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Trade Creation in the APEC Region: Measurement of the Magnitude of and Changes in Intra-regional Trade since APEC's Inception

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FOREWORD

APEC's formation in 1989 was not only a bridge for greater integration of the economies on either shore of the Pacific, but also a far-sighted and brave New World initiative bringing together industrialised and developing economies with a commitment to free and open trade and investment in the Asia – Pacific region.

As it has matured and evolved, and indeed enjoyed the benefits of its successes in reducing regional tariff barriers, APEC has broadened its agenda to involve other issues that also contribute to better trade and investment linkages in a low tariff environment; for example, trade and investment facilitation and structural reform. The overall focus however has remained on greater regional economic integration and the benefits that increased trade and investment can contribute.

This Research Paper is the first of a research paper series that the APEC Policy Support Unit (PSU) plans to institute. It is also the first in-house project and I am grateful for the work of the PSU's Professor Lee who was the principal researcher and author.

Given APEC's "core business" of promoting trade, noting that 2009 marks the 20th anniversary of APEC and 2010 is the first milestone of the Bogor Goals for industrialized economies, this paper seeks to provide empirical evidence that the formation of APEC has contributed to greater trade intensity within the region.

The establishment of the PSU was a decision of APEC Leaders' in 2007 and the Unit commenced operation in August 2008. Its role is to provide analytical and evaluation capacity and assist in coordinating related economic and technical cooperation for the development and implementation of APEC's agenda. Its broad mandate is to provide a policy and research capability to assist in implementing APEC's regional economic integration agenda. It is currently focusing on behind-the-border (structural) economic reforms and trade and investment policy reforms, particularly in the area of facilitation.

We hope that this report sets a tone for future high quality publications from the PSU.

Philip Gaetjens
Director
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EXECUTIVE SUMMARY

Since its inception in 1989, APEC has striven to achieve the goals of "free and open trade and investment" in the APEC region. However, the view has been expressed that because APEC's approach is voluntary, non-binding and involves open regionalism, it has not developed a rapid liberalization process and the creation of APEC has not contributed to greater intra-regional trade in the APEC region. Nonetheless, there is evidence of success in certain areas, such as trade liberalization and facilitation, and this may have contributed to intra-regional trade.

Noting that the year 2009 marks the 20th anniversary of APEC and 2010 is the target year of the Bogor Goals for industrialized member economies, this report attempts to evaluate whether APEC member economies are enjoying a high degree of *de facto* integration and whether APEC economies have increased their intra-regional trade in goods.[1] Specifically, this paper provides analytical evidence of how closely the region as a whole is connected and the member economies are linked with each other in terms of goods trade, and also by how much the region as a whole has increased its intra-regional trade since APEC was founded in 1989.

For this purpose, the report first gives a description of the extent and trends of intra-regional trade for the period 1989 – 2007. Among others, it is found that the share of intra-regional exports and imports in the APEC region is marginally larger than the comparable estimates for the European Union (EU) region and is much greater than those of intra-NAFTA trade or of intra-ASEAN-7 trade.

It is also found that APEC economies' goods exports and imports each accounted for 45 per cent of world exports and imports in 2007 (increased from approximately 41 per cent in 1989). APEC's total exports increased from US$ 1.2 trillion to US$ 6.2 trillion: an annualized average growth rate of 9.5 per cent and larger than the world average – 8.9 per cent. During the same period, APEC's total imports grew at the high rate of 9.4 percent per annum, also outpacing the world average.

This report then estimates the gravity equation augmented with an APEC membership dummy variable and investigates any positive deviations from the "norm of trade" from the APEC members' point of view that may become evident by applying gravity after we control for as many "natural" and "institutional" causes of trade as possible.

The gravity model first finds that the level of bilateral trade (exports and imports alike) between APEC member economies is higher than would be expected from the gravity model. In other words, APEC member economies trade more with other APEC economies than with non-APEC economies, even when all the usual influences on bilateral trade flows have been controlled for. Specifically, an APEC member exports 2.8 times more to other APEC members, compared with non-APEC economies; An APEC member imports 1.9 times more from other APEC members, compared with non-

[1] This paper does not cover trade in services. For international investment, two separate reports have also been prepared by APEC Policy Support Unit. See Lee and Rajan (2009) for foreign direct investment and Lee and Huh (2009) for portfolio investment and bank lending.

APEC economies.

In fact, the APEC membership effect is similar in size to the effect of a free trade agreement (FTA). This is evidence that APEC members are enjoying a high degree of *de facto* integration, even though APEC's trade liberalization process is non-binding.

It is noted, however, that there are some discrepancies among the individual member economies in the sense that the extent to which individual APEC economies trade more with other members is quite diverse. Specifically, 19 member economies show a stronger linkage in their exports to other APEC member economies than to non-APEC members. On the other hand, APEC membership effects on imports of total products are positive for 16 member economies.

Secondly, when the APEC membership effect is examined over the period 1989 – 2007, the gravity model finds that while its impact on both exports and imports has remained positive, the positive impact on exports has been growing, while for imports it has been weakening over time. While this was not pursued as a research issue in this paper, there is the possibility that APEC's open form of regionalism and its clear focus on trade liberalization and facilitation may have led to greater imports from non-members.

To summarize, this report finds that the share of intra-regional trade is larger than the comparable estimates for the EU region, that the APEC membership effect on bilateral trade is positive and is similar in size to the bilateral and sub-regional FTA effect. Thus, APEC members as a whole are enjoying a very high degree of *de facto* integration. This evidences the benefits of APEC's common purpose, and its non-binding approach of trade liberalization in the context of open regionalism.

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1. INTRODUCTION

Trade creation can take place when the formation of a customs union results in an increase in trade among member nations as protectionist barriers such as tariffs, quotas, and subsidies are eliminated. Since its inception in 1989, APEC has striven to achieve the goals of "free and open trade and investment" in the APEC region.

APEC, however, is not a trading bloc as its approach is voluntary with non-binding decisions. Also, because it involves open regionalism, the view has been expressed that it has not established greater trading ties between member economies. Nonetheless, there is evidence of success in certain areas, such as trade liberalization and facilitation, and this may have contributed to intra-regional trade.

Noting that the year 2009 marks the 20th anniversary of APEC and 2010 is the target year of the Bogor Goals for industrialized member economies, this report attempts to evaluate whether APEC member economies are enjoying a high degree of intra-regional trade in goods and whether the creation of APEC has increased intra-regional trade.[2] More specifically, this report aims to

a. Examine the degree and structure of bilateral trade linkages among APEC member economies.
b. Establish an understanding of the various factors that have an impact on the bilateral trade among APEC member economies.
c. Assess whether APEC member economies as a whole are enjoying a high degree of intra-regional trade.
d. Assess whether each individual APEC economy is enjoying a high degree of intra-regional trade.
e. Assess whether the degree of intra-regional trade in the APEC region has been increasing since its inception in 1989.
f. Draw policy implications and issues for further analysis within the context of identifying priorities for APEC's forward agendas to further strengthen regional economic integration.

To accomplish the above goals, the report first gives a description of the extent and trends of intra-regional trade for the period 1989 – 2007. Secondly, this report estimates the gravity equation augmented with an APEC membership dummy variable. Most studies formally assessing the influence of regional trade arrangements on bilateral trade also make use of the gravity equation (see, e.g., Bayoumi and Eichengreen, 1995; Frankel and Wei, 1998; and, for more recent studies, Ghosh and Yamarik, 2004; Carrère, 2006; Spies and Marques, 2006; Baier, *et al.*, 2007; Lee, *et al.*, 2008). Following these studies, this report investigates any positive deviations from the "norm of trade" given by the gravity model. In other words, the report is intended to search, from the APEC

[2] For similar work on intra-regional investment in the APEC region, the reader is also referred to another PSU project report entitled "Investigation of Cross-border Investment Linkages among APEC Economies and Identification of Policy Implications" (Lee, Rajan and Huh, 2009). See also Woo and Bo (2008) for a paper measuring economic integration in the APEC region using a composite index.

members' point of view, for positive deviations from the norm of trade after we control for as many "natural" and "institutional" causes of trade as possible.

The remainder of the paper is organized as follows. Some stylized facts on the APEC region and its intra-regional trade are presented in Section 2. Section 3 presents the gravity equations to be estimated and describes our data. The main empirical results are presented in Section 4. Finally, Section 5 summarizes the main findings and suggests policy implications.

2. STYLIZED FACTS ON THE APEC REGION AND ITS INTRA-REGIONAL TRADE

2.1. DIVERSITY AND DYNAMISM OF THE APEC REGION

Diversity

The APEC region is very diverse among member economies in terms of the size of population, GDP, level of economic development, and structure and size of trade, among other factors. With 2.7 billion people, the twenty-one APEC member economies as a whole accounted for more than 40 percent of the world population of 6.6 billion people in 2007. As shown in Table 2.1.a, however, the size of population varies from over 1.3 billion people in China to 0.4 million people in Brunei Darussalam. China's population alone makes up 49 percent of the APEC region's total population.

Enormous diversity also exists in terms of GDP. The combined GDP of the APEC member economies was US$ 29.0 trillion in 2007, which accounted for more than 53 percent of world GDP. With US$ 13.8 trillion, the GDP of the United States, the largest economy in the world, accounted for more than 47 percent of APEC GDP in 2007.[3] The second and fourth largest economies in the world, Japan (US$ 4.3 trillion) and China (US$ 3.2 trillion)[4], are also members of APEC.[5] In contrast, Papua New Guinea's GDP was recorded at US$ 6.3 billion in 2007.

The level of economic development is also very diverse among member economies. In 2007, the highest per capita GDP, measured in market exchange rates, was US$ 45,592 for the United States, while the lowest per capita GDP was US$ 806 for Viet Nam.[6]

[3] When GDPs are calculated on the purchasing power parity (PPP) basis, the GDP of APEC economies accounted for more than 54 percent of world GDP in 2007.
[4] With US$ 3.3 trillion GDP, Germany was the third largest economy in the world in 2007.
[5] When GDPs are calculated on the purchasing power parity (PPP) basis, China was the second largest and Japan the third largest economy in 2007.
[6] When per capita GDPs are calculated on the PPP basis, Brunei Darussalam was enjoying the highest income level in 2007, followed by Singapore and the United States. See Table 2.1.b.

Table 2. 1. a. Population, GDP and Per capita GDP

	Population			GDP			Per capita GDP		
REPORTER	**1989 (million)**	**2007 (million)**	**1989-2007 (annualised growth, %)**	**1989 (billion USD)**	**2007 (billion USD)**	**1989-2007 (annualised growth, %)**	**1989 (USD)**	**2007 (USD)**	**1989-2007 (annualised growth, %)**
Australia	16.8	21.0	1.2	295.0	821.0	5.9	17,545	39,066	4.5
Brunei Darussalam	0.2	0.4	2.5	3.0	11.5	8.2	11,950	30,032	5.6
Canada	27.4	33.0	1.0	555.5	1,329.9	5.0	20,290	40,329	3.9
Chile	12.9	16.6	1.4	28.4	163.9	10.2	2,192	9,878	8.7
China	1,118.7	1,318.3	0.9	344.0	3,205.5	13.2	307	2,432	12.2
Hong Kong, China	5.7	6.9	1.1	68.8	207.2	6.3	12,091	29,912	5.2
Indonesia	175.1	225.6	1.4	101.5	432.8	8.4	580	1,918	6.9
Japan	123.1	127.8	0.2	2,940.3	4,384.3	2.2	23,882	34,313	2.0
Korea	42.4	48.5	0.7	230.5	969.8	8.3	5,438	20,014	7.5
Malaysia	17.6	26.5	2.3	38.8	186.7	9.1	2,207	7,033	6.7
Mexico	81.7	105.3	1.4	223.0	1,022.8	8.8	2,730	9,715	7.3
New Zealand	3.4	4.2	1.2	42.5	135.7	6.7	12,514	32,086	5.4
Papua New Guinea	4.0	6.3	2.5	3.5	6.3	3.2	881	990	0.6
Peru	21.3	27.9	1.5	20.6	107.3	9.6	965	3,846	8.0
Philippines	59.8	87.9	2.2	42.6	144.1	7.0	712	1,639	4.7
Russia	147.7	142.1	-0.2	506.5	1,290.1	5.3	3,429	9,079	5.6
Singapore	2.9	4.6	2.5	30.1	161.3	9.8	10,275	35,163	7.1
Chinese Taipei	20.1	22.9	0.7	152.7	383.3	5.2	7,596	16,764	4.5
Thailand	53.6	63.8	1.0	72.3	245.4	7.0	1,347	3,844	6.0
United States	246.8	301.6	1.1	5,441.7	13,751.4	5.3	22,047	45,592	4.1
Viet Nam	64.8	85.2	1.5	6.3	68.6	14.2	97	806	12.5
APEC	2,246.1	2,676.4	1.0	11,147.5	29,028.8	5.5	4,963	10,846	4.4
(simple average)			1.4			7.6			6.1
World	5,170.3	6,610.3	1.4	19,589.2	54,583.8	5.9	3,789	8,257	4.4

Notes: For the indicators shown in this table only, 1989 and 2006 data are used for Brunei Darussalam; Regional growth rates are weighted average, unless stated as "simple average".

Source: World Bank, *World Development Indicators* ; Data on Population and GDP for Chinese Taipei are from Chinese Taipei, *Taiwan Statistical Data Book 2008.*

Table 2. 1. b. Population, GDP PPP and Per capita GDP PPP

	Population			GDP, PPP			Per capita GDP, PPP		
REPORTER	1989 (million)	2007 (million)	1989-2007 (annualised growth, %)	1989 (billion International Dollar)	2007 (billion International Dollar)	1989-2007 (annualised growth, %)	1989 (International Dollar)	2007 (International Dollar)	1989-2007 (annualised growth, %)
Australia	16.8	21.0	1.2	265.4	733.9	5.8	15,784	34,923	4.5
Brunei Darussalam	0.2	0.4	2.5	8.7	19.5	4.6	34,973	50,199	2.0
Canada	27.4	33.0	1.0	521.7	1,180.9	4.6	19,054	35,812	3.6
Chile	12.9	16.6	1.4	58.2	230.3	7.9	4,496	13,880	6.5
China	1,118.7	1,318.3	0.9	835.8	7,096.7	12.6	747	5,383	11.6
Hong Kong, China	5.7	6.9	1.1	90.4	293.0	6.7	15,906	42,306	5.6
Indonesia	175.1	225.6	1.4	236.1	837.6	7.3	1,349	3,712	5.8
Japan	123.1	127.8	0.2	2,129.0	4,297.2	4.0	17,293	33,632	3.8
Korea	42.4	48.5	0.7	310.2	1,201.8	7.8	7,318	24,801	7.0
Malaysia	17.6	26.5	2.3	76.7	358.9	8.9	4,358	13,518	6.5
Mexico	81.7	105.3	1.4	472.1	1,484.9	6.6	5,781	14,104	5.1
New Zealand	3.4	4.2	1.2	46.8	115.6	5.1	13,783	27,336	3.9
Papua New Guinea	4.0	6.3	2.5	5.1	13.2	5.5	1,259	2,084	2.8
Peru	21.3	27.9	1.5	71.1	218.6	6.4	3,337	7,836	4.9
Philippines	59.8	87.9	2.2	100.4	299.4	6.3	1,680	3,406	4.0
Russia	147.7	142.1	-0.2	1,342.2	2,087.4	2.5	9,086	14,690	2.7
Singapore	2.9	4.6	2.5	46.1	228.1	9.3	15,718	49,704	6.6
Chinese Taipei	20.1	22.9	0.7	177.6	696.1	7.9	8,832	30,443	7.1
Thailand	53.6	63.8	1.0	140.5	519.2	7.5	2,621	8,135	6.5
United States	246.8	301.6	1.1	5,441.7	13,751.4	5.3	22,047	45,592	4.1
Viet Nam	64.8	85.2	1.5	39.5	221.4	10.0	610	2,600	8.4
APEC	2,246.1	2,676.4	1.0	12,415.5	35,885.2	6.1	5,528	13,408	5.0
(simple average)			1.4			6.8			5.4
World	5,170.3	6,610.3	1.4	24,005.7	65,973.1	5.8	4,643	9,980	4.3

Notes: Regional growth rates are weighted average, unless stated as "simple average".

Source: World Bank, *World Development Indicators*; Data on Population for Chinese Taipei are from Chinese Taipei, *Taiwan Statistical Data Book 2008;* Data on GDP, PPP for Chinese Taipei are from International Monetary Fund, *World Economic Outlook 2008.*

The combined exports of APEC members recorded US$ 6.2 trillion in 2007, which accounted for 45 percent of world exports. However, the sum of China and U.S. exports, which recorded US$ 1,218.7 billion and US$ 1,162.7 billion, respectively, accounted for 38 percent of total exports of all APEC member economies (Table 2.2).

Table 2. 2. Total Exports

	World			APEC		
REPORTER	1989 (billion USD)	2007 (billion USD)	1989-2007 (annualised growth, %)	1989 (billion USD)	2007 (billion USD)	1989-2007 (annualised growth, %)
Australia	37.4	141.6	7.7	26.2	102.5	7.9
Brunei Darussalam	1.9	6.9	7.5	1.9	6.8	7.4
Canada	120.7	420.9	7.2	99.9	367.6	7.5
Chile	8.3	67.5	12.3	3.7	37.5	13.7
China	52.9	1,218.7	19.0	38.9	781.2	18.1
Hong Kong, China	73.4	344.8	9.0	54.2	270.8	9.3
Indonesia	21.9	114.1	9.6	18.4	87.2	9.0
Japan	274.8	714.9	5.5	191.1	531.3	5.8
Korea	60.6	373.7	10.6	45.5	254.2	10.0
Malaysia	25.1	176.2	11.4	19.4	134.8	11.4
Mexico	23.0	271.9	14.7	18.4	238.7	15.3
New Zealand	8.9	27.1	6.4	6.0	18.8	6.5
Papua New Guinea	1.4	7.4	9.6	0.9	3.7	8.1
Peru	3.5	26.4	11.9	1.6	16.0	13.8
Philippines	7.8	50.5	11.0	6.1	40.7	11.1
Russia	-	352.9	-	-	43.8	-
Singapore	44.8	299.9	11.1	31.9	227.3	11.5
Chinese Taipei	66.3	246.7	7.6	50.7	200.4	7.9
Thailand	20.2	152.5	11.9	13.0	106.0	12.4
United States	363.9	1,162.7	6.7	213.2	696.5	6.8
Viet Nam	2.5	48.6	18.0	0.5	33.7	26.1
APEC	1,219.2	6,225.8	9.5	841.4	4,199.6	9.3
(simple average)			10.4			11.0
APEC (ex-RUS)	1,219.2	5,872.9	9.1	841.4	4,155.8	9.3
(simple average)			10.4			11.0
World	2,987.4	13,837.8	8.9			

Notes: "-" denotes data not available; Regional growth rates are weighted average, unless stated as "simple average".
Source: International Monetary Fund, *Direction of Trade Statistics*; Chinese Taipei, *Taiwan Statistical Data Book 2008;* Chinese Taipei Bureau of Foreign Trade Website.

Dynamism

Between 1989 and 2007, the per capita GDPs of sixteen APEC member economies and the GDPs of thirteen member economies grew faster than the world average during the period. Specifically, the GDPs of Viet Nam and China grew at the exceptional rates of 14.2 percent and 13.2 percent per annum, respectively. Chile; Singapore; Peru; Malaysia; Mexico; Indonesia; and Korea also recorded very high growth rates ranging from 10.2 percent to 8.3 percent. The combined GDP of the APEC economies grew at an annualized growth rate of 5.5 percent, which is smaller than the world average growth rate of 5.9 percent. This is largely due to the fact that the United States and Japan grew at rates smaller than the world average, while taking more weight in the calculation. When GDPs are calculated on the PPP basis, the APEC economies as a whole grew at the annualized rate of 6.1 percent during the period 1989 - 2007, which is greater than the world average growth rate of 5.8 percent. The annualized growth rate of

per capita GDP for the APEC region recorded 5.0 percent, which is also greater than the world average growth rate of 4.3 percent.

Table 2. 3. Total Imports

	World			APEC		
REPORTER	1989 (billion USD)	2007 (billion USD)	1989-2007 (annualised growth, %)	1989 (billion USD)	2007 (billion USD)	1989-2007 (annualised growth, %)
Australia	45.0	174.2	7.8	29.9	121.6	8.1
Brunei Darussalam	0.9	3.9	8.8	0.7	1.9	6.0
Canada	129.1	418.0	6.7	101.2	324.5	6.7
Chile	7.0	43.8	10.7	2.8	19.4	11.3
China	59.1	956.3	16.7	37.9	567.2	16.2
Hong Kong, China	72.2	368.3	9.5	60.2	333.1	10.0
Indonesia	16.5	74.5	8.7	11.4	55.5	9.2
Japan	209.6	621.9	6.2	135.4	399.2	6.2
Korea	60.2	356.8	10.4	43.3	230.6	9.7
Malaysia	22.6	147.0	11.0	17.2	111.5	11.0
Mexico	25.1	310.1	15.0	19.5	247.3	15.1
New Zealand	8.8	30.8	7.2	6.0	23.1	7.8
Papua New Guinea	1.6	3.0	3.4	1.5	2.8	3.6
Peru	2.5	20.7	12.4	1.2	10.8	13.2
Philippines	11.2	55.5	9.3	8.2	43.7	9.7
Russia	-	199.4	-	-	63.3	-
Singapore	49.7	263.3	9.7	35.2	185.3	9.7
Chinese Taipei	52.3	219.3	8.3	38.4	154.2	8.0
Thailand	25.4	141.3	10.0	17.7	96.3	9.9
United States	493.4	2,017.4	8.1	315.9	1,269.7	8.0
Viet Nam	3.0	62.7	18.3	0.3	52.1	33.4
APEC	1,295.2	6,488.3	9.4	883.9	4,313.2	9.2
(simple average)			9.9			10.6
APEC (ex-RUS)	1,295.2	6,288.8	9.2	883.9	4,249.9	9.1
(simple average)			9.9			10.6
World	3,111.2	14,333.5	8.9			

Notes: "-" denotes data not available; Regional growth rates are weighted average, unless stated as "simple average".
Source: International Monetary Fund, *Direction of Trade Statistics* ; Chinese Taipei, *Taiwan Statistical Data Book 2008;* Chinese Taipei Bureau of Foreign Trade Website.

Trade expansion has been more dramatic, as can be seen in Tables 2.2 and 2.3. Between 1989 and 2007, APEC's total exports increased from US$ 1.2 trillion to US$ 6.2 trillion, recording an annualized average growth rate of 9.5 percent, larger than the world average growth rate of 8.9 percent. During the same period, APEC's total imports grew at the high rate of 9.4 percent per annum, also outpacing the world average. China and Viet Nam, in particular, led the way in export growth during this period by averaging 19.0 percent and 18.0 percent, respectively. Mexico (14.7%); Chile (12.3%); Peru (11.9%); Thailand (11.9%); Malaysia (11.4%); Singapore (11.1%); the Philippines (11.0%); and Korea (10.6%) also enjoyed double digit export growth rates during the period 1989-2007.

Viet Nam and China also led the way in import growth, recording 18.3 percent and 16.7 percent per annum, respectively, and were followed by Mexico (15.0%); Peru (12.4%); Malaysia (11.0%); Chile (10.7%); Korea (10.4%); and Thailand (10.0%).

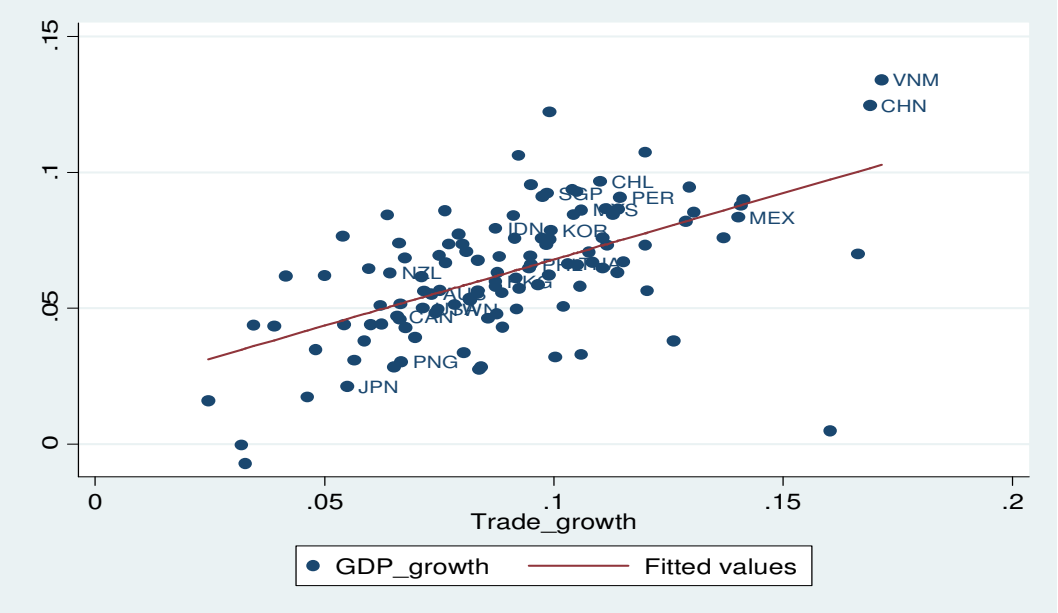
A number of studies have shown that the phenomenal growth of Asian economies was due to the marked expansion of trade, as well as openness, high savings and investment rates, and well-educated workforces (e.g., World Bank, 1993). World Bank (2005) also

concludes that key factors in the growth process are openness to trade as well as a stable macroeconomic environment, enforcement of property rights, and effective government.

Figure 2.1 shows for 118 countries a scatter diagram of plots between annualized growth rates of trade and those of GDP in US dollars for the period 1989 – 2007. A predicted regression line is also shown. As can be seen in the graph, there seems to be a very strong relationship between trade growth and income growth. Figure 2.2 shows that this relationship is even stronger for APEC member economies. As noted below each of these diagrams, both the size of estimated coefficients and the measure of fit are greater for APEC economies only than for all nations of the world.

Thus, it is very likely that freer and more open trade will further fuel the economic growth of APEC member economies.[7]

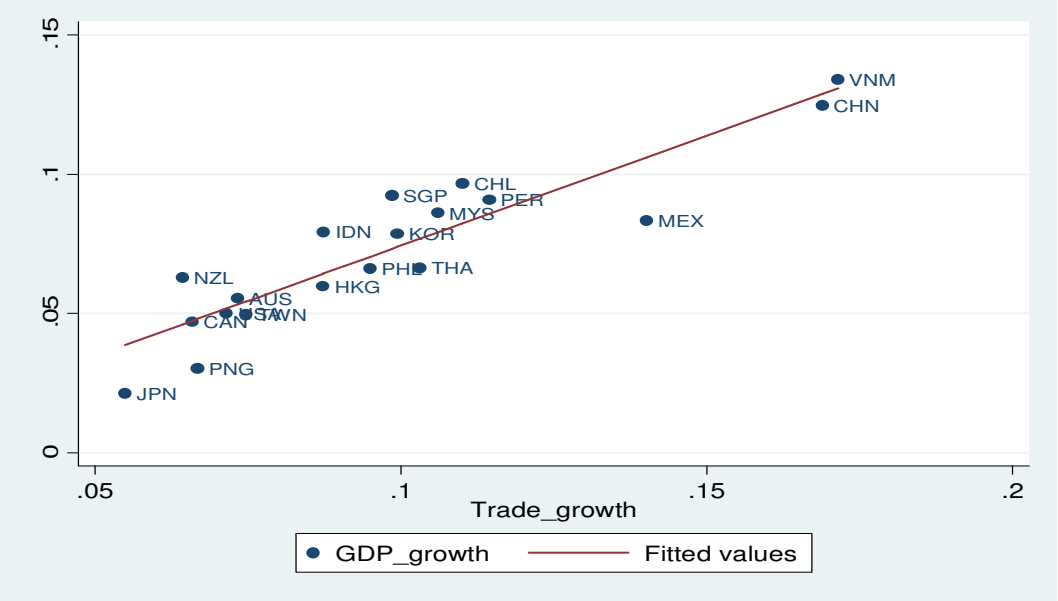
Figure 2. 1. Relation between Growth Rates of GDP and Trade (All countries = 118)



GDP_growth = 0.02*** + 0.49***Trade_growth; # Obs = 118; R^2 = 0.329
(3.17) (7.54)

[7] Of course, the strong relationship between trade expansion and income growth does not necessarily mean that trade expansion always causes income growth and may simply suggest that income growth causes trade expansion. But it seems reasonable to say that there is a two-way causality between trade and growth, as theories of trade and economic growth suggest. Empirically, however, the causality from trade to income could usefully be further researched.

Figure 2. 2. Relation between Growth Rates of GDP and Trade (APEC member economies only)



GDP_growth = -0.00*** + 0.79***Trade_growth; # Obs = 19; R^2 = 0.832
(0.54) (9.17)

2.2. CHANGING STRUCTURE OF INTRA-REGIONAL TRADE

This sub-section examines the changing structure of intra-regional trade, again in two parts. It first provides an overview of the extent and trends of intra-regional trade in total goods. This is followed by a similar discussion on trade in manufactured goods vs. trade in non-manufactured goods.

Overall Structure

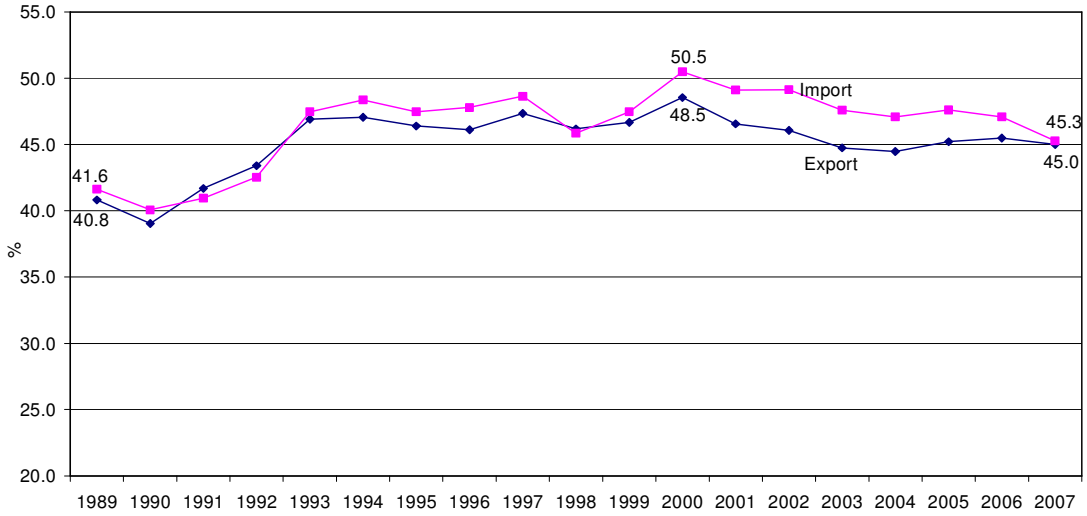
This study makes use of data drawn from the International Monetary Fund's *Direction of Trade Statistics* and, for disaggregated trade, data drawn from United Nations' *Comtrade Database*. The UN data system does not cover Chinese Taipei, and therefore for Chinese Taipei's total trade this study also draws data from Chinese Taipei's Bureau of Foreign Trade website.[8] For Chinese Taipei's disaggregated trade, this study uses data recorded under "Other Asia, nes" in *Comtrade Database*.[9]

As seen in Figure 2.3, the share of APEC in total world exports of goods increased from 40.8 percent in 1989 to 48.5 percent in 2000, but since then it has decreased so as to

[8] http://cus93.trade.gov.tw/bftweb/english/FSCE/FSC0011E.ASP
[9] The reason is that in the partner breakdown Chinese Taipei is included under "Other Asia, not elsewhere specified" (code 490). Trade data for territories belonging to Asia, but not specified by country, could end up in code 490. In practice, only trade of Chinese Taipei is included under this code." UN *Comtrade* (http://comtrade.un.org/kb/Article.aspx?id=10043)

reach 45.0 percent in 2007. [10] A similar pattern can be found for imports: the share of APEC in total world imports increased from 41.6 percent in 1989 to 50.5 percent in 2000 and then decreased to 45.3 percent in 2007. This is in large part due to the decreasing shares of U.S. and Japanese exports and imports in the world market, these being both the major exporters and major importers in the world. More specifically, as seen in Table 2.4, the shares of U.S exports (imports) in the world market decreased from 12.2 percent (15.9 percent) in 1989 to 8.4 percent (14.1 percent) in 2007. Similarly, the shares of Japanese exports (imports) in the world market decreased from 9.2 percent (6.7 percent) to 5.2 percent (4.3 percent) between 1989 and 2007.

Figure 2. 3. Share of APEC in World Trade



[10] Unless otherwise specified, APEC aggregates in the tables and figures in this section include all 21 APEC economies in 1989 through 2007 and do not take into account their date of accession to APEC.

Table 2. 4. Shares of Exports and Imports in the World and APEC Region

	Export Shares (%)				Import Shares (%)			
	World		APEC		World		APEC	
REPORTER	1989	2007	1989	2007	1989	2007	1989	2007
Australia	1.3	1.0	3.1	2.4	1.4	1.2	3.4	2.8
Brunei Darussalam	0.1	0.1	0.2	0.2	0.0	0.0	0.1	0.0
Canada	4.0	3.0	11.9	8.8	4.1	2.9	11.5	7.5
Chile	0.3	0.5	0.4	0.9	0.2	0.3	0.3	0.4
China	1.8	8.8	4.6	18.6	1.9	6.7	4.3	13.2
Hong Kong, China	2.5	2.5	6.4	6.4	2.3	2.6	6.8	7.7
Indonesia	0.7	0.8	2.2	2.1	0.5	0.5	1.3	1.3
Japan	9.2	5.2	22.7	12.7	6.7	4.3	15.3	9.3
Korea	2.0	2.7	5.4	6.1	1.9	2.5	4.9	5.3
Malaysia	0.8	1.3	2.3	3.2	0.7	1.0	1.9	2.6
Mexico	0.8	2.0	2.2	5.7	0.8	2.2	2.2	5.7
New Zealand	0.3	0.2	0.7	0.4	0.3	0.2	0.7	0.5
Papua New Guinea	0.0	0.1	0.1	0.1	0.1	0.0	0.2	0.1
Peru	0.1	0.2	0.2	0.4	0.1	0.1	0.1	0.3
Philippines	0.3	0.4	0.7	1.0	0.4	0.4	0.9	1.0
Russia	-	2.6	-	1.0	-	1.4	-	1.5
Singapore	1.5	2.2	3.8	5.4	1.6	1.8	4.0	4.3
Chinese Taipei	2.2	1.8	6.0	4.8	1.7	1.5	4.3	3.6
Thailand	0.7	1.1	1.5	2.5	0.8	1.0	2.0	2.2
United States	12.2	8.4	25.3	16.6	15.9	14.1	35.7	29.4
Viet Nam	0.1	0.4	0.1	0.8	0.1	0.4	0.0	1.2
APEC	40.8	45.0	100.0	100.0	41.6	45.3	100.0	100.0
World	100.0	100.0			100.0	100.0		

Notes: "-" denotes data not available.

Source: International Monetary Fund, *Direction of Trade Statistics*; Chinese Taipei, *Taiwan Statistical Data Book 2008*; Chinese Taipei Bureau of Foreign Trade Website.

On the other hand, the shares of Chinese exports (imports) in the world dramatically increased from 1.8 percent (1.9 percent) to 8.8 percent (6.7 percent) during the same period. Chile; Hong Kong, China; Korea; Malaysia; Mexico; Peru; the Philippines, Singapore; Thailand; and Viet Nam also recorded increases in world market share of their exports and imports during the period.

Table 2.4 also shows that the shares of U.S. and Japanese exports and imports in the APEC region decreased between 1989 and 2007 and Chinese intra-regional export (import) shares increased drastically. Specifically, the shares of U.S. exports (imports) in the region decreased from 25.3 percent (35.7 percent) to 16.6 percent (29.4 percent), and those of Japanese exports (imports) decreased from 22.7 percent (15.3 percent) to 12.7 percent (9.3 percent), while Chinese intra-regional export (import) shares increased from 4.6 percent (4.3 percent) to 18.6 percent (13.2 percent). Figures 2.4 and 2.5 show the changing shares of intra-regional exports and imports during the period 1989 - 2007. It is interesting to note that while the shares of these three economies have changed progressively and persistently, those of the other 18 APEC members as a whole remained virtually stable between 1989 and 2007.

Figure 2. 4. Intra-Regional Export Share to Member Economies

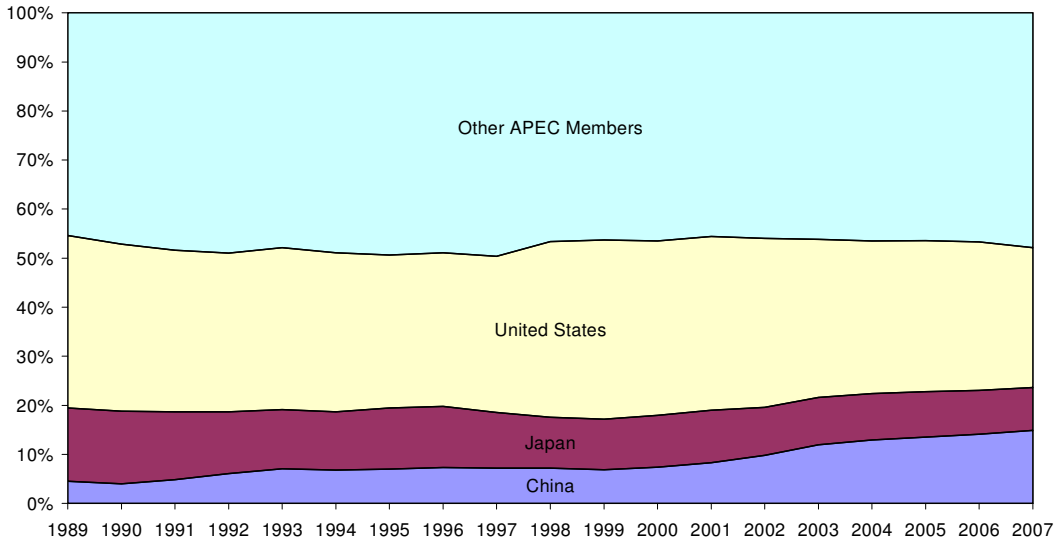


Figure 2. 5. Intra-Regional Import Share from Member Economies

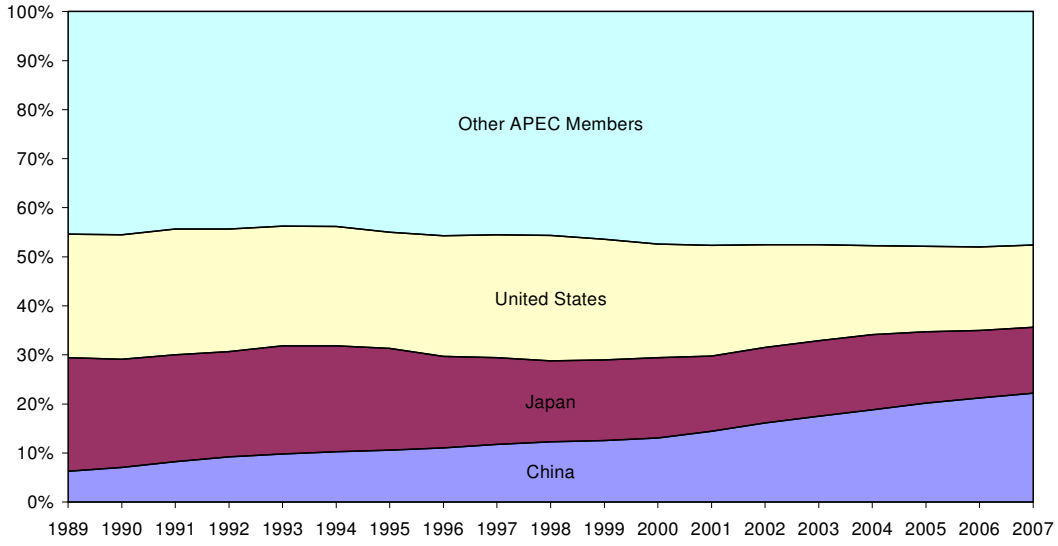


Table 2.5 reports the percentage shares of intra-regional exports for individual APEC member economies. Among the 20 APEC member economies (excluding Russia, for which 1989 data are not available), 14 economies increased their intra-regional exports. Particularly, Viet Nam's intra-regional exports increased from 21.1 percent in 1989 to 69.4 percent in 2007.

In 2007, the economies with the largest shares of intra-regional exports were Brunei Darussalam (97.9%); Mexico (87.8%); Canada (87.4%); Chinese Taipei (81.3%); the Philippines (80.6%); and Hong Kong, China (78.5%); while the economies with the lowest shares of intra-regional exports were Russia (12.4%); Papua New Guinea (50.1%); Chile (55.6%); the United States (59.9%); and Peru (60.8%). It should be

noted that Mexico's and Canada's large shares of intra-regional exports were largely due to their heavy dependence on the U.S. market: 82.2 percent and 78.9 percent of their exports were sold in the U.S. market in 2007.

Table 2.6 reports percentage shares of intra-regional imports for all other individual member economies. Among the 20 APEC member economies for which data are available, only 10 economies increased their imports from the APEC region. Again, Viet Nam's intra-regional imports in particular increased from 9.6 percent to 83.1 percent during the period 1989-2007. In 2007, Papua New Guinea (93.0%); Hong Kong, China (90.5%); Viet Nam (83.1%); Mexico (79.7%); and the Philippines (78.7%) were the economies with the largest shares of intra-regional imports, while Russia (31.7%); Chile (44.3%); Brunei Darussalam (48.0); Peru (52.3%); and China (59.3%) were the economies with the smallest shares of intra-regional imports.

Table 2. 5. Destination of Total Exports

	World (billion USD)		APEC (%)		China (%)		Japan (%)		United States (%)	
REPORTER	**1989**	**2007**	**1989**	**2007**	**1989**	**2007**	**1989**	**2007**	**1989**	**2007**
Australia	37.4	141.6	70.1	72.4	2.5	14.2	26.1	18.8	10.6	6.0
Brunei Darussalam	1.9	6.9	100.0	97.9	0.4	3.2	58.1	32.8	4.9	5.5
Canada	120.7	420.9	82.8	87.4	0.8	2.1	6.2	2.0	70.7	78.9
Chile	8.3	67.5	44.9	55.6	1.3	14.8	13.5	10.5	17.5	12.5
China	52.9	1,218.7	73.5	64.1	-	-	15.9	8.4	8.3	19.1
Hong Kong, China	73.4	344.8	73.9	78.5	25.6	48.7	6.2	4.4	25.2	13.7
Indonesia	21.9	114.1	83.9	76.4	2.4	8.5	42.2	20.7	15.8	10.2
Japan	274.8	714.9	69.6	74.3	3.1	15.3	-	-	34.2	20.4
Korea	60.6	373.7	75.1	68.0	0.0	21.9	21.7	7.1	33.4	12.3
Malaysia	25.1	176.2	77.4	76.5	1.9	8.8	16.0	9.1	18.7	15.6
Mexico	23.0	271.9	79.7	87.8	0.4	0.7	5.7	0.7	70.1	82.2
New Zealand	8.9	27.1	67.9	69.4	1.9	5.3	17.3	9.1	13.1	11.5
Papua New Guinea	1.4	7.4	63.6	50.1	0.1	5.7	37.8	9.5	1.9	1.4
Peru	3.5	26.4	44.5	60.8	0.3	12.7	11.9	7.5	22.2	19.5
Philippines	7.8	50.5	78.6	80.6	0.6	11.4	20.4	14.5	37.8	17.0
Russia	-	352.9	-	12.4	-	4.5	-	2.1	-	2.4
Singapore	44.8	299.9	71.1	75.8	2.7	9.6	8.5	4.8	23.3	8.9
Chinese Taipei	66.3	246.7	76.5	81.3	0.0	25.3	13.7	6.5	36.3	13.0
Thailand	20.2	152.5	64.3	69.5	2.7	9.7	16.9	11.9	21.6	12.6
United States	363.9	1,162.7	58.6	59.9	1.6	5.6	12.3	5.4	-	-
Viet Nam	2.5	48.6	21.1	69.4	0.0	6.9	10.6	12.5	0.0	20.8
APEC	1,219.2	6,225.8	69.0	67.5	3.1	10.1	10.3	5.9	24.3	19.2
(simple average)			68.8	69.9	2.5	11.7	19.0	9.9	24.5	19.2
APEC (ex-RUS, PRC)	1,166.3	4,654.2	68.8	72.5	3.3	13.1	10.0	5.5	25.0	20.5
(simple average)			68.6	73.2	2.5	12.1	19.2	10.4	25.4	20.1
World	2,987.4	13,837.8								

Notes: "-' denotes data not available; Regional shares are weighted average, unless stated as "simple average".

Source: International Monetary Fund, *Direction of Trade Statistics*; Chinese Taipei, *Taiwan Statistical Data Book 2008*; Chinese Taipei Bureau of Foreign Trade Website.

Table 2. 6. Origin of Total Imports

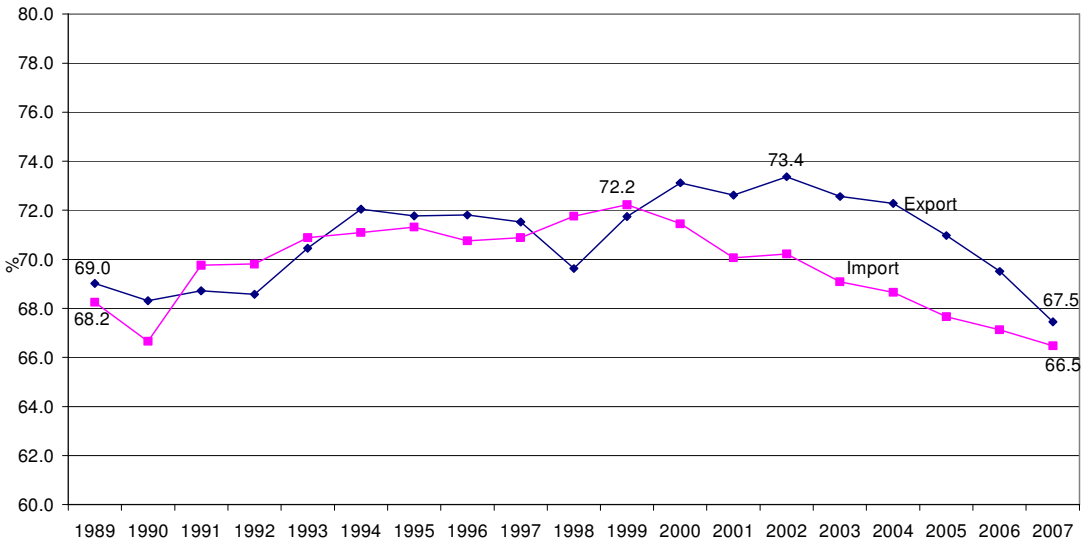
	World (billion USD)		APEC (%)		China (%)		Japan (%)		United States (%)	
REPORTER	**1989**	**2007**	**1989**	**2007**	**1989**	**2007**	**1989**	**2007**	**1989**	**2007**
Australia	45.0	174.2	66.4	69.8	2.4	15.4	20.3	9.6	22.6	12.8
Brunei Darussalam	0.9	3.9	77.0	48.0	2.3	3.2	14.7	3.5	12.7	3.9
Canada	129.1	418.0	78.4	77.6	0.9	9.4	6.9	3.8	63.5	54.1
Chile	7.0	43.8	40.7	44.3	0.7	11.2	10.6	3.7	19.3	16.7
China	59.1	956.3	64.1	59.3	-	-	17.8	14.0	13.3	7.3
Hong Kong, China	72.2	368.3	83.5	90.5	34.9	46.3	16.6	10.0	8.2	4.9
Indonesia	16.5	74.5	69.5	74.5	3.3	11.5	23.3	8.8	13.5	6.4
Japan	209.6	621.9	64.6	64.2	5.3	20.5	-	-	23.0	11.6
Korea	60.2	356.8	71.9	64.6	0.0	17.7	28.5	15.8	25.7	10.5
Malaysia	22.6	147.0	76.0	75.9	2.7	12.9	24.1	13.0	16.8	10.8
Mexico	25.1	310.1	77.9	79.7	0.7	10.5	3.6	5.8	68.2	49.6
New Zealand	8.8	30.8	68.3	75.0	1.1	13.4	18.4	9.5	16.2	9.7
Papua New Guinea	1.6	3.0	90.0	93.0	2.1	7.9	15.9	5.7	11.5	2.4
Peru	2.5	20.7	46.1	52.3	0.6	10.8	4.2	3.4	34.0	20.5
Philippines	11.2	55.5	73.4	78.7	2.2	7.2	19.5	12.3	19.1	14.1
Russia	-	199.4	-	31.7	-	12.2	-	6.4	-	4.8
Singapore	49.7	263.3	70.8	70.4	3.4	12.1	21.4	8.2	17.1	12.5
Chinese Taipei	52.3	219.3	73.4	70.4	0.3	12.8	30.7	21.0	23.0	12.1
Thailand	25.4	141.3	69.6	68.2	2.9	11.6	30.5	20.3	11.2	6.8
United States	493.4	2,017.4	64.0	62.9	2.6	16.9	19.7	7.4	-	-
Viet Nam	3.0	62.7	9.6	83.1	0.0	19.9	3.5	9.9	0.0	2.7
APEC	1,295.2	6,488.3	68.2	66.5	4.3	14.7	15.8	8.9	17.2	11.2
(simple average)			66.8	68.3	3.6	14.2	17.4	9.6	22.0	13.7
APEC (ex-RUS, PRC)	1,236.0	5,332.6	68.4	69.1	4.5	17.5	15.7	8.1	17.3	12.1
(simple average)			66.9	70.7	3.6	14.3	17.3	9.5	22.5	14.6
World	2,987.4	13,837.8								

Notes: "-' denotes data not available; Regional shares are weighted average, unless stated as "simple average".

Source: International Monetary Fund, *Direction of Trade Statistics*; Chinese Taipei, *Taiwan Statistical Data Book 2008*; Chinese Taipei Bureau of Foreign Trade Website.

As seen in Figure 2.6, the share of intra-regional exports, which recorded 69.0 percent in 1989, increased to reach 73.4 percent in 2002, but since then this has decreased to record 67.5 percent in 2007. The share of intra-regional imports also increased from 68.2 percent in 1989 to 72.2 percent in 1999 and then decreased to 66.5 percent in 2007.

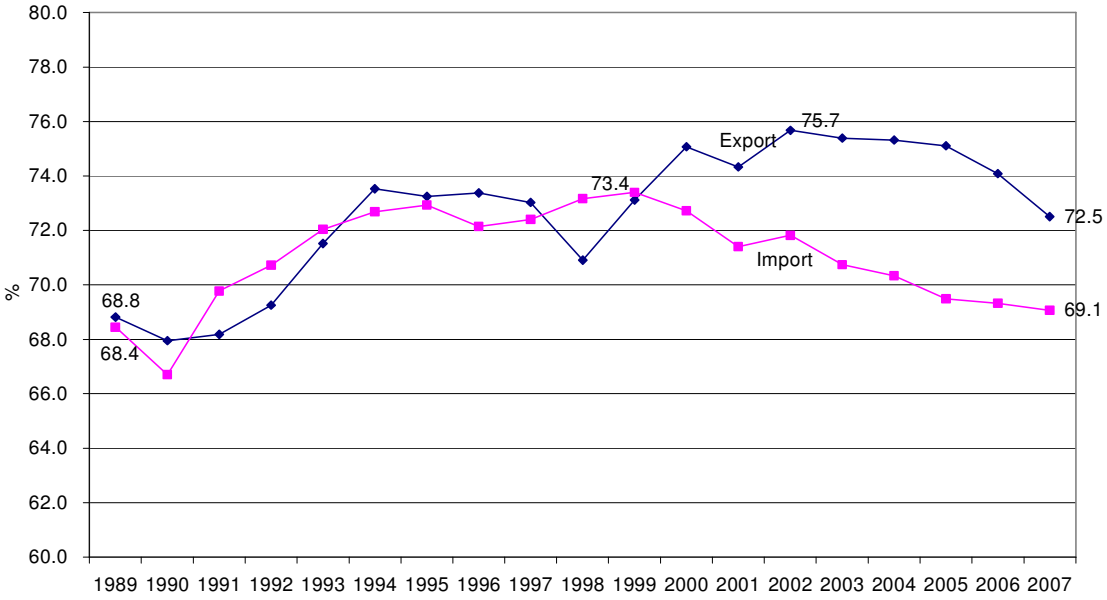
Figure 2. 6. Share of Intra-Regional Trade in the APEC Region



Compared with other members, China may have overshadowed the trend of the overall intra-regional trade share in the APEC region. While its volume of exports and imports in the world has increased, its exports to and imports from other APEC members as percentages of its total exports to and imports from the world decreased quite significantly between 1989 and 2007, namely from 73.5 percent to 64.1 percent and from 64.1 percent to 59.3 percent, respectively, as seen in Tables 2.5 and 2.6. It should also be noted that Russia's intra-regional trade share was included when calculating the data for 2007 but was not included when calculating the intra-regional trade share in 1989.

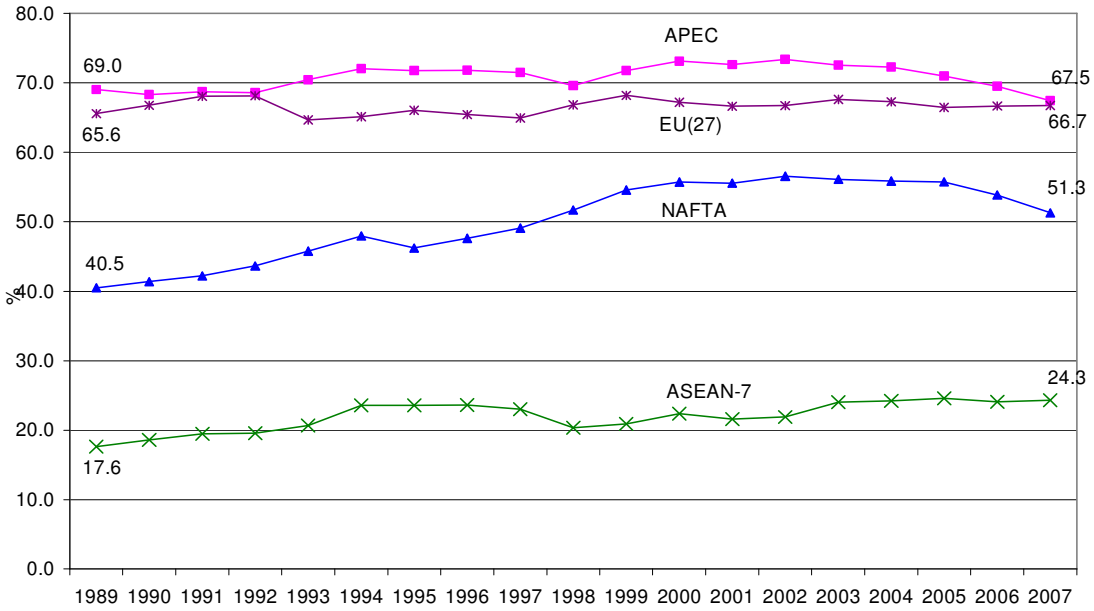
Figure 2.7 reports the trend of intra-regional exports and imports, excluding China's and Russia's intra-regional shares. As can be seen in the figure, the percentage share of intra-regional exports increased from 68.8 percent in 1989 to 72.5 percent in 2007, and that of intra-regional imports increased from 68.4 percent to 69.1 percent. It should be noted, however, that the shares of intra-regional exports and imports have nevertheless decreased in recent years. It is not clear why the shares of intra-regional trade have been decreasing in recent years and it is worth a further investigation. At least, one may argue that this is consistent with the free and open trade principle of APEC.

Figure 2. 7. Share of Intra-Regional Trade in the APEC Region (excluding China and Russia)



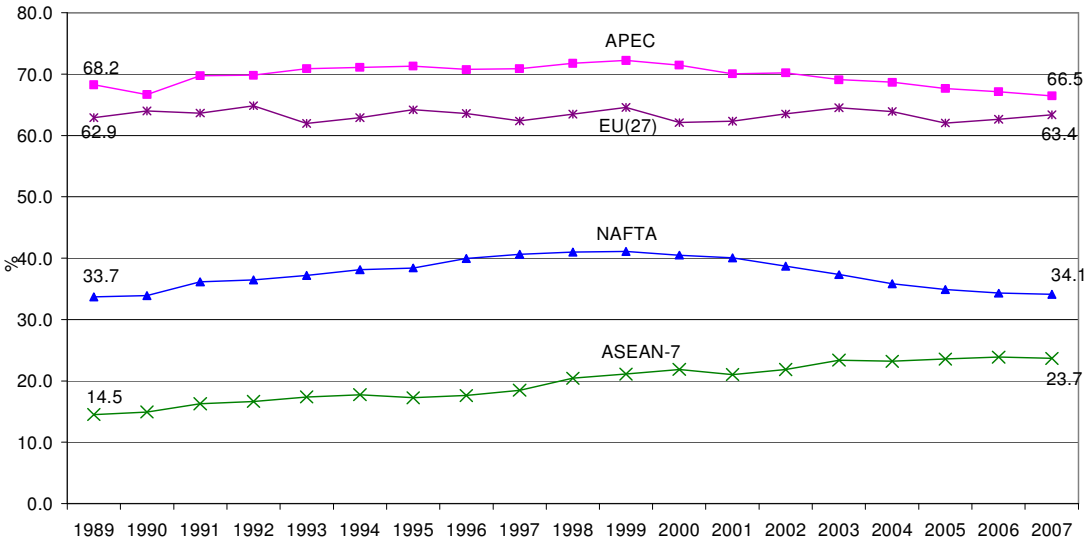
Overall, Figures 2.8 and 2.9 reveal that the share of intra-regional exports and imports in the APEC region is larger than the comparable estimates for the EU region and is much greater than those of intra-NAFTA trade or of intra-ASEAN-7 trade.[11]

Figure 2. 8. Share of Intra-Regional Exports



[11] ASEAN-7 stands for ASEAN seven member economies participating in APEC: Brunei Darussalam; Indonesia; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam.

Figure 2. 9. Share of Intra-Regional Imports



Manufactured versus Non-manufactured

We subdivide total exports and imports into manufactured (SITC 1, 2, 3, and 4) and non-manufactured (SITC 5, 6, 7, and 8) goods.[12] As seen in Figure 2.10, APEC's share of the world market of exports and imports of manufactured goods and imports of non-manufactured goods increased between 1992 and 2000, but they appear to have decreased in recent years. APEC's share of exports of non-manufactured products, on the other hand, appears to be smaller than the others.[13]

[12] International product fragmentation is an important feature of the deepening interdependence in East Asia and more broadly in the entire APEC region. Therefore, it would be worth investigating how trade in parts and components among APEC members differs from trade in final goods. But this is not the scope of the present study.

[13] As noted earlier, we used UN *Comtrade Database* under SITC 3 for disaggregated trade in manufactured and non-manufactured goods. Figures 2.10 and 2.11 are drawn only with data from 1992 because there are too many missing values before 1992 under SITC 3.

Figure 2. 10. Share of APEC in World Trade
(Manufactured vs. Non-Manufactured Products)

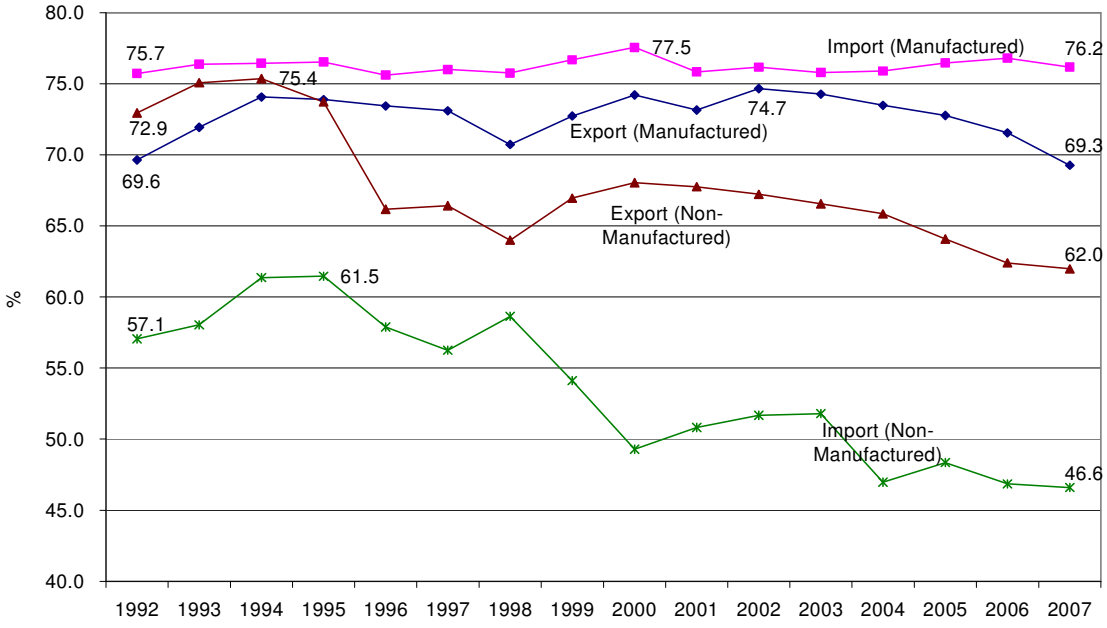


Figure 2.11 shows the changing shares of intra-regional exports and imports in the APEC region for manufactured and non-manufactured products. It appears that the shares of intra-regional exports and imports of manufactured products are greater than those for non-manufactured products. It is also worth noting that intra-regional shares of both exports and imports of non-manufactured products have declined since mid 1990s, while those for manufactured products have remained stable over the 1992-2007 period.

Figure 2. 11. Share of Intra-Regional Trade in the APEC Region
(Manufactured vs. Non-Manufactured Products)

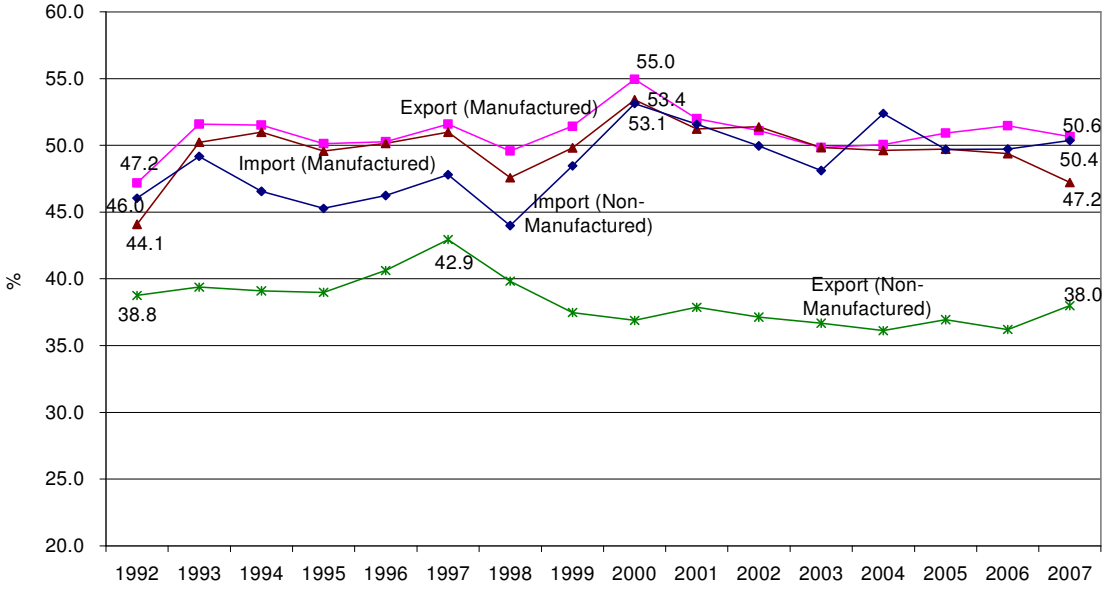


Table 2.7 reports individual APEC member economies' share of global exports and imports of manufactured and non-manufactured goods. In 2007, China, among APEC members, was the largest exporter of manufactured goods, accounting for 11.9 percent in the world market, followed by the United States (9.6%) and Japan (6.8%). On the other hand, Russia was the largest exporter of non-manufactured goods, accounting for 8.0 percent in the world market, followed by the United States (6.1%) and Canada (5.0%). On the other hand, the United States was the largest importer of both manufactured and non-manufactured goods, accounting for 15.0 percent and 14.9 percent, respectively.

Table 2. 7. Shares of Exports and Imports in the World (Manufactured vs. Non-Manufactured Products)

	Export of Manufactured		Export of Non-Manufactured		Import of Manufactured		Import of Non-Manufactured	
REPORTER	**1992**	**2007**	**1992**	**2007**	**1992**	**2007**	**1992**	**2007**
Australia	0.4	0.4	3.8	2.8	1.3	1.2	0.7	0.9
Brunei Darussalam	0.0	-	0.3	-	0.0	-	0.0	-
Canada	3.2	2.6	5.9	5.0	3.8	3.1	2.0	2.1
Chile	0.2	0.3	0.7	1.1	0.3	0.3	0.2	0.5
China	2.5	11.9	2.4	2.1	2.5	7.3	1.6	7.4
Hong Kong, China	4.1	3.5	1.0	0.2	4.1	3.5	1.6	0.8
Indonesia	0.6	0.5	2.5	2.0	0.8	0.4	0.7	1.0
Japan	12.2	6.8	0.8	0.7	4.1	3.4	14.3	8.3
Korea	2.7	3.5	0.7	1.1	2.0	2.3	3.3	4.1
Malaysia	1.0	1.3	2.0	1.5	1.3	1.2	0.6	0.8
Mexico	1.2	2.1	1.8	2.0	1.7	2.3	1.1	1.3
New Zealand	0.1	0.1	0.9	0.6	0.3	0.2	0.2	0.2
Papua New Guinea	-	-	-	-	-	-	-	-
Peru	0.1	0.1	0.2	0.5	0.1	0.1	0.2	0.2
Philippines	0.2	0.3	0.3	0.2	0.3	0.3	0.5	0.5
Russia	-	0.9	-	8.0	-	1.6	-	1.0
Singapore	1.8	2.4	1.9	1.6	2.1	2.0	1.8	1.9
Chinese Taipei	3.0	3.0	0.8	0.6	2.0	1.5	3.4	2.9
Thailand	0.8	1.2	1.5	1.1	1.2	1.1	1.0	1.1
United States	13.0	9.6	11.2	6.1	16.1	15.0	12.8	14.9
Viet Nam	-	0.3	-	0.7	-	0.5	-	0.5
APEC	47.2	50.6	38.8	38.0	44.1	47.2	46.0	50.4

Notes: "-" denotes data not available.
Source: United Nations Comtrade Database.

A similar pattern can be found in the shares of intra-regional exports of manufactured goods in the APEC region. As seen in Table 2.8, China, the United States and Japan were the largest intra-regional exporters of manufactured goods in 2007. On the other hand, Canada and the United States were the first and second largest intra-regional exporters of non-manufactured goods. Russia's share of intra-regional exports of non-manufactured goods is rather small, and this is due to the fact that much of the non-manufactured exports from Russia, the largest exporter of non-manufactured goods among APEC members, goes to the European market.

The United States was the largest intra-regional importer of both manufactured goods and non-manufactured goods, accounting for 29.2 percent and 27.5 percent, respectively.

Table 2. 8. Shares of Exports and Imports in the APEC Region (Manufactured vs. Non-Manufactured Products)

	Export of Manufactured		Export of Non-Manufactured		Import of Manufactured		Import of Non-Manufactured	
REPORTER	**1992**	**2007**	**1992**	**2007**	**1992**	**2007**	**1992**	**2007**
Australia	1.0	0.8	8.3	7.9	2.6	2.3	1.6	2.9
Brunei Darussalam	0.0	-	1.1	-	0.1	-	0.1	-
Canada	8.7	6.4	17.5	18.8	9.9	7.3	4.8	4.9
Chile	0.2	0.5	1.4	2.8	0.4	0.4	0.2	0.9
China	6.3	21.5	6.7	6.3	6.0	16.5	4.7	14.6
Hong Kong, China	9.2	7.9	3.3	0.9	10.6	8.5	4.8	2.7
Indonesia	1.2	1.1	7.8	6.6	1.7	0.9	1.9	3.0
Japan	25.2	14.1	2.4	2.7	8.2	7.4	35.6	17.5
Korea	5.6	6.6	2.3	4.0	4.6	5.0	7.6	7.4
Malaysia	2.4	2.9	5.3	4.8	3.1	2.7	1.9	2.2
Mexico	3.4	5.2	4.8	7.3	4.2	5.2	3.6	4.3
New Zealand	0.3	0.2	2.1	1.6	0.6	0.5	0.4	0.7
Papua New Guinea	-	-	-	-	-	-	-	-
Peru	0.1	0.1	0.5	1.5	0.2	0.2	0.2	0.2
Philippines	0.4	0.6	0.9	0.6	0.8	0.7	1.0	1.1
Russia	-	0.4	-	3.7	-	1.6	-	0.7
Singapore	4.0	5.4	4.9	5.9	5.1	4.5	3.4	3.7
Chinese Taipei	7.0	6.9	2.8	2.0	4.8	3.6	4.4	2.3
Thailand	1.6	2.4	3.5	3.3	2.7	2.4	2.4	1.6
United States	23.4	16.4	24.6	16.7	34.4	29.2	21.4	27.5
Viet Nam	-	0.5	-	2.4	-	1.1	-	1.7
APEC	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes: "-" denotes data not available.
Source: United Nations Comtrade Database.

3. EMPIRICAL SPECIFICATIONS OF THE GRAVITY MODEL

Since Tinbergen (1962) and Pöyhönen (1963), it has been well known that the simple gravity equation, in which the volume of trade between two countries is proportional to the product of their masses (GDPs) and inversely related to the distance between them, is empirically highly successful. Recently, with renewed interest among economists in geography, it has again become widely used in the literature. Indeed, many researchers have shown that the gravity equation can be derived from many different models of international trade (Helpman and Krugman, 1985; Bergstrand, 1989; Deardorff, 1998; Eaton and Kortum, 2002; and Evenett and Keller, 2002).[14] Thus, it possesses "more theoretical foundation than any other trade model" (Baldwin, 2006b).

The standard gravity equation can take the following form:

$$\text{LnEXP}_{ijt} = \alpha + \beta_1\text{LnGDP}_{it} + \beta_2\text{LnGDP}_{jt} + \beta_3\text{LnDIST}_{ij} + \varepsilon_{ijt}, \quad (1)$$

where LnEXP_{ijt} = log of export flows from country i to country j at time t
LnGDP_{it} = log of GDP of country i at time t
LnGDP_{jt} = log of GDP of country j at time t
LnDIST_{ij} = log of geographical distance between country i and country j
ε_{ijt} = random disturbance term.

3.1. BENCHMARK SPECIFICATION FOR MEASURING AGGREGATE EFFECTS OF APEC MEMBERSHIP

In the equation above, we augment dummy variables for common border sharing countries, countries surrounded by land, and language commonality. Taking note of the debate on the role of the WTO (Rose, 2004, 2005; Subramanian and Wei, 2007), we also include a dummy variable for WTO member countries. Some critics may argue that any positive coefficients for APEC dummies may be due to bilateral and sub-regional FTAs between APEC member economies, rather than due to APEC membership. Accordingly, a dummy variable taking into account all bilateral and sub-regional FTAs involving APEC member economies will also be included in the above gravity equation. Lastly, we include a dummy variable for partner economies belonging to APEC. Thus, our augmented gravity equation in the benchmark specification is:

$$\begin{aligned}\text{LnEXP}_{ijt} = {} & \alpha + \beta_1\text{LnGDP}_{it} + \beta_2\text{LnGDP}_{jt} + \beta_3\text{LnDIST}_{ij} + \beta_4\text{CONTIG}_{ij} \\ & + \beta_5\text{LANDLOCKED}_j + \beta_6\text{COMLANG}_{ij} + \beta_7\text{WTO}_{jt} + \beta_8\text{FTA}_{ijt} + \beta_9\text{APEC}_{jt} \\ & + u_i + u_t + \varepsilon_{ijt}, \end{aligned} \quad (2)$$

where i = one of the APEC member economies
j = one of the partner economies, including APEC economies
CONTIG_{ij} = 1 if economy i and economy j share the same border

[14] Harrigan (2001) and Anderson and van Wincoop (2003) provide a comprehensive review of the literature on the theoretical foundations for the gravity model. Greenaway and Milner (2002) provide a review of research utilizing the gravity model to investigate the trade effects of regional trading blocs. Baier *et al.* (2007) address the potential problems in estimating the gravity model to isolate the effects of an FTA on bilateral trade.

= 0 otherwise

$LANDLOCKED_j$ = 1 if economy *j* is a landlocked economy[15]

= 0 otherwise

$COMLANG_{ij}$ = 1 if economy *i* and economy *j* share the same language

= 0 otherwise

WTO_{jt} = 1 if economy *j* is a WTO member at time *t*[16]

= 0 otherwise

FTA_{ijt} = 1 if economy *i* and economy *j* are members of a bilateral or sub-regional FTA at time *t*

= 0 otherwise

$APEC_{jt}$ = 1 if economy *j* is a member of APEC at time *t*

= 0 otherwise.

u_i = home-economy specific dummies

u_t = time-specific dummies.

u_i is expected to capture home-economy specific effects that are related to the unobservable but potentially important time invariant factors such as land area and cultural uniqueness, institutional qualities, and so forth. u_t is expected to capture year-specific effects that are associated with important time-varying factors such as business cycles, exchange rates, and so forth. To summarize, we try to control for as many "natural" and "institutional" causes of trade as possible and search for effects of the membership of APEC in the residual. Thus, a statistically significant positive coefficient for the APEC dummy will suggest that APEC member economies trade with other members in a degree greater than with non-member economies.

Equation (2) will be estimated using total exports as a dependent variable and then using exports of manufactured goods and exports of non-manufactured goods, alternatively. Equation (2) will also be estimated with imports in place of exports for total, manufactured, and non-manufactured goods, respectively. That is, the dependent variable will be replaced by $LnIMP_{ijt}$, which is defined as the log value of imports of economy *i* (APEC member economies) from a partner economy *j* at time *t*.

As noted earlier, total export and import data are taken from the International Monetary Fund's *Direction of Trade Statistics*, except for Chinese Taipei, for which data are from Chinese Taipei's Bureau of Foreign Trade website. Disaggregated export and import data are from the United Nations' *Comtrade Database*. Among the explanatory variables, GDP (in US dollars)[17] is taken from the World Bank's *WDI Online Database*.[18] Information on geographical distance, border sharing, and languages is taken from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)'s website.[19] It is noted that the distances are weighted distances, which use city-level data

[15] As none of the APEC members is landlocked, there is no landlocked dummy variable for country *i*.

[16] Except for Russia, all APEC members are WTO members as of 2007. Note that Brunei Darussalam became a WTO member in 1993; Papua New Guinea in 1994; China in 2001; Chinese Taipei in 2002; and Viet Nam in 2007. A WTO dummy for country *i* is not included, so as to avoid a high multicollinearity with the APEC dummy variable.

[17] We also use GDP on the PPP basis in place of GDP, and find that the key results remain the same.

[18] http://publications.worldbank.org/WDI

[19] http://www.cepii.fr/anglaisgraph/bdd/distances.htm

to assess the geographic distribution of population inside each nation. The variable indicating whether the country is landlocked is also taken from CEPII's website. Information on the members of the World Trade Organization (WTO) is taken from the website of the WTO.[20] Lastly, information on bilateral and sub-regional FTAs is taken from various sources of APEC member economies and the Wikipedia website.[21]

Robustness Check

Since the time period in the dataset is from 1989 to 2007, which is a rather long time, the residuals of the regression model may be serially correlated over the period. If they are serially correlated, the estimators may be inconsistent. For this reason, as a robustness check, we also construct a panel data set for three years, 1989, 1998, and 2007 (i.e., at nine-year intervals) and estimate the augmented gravity model.

3.2. SPECIFICATION FOR MEASURING MEMBER-SPECIFIC EFFECTS OF APEC MEMBERSHIP

The second objective of this report is to assess how effects of APEC membership on trade behave in a different way for different member economies. It also seems reasonable to ask whether our results are dominated by any particular source economy. Thus, in order to compare the membership effects of different APEC member economies, we will replace the APEC dummy in Equation (2) with 21 interaction dummies capturing the pairs where both country *i* and country *j* are APEC member economies:

$$\begin{aligned}\text{LnEXP}_{ijt} = {} & \alpha + \beta_1\text{LnGDP}_{it} + \beta_2\text{LnGDP}_{jt} + \beta_3\text{LnDIST}_{ij} + \beta_4\,\text{CONTIG}_{ij} \\ & + \beta_5\text{LANDLOCKED}_j + \beta_6\text{COMLANG}_{ij} + \beta_7\text{WTO}_{jt} + \beta_8\text{FTA}_{ijt} \\ & + \beta_9\text{AUS\_APEC}_{jt} + \ldots\ldots\ldots + \beta_{29}\text{VNM\_APEC}_{jt} + u_i + \varepsilon_{ijt}, \qquad (3)\end{aligned}$$

where AUS_APEC_{jt} = 1 if country *i* is Australia and country *j* is a member of APEC at time *t*
= 0 otherwise,

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VNM_APEC_{jt} = 1 if country *i* is Viet Nam and country *j* is a member of APEC at time *t*
= 0 otherwise.

Similarly to Equation (2), Equation (4) will be estimated using the total exports, exports of manufactured goods, and exports of non-manufactured goods, alternatively as

[20] In 1989, 105 of 143 countries in our sample were GATT/WTO members and of the 21 APEC members, 15 were members of GATT/WTO. Between 1989 and 2007, five APEC members joined the WTO (Brunei Darussalam, 9 December 1993; China, 11 December 2001; Papua New Guinea, 16 December 1994, Chinese Taipei, 1 January 2002; and Viet Nam, 11 January 2007). Russia is still not a WTO member. See http://www.wto.org for a full list of WTO members.

[21] http://en.wikipedia.org/wiki/Trade_bloc#Most_active_regional_blocs

dependent variable. We will also use imports data, as dependent variables, for total, manufactured, and non-manufactured goods, alternatively.

3.3. SPECIFICATION FOR MEASURING YEAR-SPECIFIC EFFECTS OF APEC MEMBERSHIP

The third goal of this report is to evaluate whether APEC has contributed to intra-regional trade in goods by strengthening intra-regional trade linkages since APEC was founded in 1989. It is also reasonable to ask whether the effects of APEC membership on trade behave in a consistent way over time, without being dominated by any particular year. For example, events like the East Asian financial crisis of 1997-98 and the IT bubble collapse of 2001 may be thought to have an impact, so a comparison of estimates for different years may be useful. Therefore, with inclusion of nineteen interaction dummy variables of APEC member dummy and year dummy variables, we will also run the following equation:

$$\begin{aligned} \text{LnEXP}_{ijt} = {} & \alpha + \beta_1 \text{LnGDP}_{it} + \beta_2 \text{LnGDP}_{jt} + \beta_3 \text{LnDIST}_{ij} + \beta_4 \text{CONTIG}_{ij} \\ & + \beta_5 \text{LANDLOCKED}_j + \beta_6 \text{COMLANG}_{ij} + \beta_7 \text{WTO}_{jt} + \beta_8 \text{FTA}_{ijt} \\ & + \beta_9 \text{APEC\_1989} + \ldots\ldots\ldots + \beta_{27} \text{APEC\_2007} + u_i + \varepsilon_{ijt}, \end{aligned} \qquad (4)$$

where APEC_1989 = 1 if country *j* is a member of APEC at year 1989
= 0 otherwise,
(i.e., APEC dummy * Year 1989 dummy)

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APEC_2007 = 1 if country *j* is a member of APEC at year 2007
= 0 otherwise,
(i.e., APEC dummy * Year 2007 dummy).

Again, Equation (4) will be estimated using the total exports, exports of manufactured products, and exports of non-manufactured products, alternatively as dependent variable. We will also use imports data, as dependent variables, for total, manufactured, and non-manufactured products, alternatively.

4. ESTIMATION RESULTS

The regression results from the three different specifications alternatively to capture the aggregate effects, member-specific effects, and time-specific effects of APEC membership on intra-regional trade are presented below.

4.1. AGGREGATE EFFECTS OF APEC MEMBERSHIP

Panel regression results from running Equation (2) are summarized in Table 4.1. The gravity model works well for all equations, as indicated by the large size of R^2. APEC member economies export (import) more to (from) larger countries and less to (from) countries that are located farther apart. These traditional gravity effects are not only large and highly statistically significant but also economically sensible in size and in line with estimates from the literature. That is, the GDPs of home and partner economies have coefficient estimates close to unity (or not too greatly different from unity in some cases), and estimates for distance are around minus one.

Specifically, in the total export equation, the estimated coefficient is 0.98 for the GDP of APEC member economies and 1.16 for trade partners. This implies that a one percent increase in GDP in either an APEC member economy or a partner country would lead to an approximately one percent increase on average in APEC's total exports. However, the estimators for exports of manufactured and non-manufactured products are a little different from unity. Interestingly, APEC's GDP elasticity of manufactured exports (0.7) is less than that of non-manufactured exports (0.94), while a partner country's GDP elasticity of manufactured exports (1.36) is greater than that of non-manufactured exports (0.82). That is, when the GDP of an APEC economy increases on average, its exports of non-manufactured products increase proportionally more than those of manufactured products, but when the GDP of an APEC trading partner country increases on average, the exports of manufactured products from the exporting APEC member economy increase relatively more than those of its non-manufactured products.

The GDP elasticity of total imports is smaller than unity. Specifically, as shown in column (4) of Table 4.1, the estimators are 0.65 for the home (APEC) economy's GDP and 0.92 for a partner country's GDP. In contrast to the export equation, the difference between the elasticities of manufactured and non-manufactured imports is relatively small.

As is also expected, our regression yields, on both exports and imports, the negative effect of the distance and landlocked dummy and the positive effects of the common border dummy and common languages.

In sum, our augmented gravity model confirms that APEC member economies trade more with countries that are large in economic size and share a common border and language and less with countries that are located farther away and landlocked.

Table 4. 1. Results from Panel Specification (All Years: 1989-2007)

	Exports			Imports		
	(1) Total	(2) Manu	(3) Non-Manu	(4) Total	(5) Manu	(6) Non-Manu
$LnGDP_i$	0.98***	0.7***	0.94***	0.65***	0.67***	0.66***
	(16.02)	(10.28)	(13.27)	(14.37)	(14.7)	(10.74)
$LnGDP_j$	1.16***	1.36***	0.82***	0.92***	0.91***	0.85***
	(227.42)	(245.37)	(143.61)	(252.14)	(238.31)	(191.88)
$LnDIST_{ij}$	-1.19***	-1.35***	-1.03***	-1.21***	-1.23***	-1.59***
	(-61.24)	(-65.1)	(-45.54)	(-76.43)	(-73.33)	(-85.47)
$CONTIG_{ij}$	0.73***	0.75***	1.13***	0.74***	0.75***	0.62***
	(10.08)	(9.84)	(15.18)	(12.1)	(12.12)	(8.77)
$LANDLOCKED_j$	-0.61***	-0.42***	-0.9***	-1.11***	-0.87***	-1.38***
	(-19.04)	(-12.19)	(-24.35)	(-45.76)	(-36.16)	(-43.97)
$COMLANG_{ij}$	0.8***	0.47***	0.79***	0.91***	1.02***	0.71***
	(26.98)	(13.94)	(23.28)	(39.23)	(43.47)	(26.17)
WTO_j	0.38***	0.4***	0.18***	0.31***	0.45***	0.09***
	(12.41)	(11.95)	(4.99)	(13.49)	(19.12)	(3.24)
FTA_{ij}	0.9***	0.83***	1.04***	0.71***	0.7***	0.24***
	(19.34)	(15.62)	(18.8)	(16.96)	(14.74)	(4.98)
$APEC_j$	1.02***	0.87***	1.23***	0.62***	0.65***	0.88***
	(40.24)	(30.35)	(40.49)	(29.52)	(29.14)	(33.73)
Constant	-41.21***	-39***	-33.64***	-25.68***	-26.84***	-21.78***
	(-25.21)	(-21.58)	(-17.81)	(-21.16)	(-21.99)	(-13.39)
# OBS	41,530	39,050	36,390	42,771	41,591	38,248
R^2	0.736	0.746	0.593	0.787	0.797	0.694

Notes: 1. All estimates include year dummies and home-country (APEC member) specific dummies, but they are not reported for brevity.2. Shown in parentheses are the robust t-statistics. 3. ***, **, and * denote one, five, and ten percent level of significance, respectively, for a two-tailed test.

The estimates for the effect of WTO membership of partner countries on total, manufactured, and non-manufactured goods exports are 0.38, 0.4, and 0.18, respectively and are highly significant. This implies that the exports from APEC member economies to WTO member countries are greater by 46 percent, 49 percent, and 20 percent, respectively (i.e., 1.46 times, 1.49 times, and 1.20 times greater, respectively), than those to non-WTO member countries.[22] The estimates for WTO membership of partner country in the three different import equations are 0.31, 0.45, and 0.09, respectively, which implies that APEC member economies import 36 percent, 57 percent, and 9 percent more of total products, manufactured products, and non-manufactured products, respectively, from WTO member countries, compared to those from non-WTO member countries.

Regarding the bilateral and sub-regional FTA effect, we find positive and significant effects here as well. In Table 4.1, the estimated coefficients of FTA between APEC

[22] It is calculated as 46% = (exp(0.38)-1) X 100; 49% = (exp(0.4)-1) X 100; and 20% = (exp(0.18)-1) X 100.

member economies and partner countries are 0.9, 0.83, and 1.04 for total, manufactured, and non-manufactured goods exports, respectively. This implies that an APEC member economy tends to export 146 percent (all products), 129 percent (manufactured products), and 183 percent (non-manufactured products), respectively (i.e., 2.5 times, 2.3 times and 2.8 times, respectively), more to their bilateral and sub-regional FTA partners than to non-FTA trade partners. The effects on imports are also found to be positive and significant. Specifically, the estimated coefficients are 0.71, 0.7, and 0.24 for total, manufactured, and non-manufactured goods imports, respectively, suggesting that an average APEC member economy tends to import 103 percent (all products), 101 percent (manufactured products), and 27 percent (non-manufactured products), respectively, more from its FTA partners than from its non-FTA partners. It is also noted that the estimated coefficients on the FTA dummy variable in the export equation are greater than those in the import equation, suggesting that FTAs involving APEC member economies have on average boosted exports to their FTA partners more than imports from their FTA partners.

It is also interesting to note that the sizes of coefficients for the FTA dummies in both export and import equations are much larger than those for the WTO membership dummy. This suggests that both FTA and WTO membership contribute to exports and imports of APEC member economies but the FTA impact is much larger than the WTO impact.

Finding 1:

APEC economies trade more with other APEC economies than with non-APEC economies, even when all usual "natural" and "institutional" causes of trade are controlled.

Finding 1 summarizes our answer to one of the main questions of this report: the level of bilateral trade between APEC member economies is greater than is expected from the gravity model. That is, the estimated coefficient for APEC membership on the total exports equation is positive and highly significant. The estimated coefficient is 1.02, suggesting that on average an APEC member economy exports 177 percent (or 2.8 times) more to other APEC member economies than to non-APEC member economies. The effect of APEC membership on total imports is 0.62 and statistically significant, implying that on average an APEC economy imports 86 percent (1.9 times) more from other APEC member economies, compared with non-APEC member countries.

It is also worth noting that the coefficients on APEC dummy are similar in size to those on FTA dummy, suggesting that the APEC membership effect on bilateral trade is similar to the FTA effect. Thus, we have strong evidence that APEC economies as a whole are enjoying a very high degree of *de facto* integration.

Finding 2:

The APEC membership effect is stronger on exports than on imports. This finding is consistent with the fact that APEC has pursued an open form of regionalism which minimizes discrimination against non-members.

As noted above, the estimated coefficient for the APEC membership dummy in the total exports equation (Column 1) is 1.02, while that in the total imports equation (Column 4) is 0.62, suggesting that an APEC member economy exports 177 percent more to other APEC members while it imports 86 percent more from other APEC members, compared with non-APEC economies. Thus, the APEC membership effect is stronger on exports than on imports.

This finding is consistent with the fact that APEC has pursued an open form of regionalism which minimizes discrimination against non-members. That is, since its inception in 1989, APEC has not created any new preference or discrimination and its trade liberalization has been extended unconditionally to all of the members' trading partners. Therefore, the APEC membership effects on imports appear to be not as strong as those on exports. This finding may also be in part due to the fact that a large number of APEC members import natural resources such as oil largely from outside the region, for example from the Middle East.

Finding 3:

The APEC membership effect is stronger on trade (exports and imports alike) in non-manufactured products than on trade in manufactured products.

When we decompose total exports into manufactured and non-manufactured goods, the former show a smaller effect than the latter. Specifically, an APEC member economy exports 139 percent more of manufactured products to other APEC members and 243 percent more of non-manufactured goods, compared to those to non-APEC member countries. On the other hand, an APEC member economy imports 92 percent more of manufactured products from other APEC members and 141 percent more of non-manufactured products, compared to those from non-APEC countries.

Robustness Check

It should be noted that the above findings are obtained when we use the yearly data spanning 1989 to 2007, and in this case the error terms in the regression model may be serially correlated, as noted earlier. Therefore, we conduct a regression by using only three years of the data, 1989, 1998, and 2007, which represent nine-year intervals. The results are summarized in Table 4.2. As shown in the table, the above three findings still remain unchanged qualitatively, although the quantitative values of the estimators are slightly different.

Table 4. 2. Results from Panel Specification (Three Years Only: 1989, 1998, 2007)

	Exports			Imports		
	(1) Total	(2) Manu	(3) Non-Manu	(4) Total	(5) Manu	(6) Non-Manu
$LnGDP_i$	0.82***	0.56***	0.63***	0.67***	0.75***	0.81***
	(5.93)	(3.65)	(4.07)	(6.89)	(7.69)	(5.72)
$LnGDP_j$	1.15***	1.36***	0.81***	0.9***	0.9***	0.85***
	(83.74)	(94.13)	(53.84)	(94.49)	(88.08)	(72.54)
$LnDIST_{ij}$	-1.17***	-1.33***	-0.98***	-1.26***	-1.29***	-1.64***
	(-22.67)	(-24.58)	(-16.47)	(-31.32)	(-30.15)	(-33.26)
$CONTIG_{ij}$	0.65***	0.57***	1.11***	0.61***	0.62***	0.4**
	(3.38)	(2.93)	(5.35)	(3.85)	(3.82)	(2.06)
$LANDLOCKED_j$	-0.65***	-0.6***	-1.05***	-1.11***	-0.85***	-1.38***
	(-7.52)	(-6.5)	(-10.46)	(-17.56)	(-13.66)	(-16.7)
$COMLANG_{ij}$	0.84***	0.47***	0.81***	0.91***	1.05***	0.74***
	(10.81)	(5.26)	(9.09)	(15.42)	(17.4)	(10.44)
WTO_j	0.5***	0.58***	0.23**	0.35***	0.52***	0.19***
	(6.07)	(6.5)	(2.43)	(6)	(8.54)	(2.65)
FTA_{ij}	0.99***	1.08***	1.14***	0.67***	0.64***	0.32**
	(9.02)	(8.96)	(8.02)	(6.49)	(5.71)	(2.44)
$APEC_j$	1.06***	0.92***	1.31***	0.53***	0.56***	0.79***
	(16.8)	(12.56)	(17.02)	(9.8)	(9.67)	(11.87)
Constant	-36.77***	-35.15***	-25.61***	-25.31***	-28.02***	-25.66***
	(-9.88)	(-8.55)	(-6.08)	(-9.62)	(-10.61)	(-6.7)
# OBS	6,018	5,635	5,341	6,207	6,050	5,610
R^2	0.731	0.750	0.597	0.788	0.794	0.689

Notes: 1. All estimates include year dummies and home-country (APEC member) specific dummies, but they are not reported for brevity. 2. Shown in parentheses are the robust t-statistics. 3. ***, **, and * denote one, five, and ten percent level of significance, respectively, for a two-tailed test.

4.2. MEMBER-SPECIFIC EFFECTS OF APEC MEMBERSHIP

Having found that APEC member economies trade more with other member economies, we seek to assess how the effects of APEC membership on trade behave in a different way for different member economies.

Finding 4:

The APEC membership effect on total exports is positive and significant for 19 member economies, while the APEC membership effect on imports of total products is positive and significant for 16 member economies.

Table 4.3 reports the results for the member-specific APEC membership effect on trade obtained from regressing Equation (3). Note that the estimated coefficients for other control variables are not shown, for brevity.

First, the APEC membership effect on exports of total products is positive and

significant for 19 member economies. Among the 19 member economies which have positive coefficients of APEC membership on their exports, Korea (1.74); Chinese Taipei (1.54); New Zealand (1.5); the United States (1.36); and Singapore (1.23) enjoy the greatest APEC membership effect. Exceptions are China and Canada. Their exports to and imports from APEC member economies are smaller than with non-APEC member countries by 66 percent and 46 percent, respectively.

Second, the APEC membership effect on imports of total products is positive and significant for 16 member economies. Among the 16 economies, Malaysia (2.92); New Zealand (1.75); Korea (1.59); and the United States (1.07) witness the greatest APEC membership effect on their imports of total products. On the other hand, the gravity model suggests that Canada (-1.26); China (-1.12); Papua New Guinea (-0.47); and Peru (-0.22) import less from other APEC members than from non-APEC economies. For Singapore, APEC membership does not appear to have any impact on its imports

It should be noted that China and Canada are the only two economies for which the model does not indicate positive APEC membership effects either on their exports or on their imports. The negative APEC membership effect on Canadian trade may be due to the fact that Canada's trade with the United States is quite dominant and its trade linkage with other APEC member economies is rather small. For instance, in 2007, 78.9 percent of Canada's total exports went to the U.S. market, while its intra-regional export share in the APEC region was 87.4 percent (Table 2.5). This suggests that only 8.5 percent of Canada's total exports went to non-U.S. APEC member economies. Similarly, 54.1 percent of Canada's total imports came from the United States, while its intra-regional import share in the APEC region in 2007 was 77.6 percent (Table 2.6).

The result for China is somewhat at odds with the fact that its share in intra-regional APEC trade has increased dramatically for the period 1989 -2007, as seen in Figures 2.4 and 2.5. This finding is, however, consistent with the fact that its trade with other APEC members as percentages of its total trade in the world has decreased quite significantly, as seen in Tables 2.5 and 2.6. In other words, China's exports and imports increased very markedly in the APEC region, thus resulting in increased shares of China's exports and imports in the APEC region, but its exports and imports increased more drastically outside the APEC region, thus resulting in a negative APEC membership effect on Chinese trade in our gravity estimation.

Third, when the total exports (imports) are decomposed into exports (imports) of manufactured products and exports (imports) of non-manufactured products, the majority of APEC members enjoy positive APEC membership effects, but the magnitude of the APEC membership effects is different for some member economies.

Table 4. 3. Member-Specific Effects of APEC Membership

	Exports			Imports		
	(1) Total	(2) Manu	(3) Non-Manu	(4) Total	(5) Manu	(6) Non-Manu
Australia	0.98***	0.69***	0.94***	0.67***	0.68***	0.67***
	(16.03)	(10.23)	(13.4)	(14.91)	(15.19)	(11.11)
Brunei Darussalam	1.16***	1.36***	0.82***	0.92***	0.91***	0.85***
	(227.75)	(245.84)	(143.7)	(254.04)	(239.38)	(194.11)
Canada	-1.19***	-1.4***	-0.94***	-1.26***	-1.3***	-1.58***
	(-57.24)	(-63.36)	(-38.73)	(-76.48)	(-74.08)	(-80.27)
Chile	0.75***	0.72***	1.27***	0.73***	0.71***	0.67***
	(10.71)	(9.37)	(17.67)	(12.18)	(11.49)	(9.73)
China	-0.61***	-0.42***	-0.91***	-1.12***	-0.88***	-1.39***
	(-19.15)	(-12.27)	(-24.46)	(-46.32)	(-36.55)	(-44.59)
Hong Kong, China	0.81***	0.46***	0.81***	0.93***	1.03***	0.75***
	(26.99)	(13.52)	(23.45)	(40.31)	(44.17)	(27.44)
Indonesia	0.38***	0.4***	0.16***	0.32***	0.47***	0.09***
	(12.49)	(12.16)	(4.52)	(14)	(19.92)	(3.39)
Japan	0.96***	0.91***	1.11***	0.64***	0.66***	0.25***
	(20.8)	(17.03)	(19.82)	(15.77)	(14.36)	(5.21)
Korea	1.74***	1.22***	1.91***	1.59***	1.63***	1.75***
	(19.05)	(12.72)	(16.51)	(24.16)	(22.17)	(26.54)
Malaysia	1.08***	0.51**	1.49***	2.92***	0.44	5.15***
	(5.74)	(2.46)	(7.66)	(9.08)	(1.44)	(7.47)
Mexico	1.04***	1.3***	0.87***	0.88***	1***	1.27***
	(12.06)	(12.09)	(7.12)	(15.32)	(17.1)	(13.85)
New Zealand	1.5***	1.3***	1.16***	1.75***	2***	1.92***
	(16.37)	(13.05)	(8.94)	(19.25)	(16.06)	(21.2)
Papua New Guinea	0.96***	1.1***	1.65***	-0.47***	-0.48***	0.15**
	(9.18)	(8.4)	(14.93)	(-7.77)	(-7.35)	(2.3)
Peru	0.87***	0.64***	1.14***	-0.22***	-0.26***	0.76***
	(10.24)	(6.18)	(10.45)	(-3.47)	(-3.97)	(8.24)
Philippines	0.66***	0.16*	1.35***	0.29***	0.09*	1.04***
	(8.12)	(1.7)	(12.95)	(5.26)	(1.69)	(13.75)
Russia	1.15***	1.11***	2.04***	0.49***	0.5***	1.26***
	(13.97)	(10.96)	(21.95)	(8.68)	(8.9)	(15.15)
Singapore	1.23***	0.75***	1.99***	0.09	0.05	1.38***
	(13.55)	(6.79)	(18.05)	(1.29)	(0.67)	(14.39)
Thailand	0.82***	0.6***	0.84***	0.51***	0.68***	0.35***
	(9.11)	(6.45)	(7.21)	(8.22)	(9.88)	(4.93)
Chinese Taipei	1.54***	1.42***	1.14***	0.9***	1.17***	0.61***
	(13.67)	(11.67)	(10.17)	(9.39)	(12.11)	(6.58)
United States	1.36***	0.95***	1.59***	1.07***	1.5***	0.82***
	(14.02)	(8.88)	(14.84)	(16.52)	(21.07)	(11.72)
Viet Nam	0.51**	-0.23	0.79**	0.62**	-0.17	-0.09
	(2.06)	(-0.81)	(2.53)	(2.12)	(-0.4)	(-0.29)
# OBS	41,530	39,050	36,390	42,771	41,591	38,248
R^2	0.738	0.747	0.596	0.792	0.802	0.701

Notes: 1. Estimates are for individual APEC dummy variables from running Eq. (5). 2. Estimates for other control variables are not shown for brevity. 3. Shown in parentheses are the robust t-statistics. 3. ***, **, and * denote one, five, and ten percent level of significance, respectively, for a two-tailed test.

4.3. YEAR-SPECIFIC EFFECTS OF APEC MEMBERSHIP

Here, we seek to investigate whether the intra-regional trade linkage has strengthened since APEC was founded in 1989. Specifically, in this section we report the results obtained by running Equation (4) to see whether intra-regional trade has increased for the period 1989 - 2007.

Finding 5:

While the APEC membership effect on both exports and imports has remained positive over the period 1989-2007, the positive impact on exports has been growing while for imports it has been weakening over time. There is the possibility that APEC's open form of regionalism and its clear focus on trade liberalization and facilitation may lead to greater imports from non-members.

Table 4.4 reports the estimated coefficients for the APEC-Year interaction dummy variables obtained from running regressions for Equation (3) in the three different types of exports and imports. Using the estimated coefficients, Figure 4.1 depicts the trend of the magnitude of the APEC membership effect over time.

As can be seen in the table and the figure, the magnitude of the estimated coefficients of APEC membership on total exports has increased gradually from 0.95 in 1989 to 1.14 in 2007, while that on total imports has decreased from 0.74 in 1989 to 0.45 in 2007. This suggests that an average APEC member economy, which exported 159 percent (i.e., 2.6 times) more to other members in 1989 and 213 percent (i.e., 3.1 times) more in 2007, imported 110 percent (i.e., 2.1 times) more from other members in 1989 but imported only 57 percent (i.e., 1.6 times) more in 2007.

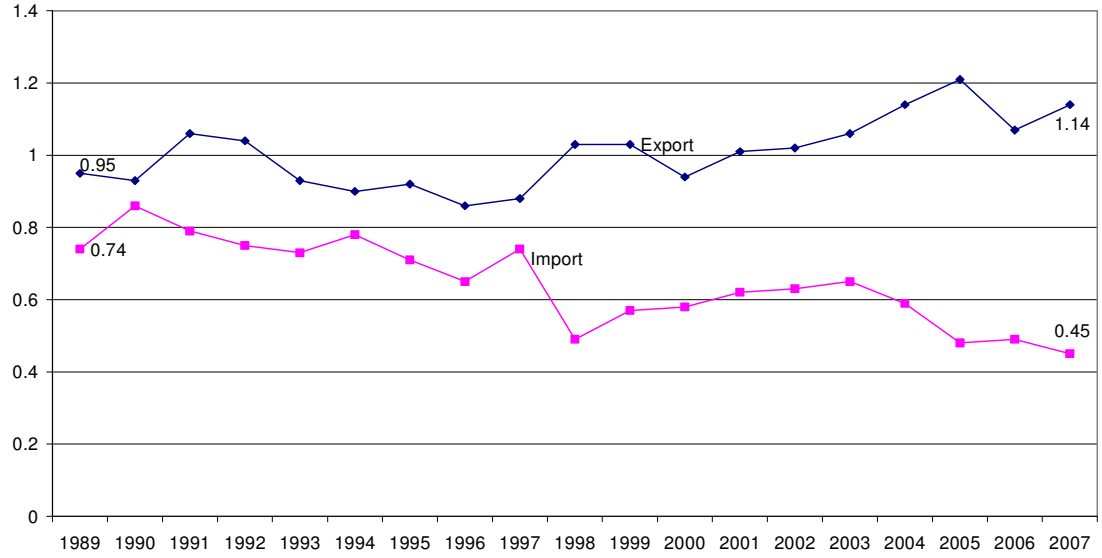
While this is not pursued as a research issue in this paper, there is the possibility that APEC's open form of regionalism and its clear focus on trade liberalization and facilitation may lead to greater imports from non-members. That is, as APEC trade liberalization and facilitation have been extended unconditionally to all of the members' trading partners, APEC members on average may have diversified their imports by increasing their imports from outside the region.

Table 4. 4. Year-Specific Effects of APEC Membership

	Exports			Imports		
	(1) Total	(2) Manu	(3) Non-Manu	(4) Total	(5) Manu	(6) Non-Manu
1989	0.95***	0.83***	1.33***	0.74***	0.91***	0.83***
	(7.68)	(5.91)	(8.69)	(7.30)	(8.19)	(6.86)
1990	0.93***	0.80***	1.31`***	0.86***	0.97***	0.97***
	(7.81)	(5.68)	(8.42)	(8.09)	(8.39)	(7.80)
1991	1.06***	1.07***	1.17***	0.79***	0.88***	0.96***
	(10.11)	(9.01)	(8.79)	(8.31)	(8.35)	(8.92)
1992	1.04***	0.94***	1.24***	0.75***	0.66***	1.05***
	(10.24)	(8.26)	(10.28)	(7.49)	(6.67)	(9.71)
1993	0.93***	0.58***	1.08***	0.73***	0.67***	0.93***
	(9.69)	(4.96)	(9.20)	(7.98)	(7.14)	(9.47)
1994	0.90***	0.65***	1.12***	0.78***	0.75***	0.97***
	(9.65)	(6.10)	(9.96)	(8.89)	(8.50)	(10.28)
1995	0.92***	0.77***	1.13***	0.71***	0.77***	0.95***
	(9.67)	(7.31)	(7.98)	(8.75)	(8.76)	(10.91)
1996	0.86***	0.73***	1.03***	0.65***	0.79***	0.80***
	(8.99)	(7.24)	(8.52)	(8.02)	(9.22)	(8.86)
1997	0.88***	0.64***	1.10***	0.74***	0.82***	0.80***
	(9.28)	(5.87)	(10.02)	(9.15)	(9.34)	(7.91)
1998	1.03***	0.91***	1.16***	0.49***	0.48***	0.64***
	(11.49)	(9.14)	(10.77)	(6.32)	(5.63)	(7.02)
1999	1.03***	0.87***	1.15***	0.57***	0.57***	0.78***
	(11.93)	(8.77)	(11.06)	(8.11)	(7.34)	(8.93)
2000	0.94***	0.72***	1.15***	0.58***	0.58***	0.79***
	(10.17)	(6.87)	(10.39)	(7.90)	(7.24)	(8.41)
2001	1.01***	0.87***	1.26***	0.62***	0.57***	0.93***
	(10.72)	(8.61)	(11.94)	(8.06)	(7.44)	(9.75)
2002	1.02***	0.88***	1.22***	0.63***	0.66***	0.90***
	(11.15)	(8.73)	(11.09)	(8.06)	(8.87)	(9.34)
2003	1.06***	0.93***	1.31***	0.65***	0.65***	0.90***
	(11.73)	(9.35)	(12.47)	(8.85)	(8.59)	(10.14)
2004	1.14***	1.00***	1.41***	0.59***	0.57***	0.95***
	(12.51)	(9.93)	(12.86)	(8.73)	(7.37)	(10.92)
2005	1.21***	1.06***	1.36***	0.48***	0.57***	0.86***
	(13.25)	(10.06)	(11.63)	(6.32)	(7.34)	(8.87)
2006	1.07***	0.98***	1.34***	0.49***	0.51***	0.92***
	(11.41)	(9.21)	(12.19)	(6.12)	(6.53)	(8.37)
2007	1.14***	1.13***	1.45***	0.45***	0.50***	1.02***
	(13.42)	(11.48)	(13.87)	(6.50)	(7.10)	(10.78)
# OBS	41,530	39,050	36,390	42,771	41,591	38,248
R^2	0.736	0.746	0.593	0.787	0.797	0.694

Notes: 1. Estimates are APEC-year interaction dummy variables from running Eq. (3). 2. Estimates for other control variables are not shown for brevity. 3. Shown in parentheses are the robust t-statistics. 3. ***, **, and * denote one, five, and ten percent level of significance, respectively, for a two-tailed test.

Figure 4. 1. Year-Specific Effects of APEC Membership in Trade of Total Products



Note: Drawn using the estimates for APEC-Year interaction dummies obtained from running Equation (3).

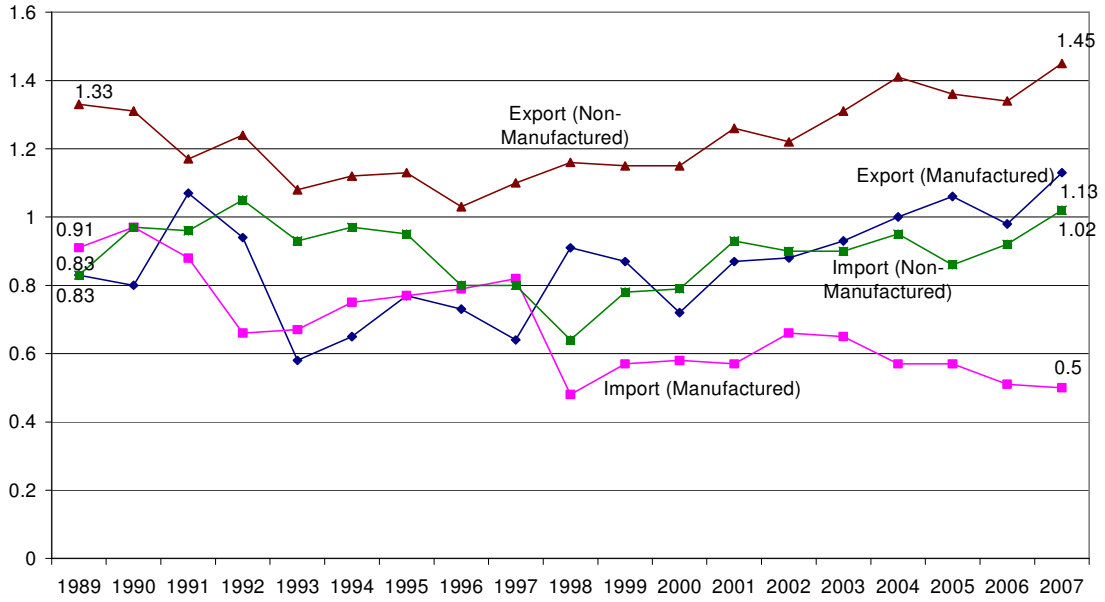
Finding 6:

Since 1989, the APEC membership effects on imports of total products have weakened mainly because APEC membership effects on imports of manufactured products have weakened.

When the total trade was disaggregated into manufactured and non-manufactured trade, the trend of the effect of APEC membership was found to be different for each. The results are reported in Columns (2), (3), (5), and (6) of Table 4.3 and are depicted in Figure 4.2.

As can clearly be seen in Figure 4.2, the effects of APEC membership on total imports have been decreasing mainly because those on manufactured imports have been decreasing. Specifically, while the estimator of the APEC-Year interaction dummy in the non-manufactured import equation remains relatively high and persistent throughout the period 1989 – 2007, that in the manufactured imports equation decreased from 0.91 in 1989 to 0.5 in 2007, suggesting that while the APEC membership effect has remained positive on imports of manufactured products, it has waned over time from 148 percent to 65 percent.

Figure 4. 2. Year-Specific Effects of APEC Membership in Trade of Manufactured and Non-Manufactured Products



Note: Drawn using the estimates for APEC-Year interaction dummies obtained from running Equation (3)
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5. POLICY IMPLICATIONS

5.1. POLICY IMPLICATIONS

The main goal of this report has been to establish evidence as to whether APEC economies are enjoying a high degree of intra-regional trade and APEC has made a contribution to an increase in intra-regional trade for the past 20 years since its inception in 1989. This report first gave a description of the extent and trends of intra-regional trade for the period 1989 – 2007 and then utilized an augmented gravity model.

One of the main findings summarized above is that the share of intra-regional trade is larger than the comparable estimates for the EU region, that the APEC membership effect on bilateral trade is positive and is similar in size to the bilateral and sub-regional FTA effect. Thus, APEC members as a whole are enjoying a very high degree of *de facto* integration. This evidences the benefits of APEC's common purpose, and its non-binding approach of trade liberalization in the context of open regionalism.

It was also found, however, that the share of intra-regional exports and imports in the APEC region increased initially until around 2000 but has been decreasing in recent years. Our regression analysis also confirmed that while the APEC membership effect on both exports and imports has remained positive over the period 1989-2007, the positive impact on imports has been weakening. Thus, there is the possibility that APEC's open form of regionalism and its clear focus on trade liberalization and facilitation may have led to greater imports from non-members.

It is also worth noting that there are some discrepancies among the individual member economies in the sense that the extent to which individual APEC economies trade more with other members is quite diverse. Specifically, 19 (16) member economies show a stronger linkage in their exports to (imports from) other APEC member economies than to (from) non-APEC members. There are some member economies which have not enjoyed positive APEC membership effects either on their exports or on their imports. The reasons for these outcomes could usefully be further researched and more efforts to engage these member economies as closer economic partners in the APEC region would also be needed.

5.2. SUGGESTIONS FOR FURTHER STUDY

This study has focused only on trade in final goods. As industrialized economies have extended their direct investment in developing economies, the production of manufactured goods has been fragmented across the region and this, in turn, has generated a huge expansion of intraregional trade in parts and components. Thus, international product fragmentation is an important feature of the deepening interdependence in East Asia and more broadly in the entire APEC region, and economic integration in the region has been largely driven by the development of increasingly sophisticated production/distribution networks that span the region and

enable companies to benefit from each country's comparative advantages through an articulated regional division of labor.[23]

Therefore, it would be worth investigating how trade in parts and components among APEC members differs from trade in final goods. It would also be worth investigating whether and how the APEC region as a whole differs from East Asia with regard to production/distribution networks and trade in parts and components. This kind of investigation would contribute to the on-going discussions on what would be the best form of regional integration in Asia and the Pacific (Baldwin, 2006a; Lee *et al.,* 2006; and Pomfret, 2009).

Secondly, this study has mainly focused on the effect of APEC membership on bilateral trade flows between APEC member economies and their trading partners, including both APEC members and non-member economies. As APEC has recently strengthened its efforts to improve trade facilitation and supply chain connectivity between member economies, the gravity model developed here could usefully be extended to add variables such as a trade facilitation index and/or logistic performance index to assess whether and how improvement in trade facilitation and/or supply chain connectivity has contributed to bilateral trade among APEC member economies.

Thirdly, this study has dealt with trade in goods, but a similar gravity modeling can be applied to explaining trade in services involving APEC member economies. There are some important characteristics of services that clearly distinguish trade in services from trade in goods. However, for the purposes of analysis of trade flows and their effects on the allocation of resources and the welfare of national residents, there is no reason to separate trade in goods from trade in services (Lee and Lloyd 2002). As a matter of fact, Kimura and Lee (2006) find that services trade is better predicted by gravity equations than goods trade. They also find that both goods trade and services trade are positively affected by economic freedom, but the effects are much stronger for services trade between 10 OECD member countries and other OECD and non-OECD member countries. Using the OECD's bilateral service trade data, a similar investigation could be undertaken in the context of APEC and some useful policy implications could be drawn.

The OECD's bilateral service trade data cover only aggregate services trade, whereas the idiosyncratic nature of each traded service should have different policy implications. Therefore, similarly to Kimura and Lee (2008), disaggregated service trade data of some APEC member economies, such as the United States and Japan, could also be utilized to investigate the determinants of bilateral services trade *at the sectoral level*.

[23] See Kimura and Ando (2005) and Kimura (2008) for overall explanations of the production/ distribution networks in East Asia.

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APPENDIX: DATA SOURCES

Bilateral total exports and imports (for all APEC members except for Chinese Taipei): in millions of US dollars, from International Monetary Fund*, Direction of Trade* Statistics, http://www.imfstatistics.org/DOT/.

Bilateral total exports and imports (for Chinese Taipei): in millions of US dollars, from Chinese Taipei's Bureau of Foreign Trade website, http://cus93.trade.gov.tw/bftweb/english/FSCE/FSC0011E.ASP

Bilateral disaggregated exports and imports (for manufacturing vs. non-manufacturing): in millions of US dollars, from United Nations, *Comtrade Database*, for Chinese Taipei's disaggregated trade, this study uses data recorded under "Other Asia, nes" in *Comtrade Database*.

Population, GDP, per capita GDP: in millions of US dollars, from World Bank, World Development Indicators, http://publications.worldbank.org/WDI.

Bilateral distance: weighted distances in km, which use city-level data to assess the geographic distribution of population inside each nation, from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)'s website, http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

Geography variables (Comlang, Contig, Colony): from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)'s website, http://www.cepii.fr/anglaisgraph/bdd/distances.htm.

Information on WTO membership: from the World Trade Organization (WTO)'s website, http://www.wto.org.

Information on bilateral and sub-regional FTAs: from various sources of APEC member economies and the Wikipedia website, http://en.wikipedia.org/wiki/Trade_bloc#Most_active_regional_blocs.