *FTA*, *CRISIS,* and *DEVELOP,* as explanatory variables.

Among the explanatory variables, the distance was obviously the most fundamental variable representing transportation costs and trade barriers in the gravity model. The data for distance were obtained from the website of John Havem[2]. The variables, tariff, exchange rate volatility and income gap, are all related to trade, monetary and developing policies of East Asian countries through their individual and collective actions. The tariff rate was used to measure the extent of the trade barriers between two cities. As indicated, simple average and weighted

[2] http://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeData.html

average tariff rates could be considered. In this paper, the simple average tariff rate was used[3]. The data for tariff rate are obtained from the United Nations Conference on Trade and Development (UNCTAD) data base. Exchange rate variability may make the comparison of different prices in different cities difficult and prevent price convergence. The standard deviation of log changes in the monthly bilateral exchange rates between city pairs is used for exchange rate volatility. The data for monthly exchange rate are obtained from the IFS of the IMF. In addition, we consider the income gap between a pair of cities as an independent variable to explain price differences. In fact, there is a close link between income gaps and price differentials according to the Balassa-Samuelson effect. But in the studies of Parsley and Wei (2001) and Bergin and Glick (2006), this effect was not taken into account. The data for national income are obtained from the World Bank data base.

In addition, we consider three new dummy variables *FTA*, *CRISIS* and *DEVELOP*. These dummies are to reflect the institutional features of East Asian markets that make goods market integration in East Asia different from that in the EU or US. For instance, FTAs are relatively recent in East Asia. The earliest FTA was the ASEAN FTA which went into effect in January 2003. Thereafter from the mid-2000s, numerous multilateral as well as bilateral trade arrangements were established. Table 6 summarizes the current state of FTAs in the East Asian region[4]. The FTA dummy takes into account the impact of the regional trade arrangement on reducing the cross-border price differentials. Thus, if a pair of countries concludes a new FTA at time t, then the dummy has the value 0 for all observations from time t but 1 for all observations prior to time t (i.e., prior to the conclusion of the FTA).

The second dummy, *CRISIS,* is used to take into account the impact of the financial crises on cross-border price differentials. Five countries—Korea, Thailand, Malaysia, the Philippines, and Indonesia—were hit by the currency crisis in 1997. If a pair of countries includes one country from this group but also another that does not belong to it, then this pair has the value 1 for all observations after 1998. Other pairs will have a value 0. For the 2008 global financial crisis, we assume that all East Asian countries were equally affected and thus all country pairs will have the value 0 for the observations after 2009.[5]

[3] Indeed, there is little change in the estimation result even if the weighted average tariff rate is used.

[4] We can decompose the FTA dummy into ASEAN FTA (AFTA) dummy and other FTA dummies. Given that other FTAs than the AFTA were relatively recent, however, the impact of the AFTA dummy seems dominant. Thus, from the estimation results with AFTA dummy is very similar to our estimation with FTA dummy.

[5] As in the case of FTAs, we decompose the financial crisis dummy into a1997 Asian crisis dummy and a 2008 global crisis dummy. Generally speaking, the 1997 Asian crisis dummy is far more important in our estimation and therefore the estimation results with the 1997 Asian crisis dummy are similar to our results.

Table 6: Current States of the FTAs in Effect in East Asia

	ASEAN						Hong Kong, China	Taipei,China
		Singapore	Indonesia	Malaysia	Philippines	Thailand		
ASEAN	Jan. 2012							
PRC	July(1) 2005	Jan. 2009					Jan. 2004 (CEPA)	Sep. 2010 (ECPA)
Japan (EPA)	Dec. 2008	Nov. 2002	July 2008	July 2006	Dec. 2008	Nov. 2007		
Rep. of Korea	June (2) 2007							

ASEAN = Association of Southeast Asian Nations; CEPA =Closer Economic Partnership Agreement ; ECPA = Economic Cooperation Framework Agreement, EPA = Economic Partnership Agreement.

Notes: (1) Agreement only for trade in goods; (2) Agreement only for trade in goods.

Source: Author.

The third dummy, *DEVELOP,* is justified on the ground that East Asian markets include both developed Asian countries (Japan and newly industrialized economies [NIEs] that include Korea; Taipei,China; Hong Kong, China; and Singapore) and developing Asian countries (the PRC and four developing ASEAN countries). This is in sharp contrast with the case of the EU, where market integration was pursued primarily between relatively developed countries with similar levels of income. According to the theory of the Optimum Currency Area, the cost of integration is likely to be greater when the member countries are very different from each other. Clearly, East Asia is not an optimum currency area because it is composed of countries at different stages of development. However, it is also true that the benefits of market integration are likely to be larger when the possible member countries are very different. For instance, in East Asia, FDI flows are largely from Japan and NIEs to the PRC and four developing Asian countries, and the benefit from the increasing FDI flows between developed and developing Asian countries could be larger, contributing to closer market integration of these economies.

In short, the estimation equation includes as factors that determine the goods market integration two types of variables which can be related to trade policies (tariff and existence of regional trade arrangements), monetary and financial policies (exchange rate volatility and the occurrence of financial crises), and development policies (income gap and regional development patterns). While the changes in the variables such as tariff, exchange volatility, and income gap can be brought about by individual national policies, the changes in the dummy variables are affected more by regional and global initiatives that require collective action. We examine the impact of each of these policy variables on the extent of goods market integration in East Asia.

3.2 Basic Regression

First Table 7(a) presents the results for the mean price differentials. The estimation is conducted both by using the ordinary least squares **(**OLS) model and the fixed effect model with a time dummy. Generally speaking, all the explanatory variables turn out to be significant except for the tariff, and this result is confirmed both by the OLS and the fixed effect model although the fixed model turns out to be slightly more significant with the increased R^2 values.

Columns 1–2, 3–4, and 5–6 focus, respectively, on the impacts of trade, monetary policies, and development policies on goods market integration. Tariff policy turns out to be unimportant, but all other variables and policies are significant. These results show that for goods market integration, monetary policies, and development policies are more important than trade policies. Columns 7 and 8 consider all these variables together yielding the basic results.

As expected, the price differentials increase with distance. This result is consistent with the interpretation that the distance is a proxy for transportation cost. The same result is confirmed by similar studies carried out by Parsley and Wei (2001).

Among the other three explanatory variables, the tariff rate has an expected positive sign, but its impact is insignificant and negligible. Exchange rate variability turns out to be significant and positively associated with the price differentials. Finally, the income gap is significant and increases with the price differentials. Countries with relatively large income differences, therefore, tend to show higher price differentials.

All three dummy variables are also very significant. The FTA dummy is significant with an expected positive sign. The countries linked with the FTA see smaller price differentials between them. The *CRISIS* dummy has a positive impact on the price differentials. If one country was hit by a financial crisis but the other was not, the price differential between these two countries will be widened. The *DEVELOP* dummy has an expected positive impact, suggesting that the price

differentials for a pair of countries is smaller if one country belongs to the developed countries group and the other to the developing Asian countries group.

Table 7a: Results for Mean Price Differential Estimation ($E[Q]$)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance	0.104	0.102	0.110	0.107	0.115	0.115	0.112	0.106
	(11.27)	(11.08)	(12.44)	(12.29)	(14.85)	(15.10)	(14.23)	(13.67)
Tariff	-0.004	0.057	---	---	---	---	-0.050	0.007
	(-0.10)	(1.09)	---	---	---	---	(-1.34)	(0.18)
Exvol	---	---	0.860	1.825	---	---	0.506	1.260
	---	---	(3.52)	(5.79)	---	---	(2.36)	(4.56)
Income	---	---	---	---	0.091	0.095	0.092	0.094
	---	---	---	---	(14.11)	(14.34)	(13.73)	(14.06)
FTA	0.050	0.055					0.024	0.040
	(3.98)	(3.97)					(2.27)	(3.42)
CRISIS			0.080	0.107			0.053	0.065
			(6.60)	(7.16)			(4.91)	(4.89)
DEVELOP					0.031	0.037	0.043	0.048
					(2.20)	(2.58)	(2.94)	(3.33)
Adjusted R^2	0.14	0.15	0.18	0.21	0.35	0.37	0.39	0.42
No of Observations	976	976	990	990	990	990	976	976
Method	OLS	Fixed	OLS	Fixed	OLS	Fixed	OLS	Fixed

Note: Figures in parenthesis are t-values.

Source: Author.

Table 7b shows the results for the standard deviation price differentials. The results are very similar to those for the mean price differentials. It is worth pointing out that unlike the previous case, the effect of the tariff becomes more significant. In particular, the fixed model yields the result that the impact of the tariff on price differentials is significant, with the expected positive sign. Together with the regional free trade arrangement, tariff removal is important for the integration of goods markets. The impact of exchange rate volatility and the income gap are the same.

Table 7b: Results for Standard Deviation Price Differential Estimation ($V[Q]$)

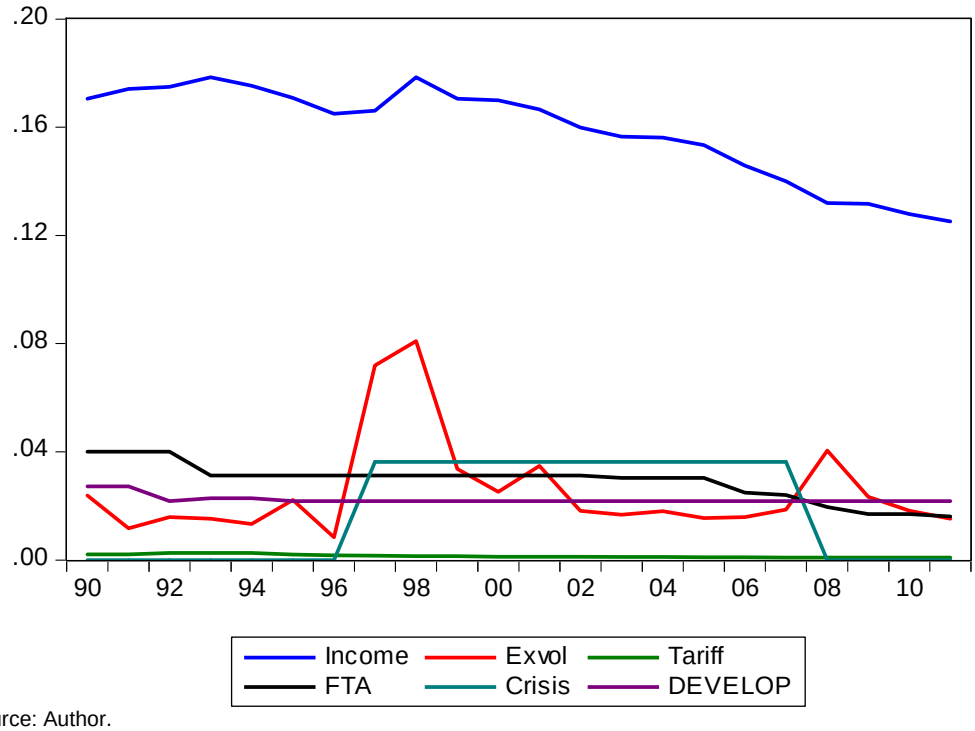
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance	0.056	0.053	0.055		0.060	0.060	0.056	0.053
	(9.94)	(9.92)	0.053		(14.29)	(14.59)	(13.10)	(12.60)
			(10.81)	(10.65)				
Tariff	0.053	0.071	---	---	---	---	0.001	0.038
	(2.16)	(2.39)	---	---	---	---	(0.09)	(1.63)
Exvol	---	---	0.622	1.296	---	---	0.328	0.902
	---	---	(4.35)	(7.09)	---	---	(3.20)	(6.01)
Income	---	---	---	---	0.066	0.067	0.066	0.066
	---	---	---	---	(18.80)	(18.80)	(17.71)	(18.24)
TPA	0.025	0.028					0.015	0.024
	(3.90)	(3.56)					(2.64)	(3.78)
CRISIS			0.025	0.039			0.010	0.012
			(3.57)	(4.50)			(1.69)	(1.75)
DEVELOP					0.040	0.041	0.042	0.044
					(5.16)	(5.30)	(5.25)	(5.57)
R^2	0.12	0.13	0.14	0.19	0.41	0.44	0.43	0.47
No of Observations	976	976	990	990	990	990	976	976
Method	OLS	Fixed	OLS	Fixed	OLS	Fixed	OLS	Fixed

Note: Figures in parenthesis are t-values

Source: Author.

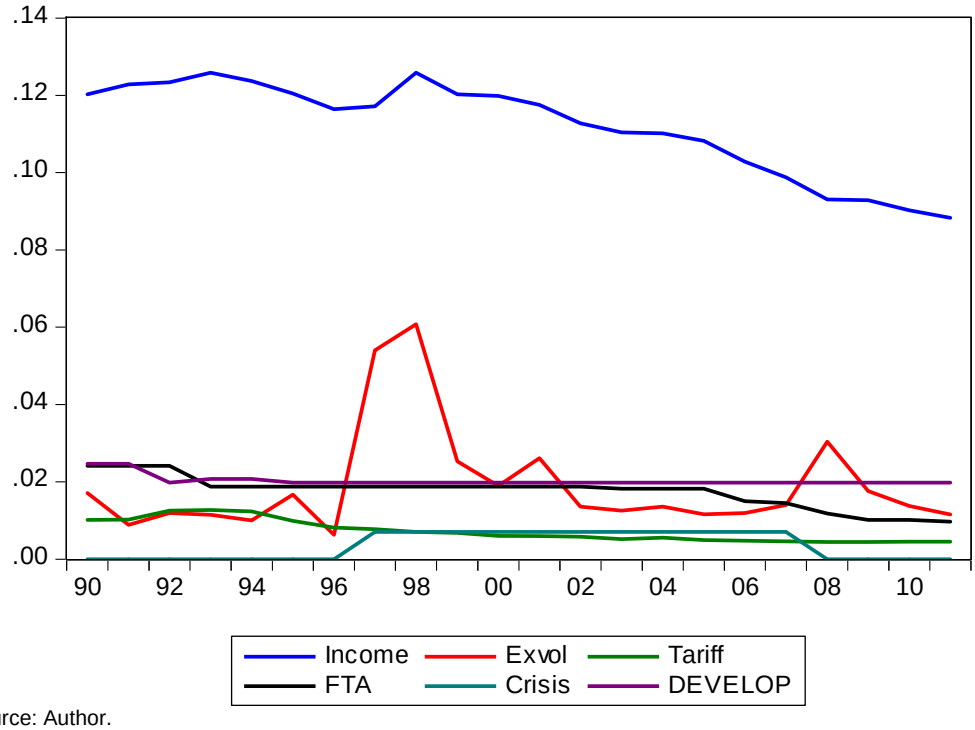
We can now examine how much goods market integration in East Asia could be strengthened, if the magnitudes of tariff, exchange rate volatility, and income gap in East Asia were reduced to the levels of the EU. Suppose, for example, that intra-regional tariff rates are reduced to zero as in the EU. Then, the mean and standard deviation of the price differentials fall by 0 and 0.006 ($=0.038\times0.18$), respectively. Also, reducing monthly exchange rate variability from the sample average 0.021 to zero will see a decrease in the mean and standard deviation of the price differentials by 0.025 ($=1.260\times0.02$) and 0.018 ($=0.902\times0.02$), respectively. Also, reducing the income gap from the sample average 1.666 to its European average value of 0.43 will lower the mean and standard deviation of the price differentials by 0.116 ($=0.094\times(1.67-0.43)$) and 0.081($=0.066\times(1.67-0.43)$), respectively. Applying the EU levels of tariff, exchange rate volatility, and income gap as shown in Table 4a to the basic estimation equations, Figure 4 presents the possible reductions in the means and standard deviations of price differentials in East Asia over time (assuming that all coefficients of the equations are significant). It is worth noting that the income gap has a more important impact on the reduction of price differentials than tariff or exchange rate volatility. This suggests that the large intra-regional income gap in East Asia is the most important barrier to price convergence in East Asia. Similarly, Figure 4b shows the possible reductions in the means and standard deviations of the price differentials in East Asia, assuming that the dummy variables take the values of the EU.

Figure 4a: Contribution of Explanatory Variables to the Mean Price Differentials



Source: Author.

Figure 4b: Contribution of Explanatory Variables to the Standard Deviation Price Differentials



Source: Author.

3.3 Extensions of the Model

Subgroup estimation

We consider two sub-periods, period 1990–2000 and the period 2001–2011. Table 8 presents the estimation results for these two periods. Generally speaking, no matter what the nature of the dependent variable may be, the variables such as distance and income gap, are strongly significant during both periods. The tariff is insignificant during both periods with the exception of the result for the standard deviation price differentials equation for the period 1990—2000. Exchange rate volatility is significant during the period 1990–2000, but turns insignificant during the period 2001–2011. Among the dummy variables, *FTA* remains significant during both periods. The dummy *CRISIS* is significant during the period 1990–2000, but tends to lose significance during the period 2001–2011. In contrast, *DEVELOP* tends to be stronger and significant in the second period 2001–2011. In short, it seems that the estimation equation has a greater explanatory power during the period 1990–2000 relative to the period 2001–2011.

Table 8: Estimation Results for the Periods 1990–2000 and 2001–2011.

	$E[Q]$		$V[Q]$	
	1990–2000	2001–2011	1990-–2000	2001–2011
Distance	0.107 0.109 (9.25) (9.54)	0.106 0.105 (9.70) (9.55)	0.050 0.053 (7.80) (8.54)	0.058 0.056 (9.74) (9.43)
Tariff	0.082 0.051 (1.85) (1.11)	-0.132 -0.061 (-1.15) (-0.51)	0.076 0.052 (3.06) (2.10)	-0.003 0.049 (-0.05) (0.75)
Exvol	0.741 1.418 (2.93) (4.69)	0.298 0.606 (0.55) (0.95)	0.505 0.882 (3.59) (5.37)	0.393 0.834 (1.35) (2.42)
Income	0.080 0.076 (9.89) (9.64)	0.122 0.129 (10.18) (10.27)	0.059 0.057 (13.15) (13.25)	0.084 0.087 (12.84) (12.86)
FTA	0.069 0.054 (3.61) (2.78)	0.026 0.037 (1.78) (2.39)	0.030 0.017 (2.88) (1.59)	0.025 0.033 (3.24) (3.95)
CRISIS	0.071 0.088 (3.97) (4.15)	0.029 0.051 (1.98) (3.00)	0.015 0.029 (1.59) (2.55)	-0.003 0.003 (-0.48) (0.35)
DEVELOP	0.025 0.018 (1.33) (1.00)	0.091 0.108 (3.77) (4.23)	0.030 0.025 (2.93) (2.59)	0.075 0.083 (5.67) (5.99)
Adjusted R^2 No of Observations Method	0.44 0.48 481 481 OLS Fixed	0.37 0.37 495 495 OLS Fixed	0.47 0.53 481 481 OLS Fixed	0.42 0.43 495 495 OLS Fixed

Source: Author.

Non-linearity

We also consider the possible non-linear effects of tariffs, exchange rate volatility, and income gap. To this end, we will include the squares of these variables as additional regressors. When square variables are included, either an original variable or its square variable tends to become weaker in its significance. Furthermore, Table 9 presents the estimation results. The evidence suggests that the addition of these variables does not improve the fitness of the model

substantially. The square of tariff is not significant at all. The squares of exchange rate volatility and income gap are significant, suggesting some non-linearity in terms of these explanatory variables. In particular, the negative sign of the square of exchange rate volatility suggests that its impact on the price differential is positively concave, meaning that higher exchange rate volatility is associated with a greater price differential but the incremental effect gets smaller as volatility increases (Parsley and Wei 2001). In contrast, the square of the income gap is positive, suggesting that its impact on the price differential is convex, meaning that the incremental effect of the income gap becomes larger along with a wider income gap. However, this incremental effect is very small.

In short, the consideration of non-linearity does not improve explanatory power much and the square variable is significantly strong only for exchange rate volatility.

Table 9: Non-linear Estimation Results

	Tariff^2		Exvol^2		Income^2	
	$E[Q]$	$V[Q]$	$E[Q]$	$V[Q]$	$E[Q]$	$V[Q]$
Distance	0.106 (13.65)	0.053 (12.61)	0.101 (13.20)	0.051 (12.13)	0.104 (13.32)	0.051 (12.07)
Tariff	-0.006 (-0.05)	-0.001 (-0.02)	0.034 (0.81)	0.051 (2.20)	0.031 (0.69)	0.064 (2.66)
Tariff^2	0.024 (0.14)	0.068 (0.71)	- -	- -	- -	- -
Exvol	1.263 (4.56)	0.910 (6.05)	4.546 (7.79)	2.493 (7.82)	1.200 (4.33)	0.835 (5.59)
Exvol^2	--- ---	--- ---	-24.750 (-6.35)	-11.98 (-5.63)	--- ---	--- ---
Income	0.094 (14.04)	0.066 (18.20)	0.092 (14.04)	0.065 (18.25)	0.057 (2.97)	0.025 (2.40)
Income^2	--- ---	--- ---	--- ---	--- ---	0.009 (2.05)	0.010 (4.27)
TPA	0.039 (3.33)	0.023 (3.58)	0.041 (3.62)	0.024 (3.95)	0.039 (3.35)	0.023 (3.65)
CRISIS	0.065 (4.89)	0.012 (1.75)	0.061 (4.71)	0.010 (1.53)	0.065 (4.90)	0.012 (1.78)
DEVELOP	0.048 (3.22)	0.043 (5.29)	0.046 (3.20)	0.043 (5.48)	0.038 (2.50)	0.033 (3.95)
Adjusted R^2 No of Obs Method	0.42 976 Fixed	0.47 976 Fixed	0.44 976 Fixed	0.49 976 Fixed	0.42 976 Fixed	0.48 976 Fixed

Note: Figures in parentheses are t-values.

Source: Author.

4. IMPLICATIONS

The analysis suggests a couple of important implications for furthering the integration of East Asian markets and thereby increasing efficiency and boosting welfare.

First, in order to further goods market integration, it is important that East Asian countries promote trade, monetary policies, and development policies together. In East Asia, regional integration is primarily trade-related. However, full regional integration cannot be achieved without strengthening cooperation in monetary and development areas. Trade, money, and development are all three essential pillars of regional integration. In fact, the coefficients of monetary and development variables turn out to be of greater significance in our estimation equations.

Generally speaking, regional trade arrangements lead to regional monetary cooperation. However, it is also true that without monetary cooperation trade integration remains limited. The typical example is of course the case of Europe. In Europe, to promote and solidify the Single Market Program, it was essential to remove all the barriers to the free movement of goods, capital, and labor. However, as capital moves freely across countries, exchange rates among the currencies of the member states started to fluctuate widely, distorting the integration of goods markets. The European Monetary System (EMS), which has existed since 1978, was insufficient to deal with these wide exchange rate fluctuations and eventually European member states decided to introduce a single currency, the euro, to permanently fix their intra-exchange rate stability. Indeed, given the magnitude of intra-regional trade in East Asia, there is a strong need for intra-regional exchange rate stability as well because even small exchange rate misalignments can disturb trade and investment flows and create trade friction among the region's economies, resulting in economic instabilities which can be detrimental for many developing countries in the region. This is why regional trade arrangements should be accompanied by greater stability in intra-regional exchange rate movements. It is also essential that East Asian countries should have similar levels of living standards. Wide income differences among East Asian countries prevent them from nurturing the necessary regional solidarity and thereby strengthening regional identity. Indeed, this is the main reason why a pessimistic view has prevailed so far regarding the future of regional cooperation in East Asia (for instance, Eichengreen 2002). The first step that needs to be taken seems to be to encourage voluntary efforts toward reducing regional economic disparities, especially the differences in per capita income in the region. Regional integration can further expand the already large differences in terms of per capita income, putting the integration process itself in danger. On the theoretical and empirical level, there is no proof that economic integration necessarily leads to the convergence of economic performances across member nations. Some studies in fact suggest that the opposite is true (For example, Krugman 1993, and Hanson 1998). It is evident that economic convergence must be the final goal of economic integration.

Secondly, although trade and monetary policies are important to reduce price differentials in East Asia, development policy must play a primordial role. In fact, as we examined, if national income differentials between East Asian countries could be reduced to those seen in the EU, it would influence cross-border price differentials more strongly than any other variables. Thus, if East Asia is to develop into a truly integrated market, East Asian countries should make reducing intra-regional income disparities a priority with a view to fostering regional solidarity. In particular, the desirability of income transfers from the rich countries and regions to the poor countries and regions cannot be overemphasized.

In a complete union or federation such as the US, this solidarity is often guaranteed by fiscal federalism. In such a region, for instance, federal transfers and taxes together help to narrow the interregional income gap. There is already a vast literature on this question originating from the so-called Optimum Currency Area. For instance, the MacDougall Report (European Commission 1977) suggested that adjustment to asymmetric shocks affecting a common currency area works through the budget of a central or federal government collecting taxes from and paying transfers to these regions. According to this report, the federal fiscal system provides a large offset against regional income disparities, allowing, for instance, a state in the US experiencing a one dollar decline in income to receive federal transfers amounting to 0.28 dollars. Sala-i-Martin and Sachs (1991) provide an estimate of 0.33–040 for the US, which is slightly higher than that found in the MacDougall report.

In contrast, the EU has no tax power over member countries and it only disposes of a small budget (of around 1% of the Community gross domestic product). Thus, to fulfill its solidarity goal and achieve harmonious and balanced development, it invented regional policy, and as its instruments it established structural funds and cohesion funds. For instance, one of the most important structural funds is the European Regional Development Fund, which was established in 1975 after the United Kingdom, Denmark, and Ireland joined the Community. It was the largest structural fund, constituting about 50% of total structural funds. Limited to less-favored regions, it focuses mainly on productive investments, infrastructure, small and medium enterprises (SME) development, and research and development (R&D) projects. Countries like Spain, Italy, Greece, and Portugal were the largest beneficiaries. In addition, the Cohesion Fund was established in 1993 as a consequence of the Maastricht Treaty. Indeed, as European integration proceeded with the advent of Economic and Monetary Union, worries emerged about increasing intra-European disparities, which contributed to the addition of a new inter-regional transfer system to the existing panoply of structural funds. The Cohesion Fund provides financial support to particular projects of EU Member States with a gross domestic product (GDP) per capita below 90% of the Community average.

Fiscal federalism and regional policy are both important in fostering regional solidarity. However, they could not easily be established in East Asia because of the absence of common institutions. Given that they both presuppose already quite advanced integration, the use of regional development banks such as the Asian Development Bank or the establishment of functionally-specific or sub-regional development funds is a possible alternative to successfully launch Asian regionalism. It will help to nurture that cultural and political solidarity that has so far been lacking in East Asia.

Third, East Asian markets have so far been mostly market-driven. However, it seems that institution-based integration is as important as market-driven integration. In our analysis, for example, a regional trade arrangement such as an FTA is found to be important. Institution building for crisis prevention and greater FDI flows are equally important. In fact, independently of tariffs, exchange rate stabilization, and income gap, all the dummy variables are found to have a positive impact on reducing the price differentials in the East Asia region. From this viewpoint, we can consider three steps to institutionalization.

The first step to institutionalization is to promote a region-wide trade arrangement, or to link all East Asian countries through bilateral or multilateral free trade areas. As a matter of fact, East Asian countries traditionally relied on multilateralism and the World Trade Organisation (WTO) for trade liberalization and were latecomers in the move towards regional trade arrangements. During the last ten years, however, East Asian countries have been rapidly catching up with the global trend of regional trade arrangements and a large number of bilateral and plulateral FTAs have been entered into. By the end of May 2010, there were 45 FTAs in effect, and another 84 in various stages of preparation in East Asia (Kawai and Wignaraja 2010). Although there are

now many bilateral and sub-regional FTAs in East Asia, however, there is no regional FTA unified under the name of East Asian Free Trade Area. There have been continuing calls for establishing an East Asian Free Trade Area (EAFTA) since 1990, ever since the Malaysian proposal for the formation of the East Asian Economic Caucus (EAEC) in 1990. As pointed out by the EAFTA expert group, the formation of an EAFTA would increase the awareness of East Asian citizens on their common destiny, institutionalize dialogues and contacts, and increase mutual understanding and cooperation. Furthermore, a growing number of current bilateral and plulateral FTAs among East Asian countries with their differing rules of origin and tariff reduction schedules will create a spaghetti bowl phenomenon, increasing transaction costs for intra-regional trade and raising production costs for production networks in East Asia. The formation of an EAFTA would certainly be an effective way to reduce these costs and ensure sustained regional economic growth. Another important regional trade arrangement is an FTA between the three Northeast Asian countries (the PRC, Japan, and Korea), because their trade accounts for the biggest trade flows in the region. Given that there are already ASEAN+1 FTAs between ASEAN countries and three Northeast Asian countries, forming a sub-regional PRC–Japan–Korea FTA will be equal to removing the last remaining hurdle for the realization of an EAFTA. In fact, an EAFTA can be formed by the simple consolidation of the existing AFTA, PRC–Japan–Korea FTA and three ASEAN+1. Although the discussion about the PRC–Japan–Korea FTA is underway, its formation is not expected to be easy, which in turn will have a bad influence on the prospects for the EAFTA.

The second step is to set up a crisis prevention system. Immediately after the outbreak of the currency crisis in 1997, East Asian countries started to work on diverse projects to prevent financial crises, which ultimately led to the establishment of the Chiang Mai initiative (CMI) in 2001. Through the CMI process, the facility for the provision of emergency funds and the prevention of crisis has continued to expand. As the operational procedures improved over time, it led eventually to the development of the Chiang Mai Initiative Multilateralisation (CMIM) and the establishment of the ASEAN+3 Macroeconomic Research Office (AMRO) in Singapore in 2011. It seems that East Asian countries are now well placed to create an Asian Monetary Fund, capable of conducting effective regional surveillance and handing financial crises (see Kawai 2009, and Moon and Rhee 2012).

The third step is to promote wide integration that includes countries at different development stages as possible members. As examined, wide income differentials between East Asian countries tend to attenuate goods market integration. However, including both developed and developing Asian countries in regionalization helps to enhance market integration. The variable *DEVELOP* is significantly positive. One possible reason for this positive impact of *DEVELOP* is that FDI flows are likely to be stronger between developed and developing Asian countries than between the developed Asian countries or between the developing countries. Indeed, Japan and the NIEs are the major FDI investors in the East Asia region, while the PRC and the four developing ASEAN countries are the major FDI recipients. Traditionally, Japan was the most important player in terms of FDI outflows in East Asia. Japan's investment in East Asia started in light industry sectors such as textiles at the beginning of the 1970s, but it soon extended to the heavy and chemical industries. Since the mid-1980s, the NIEs have also become important players in terms of FDI flows in East Asia. In the 1980s, especially after the exchange rate realignment following the Plaza Accord in 1985, Japan shifted its production to lower-cost East Asian countries even in technology-intensive sectors such as electrical machinery and transport machinery. As the PRC economy expanded, Japan's investment in the PRC rose dramatically and it also shifted its investment in the NIEs to the PRC. Following Japan, the NIEs started to move together their production abroad and soon became the leading regional suppliers of capital, collectively replacing Japan as the largest foreign investor in the ASEAN countries and the PRC. Indeed, the NIEs invested more than half of their FDI in East Asia, mainly in the

ASEAN countries and the PRC. The PRC plays a major role in these production networks and supply chains, as its expanding export industries require more and more imports of industrial materials, parts, components, and other intermediate products from its neighboring economies. The PRC has become a manufacturing assembler for East Asian economies and developed its comparative advantages in manufacturing industries. This East Asian countries' FDI pattern has led to the rise of vertical intra-industry trade in parts, components, and semi-finished and finished manufactured products (Kawai and Urata 1998, 2004). Many firms in developed East Asian countries have formed international production networks and supply chains throughout East Asia through their FDI. This is in sharp contrast with the EU where economic integration occurred mostly between the developed member countries with similar levels of incomes. European trade is characterized more by horizontal intra-industry trade than is East Asian trade.

Fourth, although the explanatory variables are important elements explaining the cross-border price differentials in East Asia, some caution is needed when drawing more general conclusions. In particular, given that a substantial part of the price differentials remain unexplained, it cannot be excluded that there may be many other important factors or policies that could enhance market integration in East Asia. For instance, political or social integration can be a catalyst for furthering economic integration and, to that extent, regional cooperation in these areas cannot be ignored.

5. CONCLUSION

This paper calculated the cross-border price differentials in East Asia and examined whether prices tend to converge over time and how closely the East Asian goods markets are integrated compared to EU goods markets. We found that, compared with the EU, there has been no noticeable trend of price-convergence among East Asian economies. Cross-border price differentials remain large and goods market integration in East Asia lags far behind that of the EU.

Using regression analysis, we found that this lack of price convergence can be explained largely by the strong exchange rate fluctuations among East Asian currencies and the wide intra-regional income disparities among East Asian economies, whereas tariffs, considered important in a gravity model, were found to be weak or insignificant. Dummy variables were introduced to capture some institutional features of East Asian region and their impact in reducing cross-border price differentials was found to be very important and significant.

The results of this study suggest that there is a strong need for East Asian economies to make efforts to stabilize exchange rate variability and reduce intra-regional income gaps as well as to reduce tariff barriers, if they want to deepen market integration, thereby increasing welfare. If so, monetary and development policies cannot be separated from trade policies as together they constitute the three pillars of market integration. Given that reducing intra-regional income disparities in East Asia can be a very difficult long-term effort, most regionalization efforts have so far focused on trade and monetary policies. Full economic integration cannot be achieved without income convergence. To increase market integration and price convergence in East Asia, collective action to conclude new FTAs and prevent the recurrence of financial crises is essential. For the benefits of integration to be maximized, collective actions that includes as possible members a large set of Asian countries at different developing stages should also be considered.

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APPENDIX: PRICES INCLUDED

White bread, 1 kg (supermarket)	Wine, superior quality (750 ml) (supermarket)
Butter, 500 g (supermarket)	Wine, fine quality (750 ml) (supermarket)
Margarine, 500g (supermarket)	Beer, local brand (1 l) (supermarket)
White rice, 1 kg (supermarket)	Beer, top quality (330 ml) (supermarket)
Spaghetti (1 kg) (supermarket)	Scotch whisky, six years old (700 ml) (supermarket)
Flour, white (1 kg) (supermarket)	Gin, Gilbey's or equivalent (700 ml) (supermarket)
Sugar, white (1 kg) (supermarket)	Vermouth, Martini & Rossi (1 l) (supermarket)
Cheese, imported (500 g) (supermarket)	Cognac, French VSOP (700 ml) (supermarket)
Cornflakes (375 g) (supermarket)	Liqueur, Cointreau (700 ml) (supermarket)
Milk, pasteurized (1 l) (supermarket)	Soap (100 g) (supermarket)
Olive oil (1 l) (supermarket)	Laundry detergent (3 l) (supermarket)
Peanut or corn oil (1 l) (supermarket)	Toilet tissue (two rolls) (supermarket)
Potatoes (2 kg) (supermarket)	Dishwashing liquid (750 ml) (supermarket)
Onions (1 kg) (supermarket)	Insect-killer spray (330 g) (supermarket)
Mushrooms (1 kg) (supermarket)	Light bulbs (two, 60 watts) (supermarket)
Tomatoes (1 kg) (supermarket)	Batteries (two, size D/LR20) (supermarket)
Carrots (1 kg) (supermarket)	Frying pan (Teflon or good equivalent) (supermarket)
Oranges (1 kg) (supermarket)	Electric toaster (for two slices) (supermarket)
Apples (1 kg) (supermarket)	Aspirins (100 tablets) (supermarket)
Lemons (1 kg) (supermarket)	Razor blades (five pieces) (supermarket)
Bananas (1 kg) (supermarket)	Toothpaste with fluoride (120 g) (supermarket)
Lettuce (one) (supermarket)	Facial tissues (box of 100) (supermarket)
Eggs (12) (supermarket)	Hand lotion (125 ml) (supermarket)
Peas, canned (250 g) (supermarket)	Shampoo & conditioner in one (400 ml) (supermarket)
Tomatoes, canned (250 g) (supermarket)	Lipstick (deluxe type) (chain store)
Peaches, canned (500 g) (supermarket)	Men's business suit, two piece, medium weight (chain store)
Sliced pineapples, canned (500 g) (supermarket)	Men's business shirt, white (chain store)
Beef: filet mignon (1 kg) (supermarket)	Men's shoes, business wear (chain store)
Beef: steak, entrecote (1 kg) (supermarket)	Men's raincoat, Burberry type (chain store)
Beef: stewing, shoulder (1 kg) (supermarket)	Socks, wool mixture (chain store)
Beef: roast (1 kg) (supermarket)	Women's dress, ready to wear, daytime (chain store)
Beef: ground or minced (1 kg) (supermarket)	Women's shoes, town (chain store)

Veal: chops (1 kg) (supermarket)	Women's cardigan sweater (chain store)
Veal: fillet (1 kg) (supermarket)	Women's raincoat, Burberry type (chain store)
Veal: roast (1 kg) (supermarket)	Women's tights, panty hose (chain store)
Lamb: leg (1 kg) (supermarket)	Child's jeans (chain store)
Lamb: chops (1 kg) (supermarket)	Child's shoes, dress wear (chain store)
Lamb: Stewing (1 kg) (supermarket)	Child's shoes, sportswear (chain store)
Pork: chops (1 kg) (supermarket)	Girl's dress (chain store)
Pork: loin (1 kg) (supermarket)	Boy's jacket, smart (chain store)
Ham: whole (1 kg) (supermarket)	Boy's dress trousers (chain store)
Bacon (1 kg) (supermarket)	Compact disc album (average)
Chicken: frozen (1 kg) (supermarket)	Television, color (66 cm) (average)
Chicken: fresh (1 kg) (supermarket)	Personal computer (64 MB) (average)
Frozen fish fingers (1 kg) (supermarket)	Kodak color film (36 exposures) (average)
Fresh fish (1 kg) (supermarket)	International foreign daily newspaper (average)
Instant coffee (125 g) (supermarket)	International weekly news magazine (Time) (average)
Ground coffee (500 g) (supermarket)	Paperback novel (at bookstore) (average)
Tea bags (25 bags) (supermarket)	Low priced car (900-1299 cc) (low)
Cocoa (250 g) (supermarket)	Compact car (1300-1799 cc) (low)
Drinking chocolate (500 g) (supermarket)	Family car (1800-2499 cc) (low)
Coca-Cola (1 l) (supermarket)	Deluxe car (2500 cc upwards) (low)
Tonic water (200 ml) (supermarket)	Cigarettes, Marlboro (pack of 20) (supermarket)
Mineral water (1 l) (supermarket)	Cigarettes, local brand (pack of 20) (supermarket)
Orange juice (1 l) (supermarket)	Pipe tobacco (50 g) (average)
Wine, common table (750 ml) (supermarket)	