Chapter II

Trade Flow and Foreign Direct Investment in APEC Region

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In this chapter the author tries to illustrate the rapid expansion of trade flows in the APEC region and to seek the determinants. International trade in the region is increasing its presence in the world. As shown in Table 1, the world trade volume in 1995 recorded 4.96 trillion U.S. dollars, of which 2.24 trillion U.S. dollars originated from 18 member economies of APEC. APEC's share of world exports amounted to 45% in 1995, up from 32% in 1970. Before we discuss in later chapters economic and technical cooperation in the region, it is worthwhile for us to have a bird's-eye view of trade flows in the region.

The analysis of determinants is carried out using an econometric technique. Specifically, the author adopted the *gravity model*, in which income, geographical distance, sub-regional dummies, and foreign direct investments (FDI) enter as explanatory variables. Through the econometric analysis of trade flows, the importance of sub-region and foreign direct investment will be pointed out. Also, the trade creation effect of the sub-regions will be identified from the mutual closeness of the member economies.

The rest of the paper is organized as follows. The first section shows an overview of trade flow. The presentation contains time series reviews as well as changes in trade destinations to show the deepening interdependence in the region. Trade intensity indexes (Iij) visualizes the closeness of individual bilateral trade flow. Also, revealed comparative advantage (RCA) indexes and complementarity (Cij) indexes show the changing pattern of comparative advantage in the region. In the second section, basic specifications of the

gravity model, an econometric framework, are introduced in order to test the determinants of the trade flows in the region. In the third section, we modify the basic model to test for the effects of FDI and the Hong Kong reversion. The last section concludes.

Table 1 Summary Table for Trade Flow in APEC

(unit : billion US dollars)

Origin	**1970**	**1980**	**1990**	**1995**
Japan	19.3	129.5	286.8	443.0
China	2.3	18.1	62.1	148.8
NIEs3	4.8	57.0	213.8	404.2
ASEAN6	6.2	71.0	141.3	311.5
ANZ	5.8	27.4	44.7	66.7
NAFTA	60.4	291.4	518.0	852.5
(US)	42.6	212.9	371.5	582.5
APEC18	100.0	600.4	1276.5	2243.6
EU12	116.0	688.1	1347.5	1757.9
World	312.0	1802.4	3337.0	4959.2

Note:

(1) Current export value. This table is aggregated from original 23x23 country table for each year.

(2) The coverage of each sub-region is as follows:

NIEs3=Korea, Taiwan, Hong Kong

ASEAN6=Singapore, Malaysia, Indonesia, Thailand, the Philippines, Brunei

ANZ=Australia, New Zealand

NAFTA=the United States, Canada, Mexico

EU12=Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom

Sources:

(1) IDE Trade Data Retrieval System(AIDXT)

(2) IMF, *Direction of Trade Statistics Yearbook 1996*

(3) Ministry of Finance, Republic of China, *Monthly Statistics of Exports and Imports*, various issues.

1. TRADE FLOWS IN APEC

1.1. Overview of Trend

Trade Flow in the region grew more rapidly than that of the whole world[1]. Table 2 provides export growth rates of selected sub-groups of APEC for the periods 1970-80, 1980-90,1990-95 and 1970-95. As shown in the Table, world exports grew at 11.7% per annum for the period 1970-95, while the aggregate trade volume increased to 4.96 trillion U.S. dollars. On the contrary, the total exports from the 18 member economies of the APEC grew at a higher rate of 13.3% per annum during the same period. In 1995, the total exports from APEC member economies amounted to 2.24 trillion US dollars,

Table 2 Export growth in APEC (by sub-period)

(unit : percent per annum)

Origin	1970-80	1980-90	1990-95	1970-95
Japan	21.0	8.3	9.1	13.3
China	23.1	13.1	19.1	18.2
NIEs3	28.1	14.1	13.6	19.4
ASEAN6	27.7	7.1	17.1	17.0
ANZ	16.7	5.0	8.4	10.2
NAFTA	17.1	5.9	10.5	11.2
(US)	17.5	5.7	9.4	11.0
APEC18	19.6	7.8	11.9	13.3
EU12	19.5	7.0	5.5	11.5
World	19.2	6.4	8.2	11.7

Note: Calculated from Table 1

[1] In reviewing the trade growth in the APEC region, the author concentrates on the export side, due to space limitation. Omitting the import side makes it difficult to analyze such issues as trade imbalances. Although the author does not intend to ignore the importance of trade imbalances in the region, he did not step deeply into imbalance issues.

44.9% of the world's total exports.[2]

1.2. Export Growth from 1970-95: Total Export Volume, by Sub-period

A closer view of the region's export growth by sub-period---1970-80, 1980-90, and 1990-95---also reveals that the growth was almost always more rapid in APEC in comparison with the rest of the world. For each sub-period, the annual average growth rate of the world's exports was 19.2%, 6.4%, 8.2%, respectively, whereas those of APEC recorded better figures of 19.6%, 7.8%, 11.9%.

United States and Japan mainly led the faster export growth in the 1970s. Japan contributed 22% and the United States contributed 34% to the export growth of the APEC region during the period, and the two economies combined to contribute 56% (See Table 3). Although hit harshly by two waves of Oil Shocks, both countries at that time still enjoyed comparative advantages in a wide range of industrial commodities over the region. ASEAN countries (in this paper ASEAN refers to Singapore, Malaysia, Indonesia, Thailand, the Philippines and Brunei) also contributed 13% to the APEC export growth during the period, and ASEAN's resource oriented exports brought about a surge in their export figures, helped by favorable primary commodity prices at that time.

In the 1980s, the export performance of the APEC members in general became stagnant, much like the economies of the rest of the world. The average annual export growth dropped to 7.8% from 19.6% in the 70s. Several factors contributed to the stagnant performance. The second Oil Shock and the United States' high interest policy under the Reagan administration in the advent of the decade and yen appreciation following the Plaza Accord in 1985 contributed to the stagnation. The second Oil Shock struck the economies with high energy resource dependency, such as Japan and Korea. The high interest rate policy in the US brought about an over-appreciation of the US dollar in foreign exchange markets, and as a consequences it led to the so called "twin deficit", deficit both in balance of payment and government finance. Yen appreciation in the latter

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[2] Exports in this analysis include re-exports.

Table 3 Contribution of Each Sub-region to the Export Growth in APEC (unit : percent per annum)

Origin	1970-1980	1980-1990	1990-1995	1970-1995
Japan	22.0	23.3	16.2	19.8
China	3.2	6.5	9.0	6.8
NIEs3	10.4	23.2	19.7	18.6
ASEAN6	13.0	10.4	17.6	14.2
ANZ	4.3	2.5	2.3	2.8
NAFTA	46.2	33.5	34.6	37.0
US	34.0	23.5	21.8	25.2
APEC18	100.0	100.0	100.0	100.0

Note 1)Calculated from Table 1.

2) Contribution ratio=(Sub-region's export increment)/(APEC export increment)*100

half of the decade scared export sectors of Japan for a couple of years.

However, the slow-down in export growth was not as severe in Japan as in the US, mainly for the following reasons. Firstly, yen appreciation in the latter half of the decade swelled the dollar denominated figure of the Japanese exports, although the yen figure showed sluggishness. Secondly, facing the trade friction in the US and Europe, Japanese exporting sectors, such as the automobile industry, tried to invest in former export partner economies in order to circumvent various trade barriers. In this case, parts exports for the overseas subsidiaries partly compensated the loss of export income. Thirdly, especially after the yen appreciation, in order to avoid the rising wages and rents at home, Japanese firms tried to shift its production to the economies where those factor prices were less expensive. This type of overseas investment mainly went to Asian developing economies, especially ASEAN. In this case Japan exported more parts. This type of investment sometimes served as a circumventing export base to the markets in the developed economies. During the period 1980-90, the US and Japan respectively contributed to the APEC export growth 23.3% and 23.5%, and the combined contribution of the two major economies in the APEC dropped below 50%, namely 46.8% (See Table 3). However, the performance deterioration of the was partly offset by aggressive export vitality in the Asian NIEs, who replaced the Japanese export supply, and the performance deterioration was especially offset by the markets of

developed economies. Thus, their outward-looking growth strategy started to bear fruit and emerged as a big trading sub-region. In the decade of the 1980's, NIEs' contribution to the export growth of the region recorded 23.2%, comparable to Japan and the US.

Table 4 GDP in APEC (unit : billion U.S dollars, current)

	1970	1980	1990	1995
Japan	204.7	1059.3	2940.4	5110.5
China	78.2	298.3	369.8	697.6
NIEs3	17.4	131.6	471.1	858.9
ASEAN5*	28.7	173.3	309.2	601.1
ANZ	43.8	172.8	338.4	408.5
NAFTA	1104.3	3159.1	6308.6	8069.4
US	985.4	2708.1	5513.8	7253.8
APEC17*	1468.9	4963.9	10706.7	15676.6
EU12	693.1	3123.5	6064.7	7832.9
World	2808.0	11349.9	22298.9	**25722.5

Note: *Excluding Brunei.

**Author's calculation, based on 1994 figure and the average growth rate between 1990-94.

Sources:

(1) IMF, "International Financial Statistics" various issues

(2) Directorate General of Budget, Accounting and Statistics, Republic of China, "Statistical Abstract of National Income, Taiwan Area, Republic of China" various issues

(3) Census and Statistics Department, Hong Kong, "Hong Kong Monthly Digest of Statistics", various issues

(4) World Bank, "World Development Report", various issues.

In the 1990s, Asian developing economies emerged as an engine for the region's export growth. In addition to NIEs, export growth in China and ASEAN was boosted by several reasons.

Firstly, continued appreciation of the Japanese yen is pointed out. In 1990, the average exchange rate of yen was 144 yen per dollar, but in 1995 the rate soared up to 94 yen per dollar, which is equivalent to a 53% appreciation. As a result, Japan gradually

Table 5 Foreign Direct Investment in APEC (unit : billion U.S. dollars)

Inflow to	70-79	80-89	90-94
Japan	1.3	1.6	7.8
China	0.0	14.7	80.3
NIEs2*	1.3	9.9	9.9
ASEAN5*	11.4	37.3	63.7
ANZ	11.9	37.9	30.5
NAFTA	55.4	352.0	228.4
US	40.8	320.7	178.1
APEC16*	81.2	458.2	425.7
EU12	79.2	270.5	365.3
World	n.a.	842.4	933.2

Outflow from	70-79	80-89	90-94
Japan	15.9	138.5	127.7
China	0.0	3.6	12.1
NIEs2*	0.2	14.0	20.2
ASEAN5*	0.1	2.5	9.5
ANZ	2.2	25.1	9.2
NAFTA	133.7	195.0	250.6
US	122.8	154.9	226.0
APEC16*	152.1	378.8	431.3
EU12	88.1	413.7	493.3
World	n.a.	878.2	1027.9

Note: Excluding Hong Kong and Brunei. Historical values.

Sources: 1)IMF, "Balance of Payment Statistics Yearbook", various issues,

2)Ministry of Economic Affairs, Republic of China, "Statistics on Overseas Chinese & Foreign Investment, Technical Cooperation, Outward Investment, Outward Technical Cooperation, The Republic of China", various issues.

yielded her competitiveness in manufactured goods to neighboring Asian developing economies.

Secondly, because of the yen appreciation, Japan's GDP in current dollar terms inflated by 73.8% in the first half of the decade to 5.1 trillion dollars (See Table 4). This increased income generated a huge import demand, and most of it went to neighboring Asian economies.

Thirdly, increased FDI flowed from developed economies to Asian developing economies, especially toward China and ASEAN (See Table 5). During the period 1990-94, Japan and the European Union (EU) continued to serve as net donors of FDI with the amount exceeding $ 100 billion. Also, the US became a net FDI donor in this period. Increased FDI outflow from Japan can no doubt be associated with relocation of production sites which is due to the continued yen appreciation. Though it was impossible to obtain

the detailed direction of FDI flow in the region, it is widely believed that a great portion of those investments went to Asian developing economies. During the period, FDI inflow to China and ASEAN recorded $ 80.3 billion and $63.7 billion, respectively, which amounted to 11.5% and 10.6% of the 1995 GDP of each entity.

As a result of these three factors, during the period 1990-95, Asian developing economies contributed 46.3% of the export growth in the region as a whole. On the contrary, the impact of the US and Japan, in terms of contribution to the export growth, further declined in this current decade. Only 38% of the region's export growth was attributed to the two economies. Comparing the two economies, higher growths of exports destined for Asian developing economies are commonly observed. However, it is also observed that Japan's exports to China and ASEAN grew more rapidly, and the US steadily increased exports to other members of NAFTA and the EU. The contrast between Japan and the US might reflect the "NAFTA effect" and the difference in the two economies' investment destination[3].

1.3. Change in Trade Destination: Increasing Interdependence

We have so far surveyed trade development in the region. Next, we will analyze the trade destinations of the member economies. Over time, generally speaking, the member economies tend to concentrate their trade within the APEC region over time. Table 6 shown below clearly depicts deepening interdependence within the region. For the period 1990-95,

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[3] Canada, Mexico and the EU are important investment destinations for the U.S. The combined share of Canada and Mexico in the US direct investment abroad (balance, historical US dollar cost basis) in 1995 was 13.4%, and the share of the twelve EU countries was 42.2%. While in the Japanese direct investment balance as of March 1995, Canada and Mexico combined to occupy only 2.4% and the EU occupied only 18.1%. For Japan, Asian economies are more important as investment destinations. China and ASEAN (5 countries) respectively occupied 1.9% and 9.2% in the Japanese direct investment abroad (balance, historical US dollar cost basis). In the US FDI balance in 1995, China and ASEAN occupied only 0.3% and 4.3%, respectively. For more information, refer to US Department of Commerce (1996) pp124-125 and International Finance Bureau, Ministry of Finance, Japan (1996) pp450-453.

the trade volume within the APEC region grew by 1.87 times, while the region's exports and imports to the world increased at a slightly slower pace of

Table 6 Export Growth Matrix by destination: 1990-95 (unit: times)

	Japan	China	NIEs3	ASEAN 6	ANZ	NAFTA	US	APEC 18	EU12	World
Japan	-----	3.58	1.92	2.33	1.20	1.32	1.34	1.70	1.23	1.54
China	3.16	-----	1.62	2.44	3.69	4.60	4.78	2.37	3.24	2.40
NIEs3	1.60	3.32	2.52	2.37	1.66	1.44	1.45	1.97	1.56	1.89
ASEAN6	1.65	3.24	2.51	2.50	2.10	2.13	2.13	2.21	2.02	2.20
ANZ	1.30	2.43	2.17	2.24	2.00	0.93	0.87	1.60	1.16	1.49
NAFTA	1.35	2.27	1.92	2.14	1.30	1.84	2.02	1.78	1.25	1.65
US	1.39	2.46	1.91	2.19	1.33	1.63	-----	1.68	1.28	1.57
APEC18	1.59	3.16	2.02	2.34	1.54	1.69	1.74	1.87	1.41	1.76
EU12	1.33	2.61	2.16	2.20	1.45	1.29	1.32	1.54	1.19	1.30
World	1.36	2.89	1.94	2.12	1.46	1.55	1.53	1.70	1.26	1.49

Note: (Trade flow in 95)/(Trade flow in 90)

Source: Author's calculations based on the materials shown in Table 1.

1.76 times and 1.70 times, respectively.

Except for ASEAN, where interdependence already deepened in 1970, a jump in the intra-APEC trade ratio was observed in every sub-region in 1990 (See Table 7). For instance, the intra-APEC ratio of U.S. exports increased to 58.1% in 1990 from 45.7% in 1980. This trend continued in 1995. Japan's involvement in the regional trade is relatively remarkable. Her intra-APEC export ratio increased by 6.5 points to 74.3% in 1995.

For the whole region, the intra-APEC trade ratio steadily rose after the 1980s. As of 1995, 73.3% of the region's total exports were intra-APEC. This trend is contrary to that of the EU. When the EU went into effect in 1993, there was a widespread worry outside the EU that the trade diversion effect would overwhelm the trade creation effect, and as a result non-EU economies might suffer from a net damage due to EU economic integration. However, statistics show that intra-EU trade did not increase as much as expected. As shown in Table 8, the intra-EU trade ratio fell from 60.7% in 1990 to 55.5% in 1995.

One important factor for the rise in the intra-APEC trade ratio in the region is an

Table 7 Intra-APEC Trade

	1970	1980	1990	1995
Japan	61.3	56.4	67.5	74.3
China	45.4	66.7	76.1	75.2
NIEs3	71.3	62.1	72.4	75.4
ASEAN6	72.2	75.4	75.4	75.5
ANZ	55.9	59.0	70.7	75.5
NAFTA	52.8	53.3	65.7	71.1
(US)	44.0	45.7	58.1	62.2
APEC18	56.2	57.9	68.8	73.3
(EU12)	15.0	10.7	14.7	17.3
World	29.7	34.2	39.2	44.9

Note: Percentage of exports destined to APEC members.

Source: Author's calculations based on the materials shown in Table 1.

Table 8 Sub-region Trade in APEC

Sub-region	1970	1980	1990	1995
NIEs3	5.5	6.5	9.4	12.5
ASEAN6	22.6	18.1	19.5	22.1
ANZ	6.0	6.5	7.4	9.9
NAFTA	36.8	33.5	41.4	46.2
(US)	24.6	22.2	28.3	29.4
APEC18	56.2	57.9	68.8	73.3
(EU12)	53.3	55.5	60.7	55.5

Note: Ratio of exports within sub-region.

Source: Author's calculation based on the materials shown in Table 1. .

increase in sub-region trade. From Tables 7 and 8, the trend of increasing sub-regional trade generally corresponds to the intra-APEC trade ratio. Especially, during the 1980-1980 period, as shown in Table 8, we see in NIEs, ANZ and NAFTA the rising trend of sub-region trade. During that period, NAFTA's involvement in regional trade was impressive, with its sub-regional trade ratio rising to 41.4% in 1990 from 33.5% in 1980. This reflects the "NAFTA effect" mentioned above. For the period 1990-95, this tendency generally continued. NAFTA's involvement in their own regional trade was impressive during that period, with a rise to 46.2% in 1995. Also, for the year 1995, NIEs and ANZ saw their sub-regional trade ratio rise.

Among the sub-regional groups in the APEC, it is interesting to observe that ASEAN's intra-APEC ratio and its own regional trade ratio generally stayed almost stable for years. Their own regional cooperation, such as implementation of AFTA, gradually developed, but

up to now statistics show no clear linkage between the deepening regional cooperation in ASEAN and their intra-regional trade volume.

1.4. Trade Intensity Analysis

For a more systematic understanding of the trade linkage within the region, the trade intensity index (Iij) is a useful instrument[4]. Trade intensity index is based on an actual observation of bilateral trade flow, and it measures the intimacy of the trading relationship between any given two countries. The formula of the index for the exports from Country **i** to Country **j** is defined below.

$$I_{ij} = (X_{ij}/X_i) / (M_j/W) \text{----------(1)}$$

where Xij denotes exports from Country **i** to Country **j**, Xi equals the total exports from Country **i**, Mj is the total imports of Country **j**, and **W** represents the world trade volume. Note that in this analysis Xs include re-exports. The numerator in the right-hand side is the share of the importing country in the exporting country, and denominator is the share of the importing country in the global market. A higher intensity index implies a closer trade linkage between the two countries, in comparison with the world standard. The following table, Table 9, shows trade intensity indexes in the APEC region.

From the Table, several major observations can be derived as follows. First of all, trade intensity indexes tend to show higher figures among geographically close economies. For example, the index for ANZ, that is, Australia and New Zealand, steadily rose from 3.44 in 1970 to 7.36 in 1995. These are extremely high figures compared with the world standard. Similarly, the index for the intra-regional trade of ASEAN remains quite high, exceeding 3 in 1995. For NAFTA, the index constantly registered high figures around 2. Secondly, the index tends to be higher if the bilateral trade flow involves a larger economy, such as Japan and the U.S. Most of the developing groups in the region have a stronger linkage with Japan and the U.S. For instance, as seen from trade intensity indexes,

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[4] See Yamazawa and Nohara (1985), p112.

Table 9 Trade Intensity Indexes in the APEC Region

		Japan	China	NIEs3	ASEAN 6	ANZ	NAFTA	US	APEC18	EU12
Japan	70	------	2.59	5.88	4.20	2.20	2.03	2.55	2.06	0.32
	80	------	3.52	3.49	2.99	2.34	1.57	1.85	1.65	0.34
	90	------	1.40	2.69	2.51	2.07	1.84	2.15	1.72	0.47
	95	------	1.67	2.55	2.66	1.63	1.50	1.81	1.66	0.44
China	70	1.97	------	10.68	4.68	1.05	0.05	0.00	1.53	0.40
	80	3.22	------	7.17	2.81	1.16	0.43	0.48	1.95	0.37
	90	2.20	------	7.64	1.31	0.59	0.49	0.57	1.94	0.23
	95	3.16	------	3.96	0.93	0.93	0.89	1.10	1.68	0.36
NIEs3	70	2.32	0.19	2.83	3.46	1.43	2.46	3.19	2.40	0.41
	80	1.45	1.98	1.92	2.55	1.79	1.82	2.20	1.82	0.44
	90	1.81	6.25	1.58	1.82	1.35	1.65	1.93	1.85	0.39
	95	1.67	5.63	1.61	1.59	1.20	1.20	1.44	1.68	0.38
ASEAN6	70	3.89	0.64	2.92	10.10	1.40	1.09	1.43	2.43	0.43
	80	4.01	0.88	1.96	5.38	2.14	0.98	1.24	2.21	0.31
	90	2.93	1.21	1.89	4.28	1.60	1.12	1.36	1.92	0.38
	95	2.39	0.91	1.65	3.39	1.55	1.03	1.28	1.68	0.42
ANZ	70	4.09	2.01	1.16	2.48	3.44	1.00	1.13	1.88	0.71
	80	3.01	3.07	1.48	2.25	4.87	0.74	0.80	1.73	0.37
	90	3.77	1.60	1.82	2.03	5.42	0.76	0.83	1.80	0.35
	95	3.57	1.33	2.02	2.13	7.36	0.45	0.47	1.68	0.32
NAFTA	70	1.56	0.20	1.11	0.86	1.23	2.16	1.59	1.78	0.65
	80	1.16	1.42	1.21	0.96	1.36	1.94	1.29	1.56	0.56
	90	1.59	0.79	1.08	0.82	1.46	2.19	1.43	1.68	0.51
	95	1.43	0.56	0.97	0.75	1.17	2.34	1.70	1.58	0.45
(US)	70	1.86	0.00	1.51	1.13	1.41	1.44	------	1.48	0.74
	80	1.30	1.58	1.55	1.22	1.63	1.28	------	1.34	0.64
	90	1.88	0.84	1.40	1.06	1.85	1.49	------	1.48	0.62
	95	1.82	0.68	1.30	1.04	1.59	1.49	------	1.39	0.59
APEC18	70	1.60	0.79	2.43	2.37	1.55	1.95	1.77	1.89	0.57
	80	1.43	1.90	2.05	2.18	1.87	1.62	1.44	1.69	0.46
	90	1.53	1.87	1.96	1.82	1.70	1.76	1.60	1.76	0.45
	95	1.51	1.73	1.72	1.69	1.51	1.62	1.53	1.63	0.43
EU12	70	0.21	0.35	0.35	0.48	0.88	0.59	0.68	0.50	1.41
	80	0.13	0.32	0.24	0.32	0.56	0.38	0.41	0.31	1.37
	90	0.32	0.32	0.27	0.32	0.52	0.43	0.47	0.37	1.52
	95	0.36	0.33	0.34	0.37	0.59	0.41	0.46	0.39	1.64

Note: Trede intensity index is defined as follows:

$$Iij = (Xij/Xi) / (Mj/W)$$

where, Xij: Exports from Country i to j, Xi: Total exports from Country i

Mj: Total imports of Country j, **W**: World exports

China, NIEs and ASEAN all have very strong trade linkage with Japan in both exports and imports. This tendency holds for the trade relationship between the U.S. and Asian developing groups. Higher intensity indexes between these developing groups and the developed economies might be partly attributed to the existence of GSP (General System Preference)[5]. Lastly, the variation of the trade intensity indexes among the region tend to converge. The arithmetic average of trade intensity indexes, where applicable, for six major groups in the region (namely, Japan, China, NIEs, ASEAN, ANZ and NAFTA) fell over time, from 2.63 in 1970 to 1.94 in 1995. Variance of the indexes for the same sample also decreased from 5.71 to 2.10. This suggests that the effects of barriers that hinder international trade, such as transportation costs, political regimes, etc., gradually ebbed away over time. Also, this can be regarded as a result of diversification of export destinations during the analysis period.

1.5. Structure of Comparative Advantage in APEC

So far, we have so far reviewed expansion of trade volume and changes in trade intensity in the APEC region. Now we will look at another important trade related concept, comparative advantage. One of the devices to measure the extent of comparative advantage of an individual economy is the revealed comparative advantage (RCA) index[6]. The intuition behind this index is that if a country exports a certain classification of goods more intensively than the world standard, then it is said that the country has a comparative advantage. The formula of the index is presented in the following:

$$\mathbf{RCA_{xih} = (X_{ih}/X_i) \diagup (W_h/W),\text{----------(2)}}$$

[5] Preferential treatment tariff applied to the imports from developing economies, to support their economic development. This scheme was agreed to in the New Delhi conference of UNCTAD in 1968 and put into effect in 1976.

[6] See Yamazawa and Nohara(1985), p148.

where RCAxih is revealed comparative advantage index of Country i in commodity h, Xih is exports of commodity h from Country i to the rest of the world, Xi is Country i's total exports, Wh is the world total of commodity h trade, and W is the world trade volume. For instance, RCAih above unity implies that Country i has comparative advantage in commodity h. Note that RCAxih indexes are defined for Country i's exports and measures the competitiveness of Country i's exports in a partner Country j. A similar index can be defined for imports, RCAmih, which implies comparative disadvantage.

Table 10 shows the changing comparative advantage in the region. (Because trade data by commodity was not available for 1995, the table only shows the figures up to 1990).

From the Table, we can observe the dynamic change of comparative advantage in the region. First of all, the changing comparative advantage of Japan is clearly depicted. In 1970, Japan had comparative advantage in most industrial goods. However, she yielded her comparative advantage to late-comers. By 1980, she came to lose comparative advantage in labor-intensive products such as clothes and textiles, and by 1990 Japan lost its comparative advantage in capital intensive goods such as ships and general machinery. In 1990, Japan specialized in technology intensive industries such as electronics.

Secondly, it was confirmed that developed economies have comparative advantage in industrial commodities, especially technology-intensive commodities. The United States and the EU's advantage structures in industrial goods are similar to that of Japan, with strong competitiveness in technology-intensive commodities. However, the structure of Japan and the U.S. are different in the agriculture sector: The U.S. has been an important exporter of food grain such as wheat and corn.

Table 10 Comparative Advantage in APEC[7]

[7] RCA indexes can be calculated for a specific country and commodity, as expressed in equation (2). However, for the sake of brief display, RCAx indexes in Table 10 are somewhat aggregated to comply with other tables. Weighted average of RCAx index by exports of country I within a subgroup makes

		Japan	China	NIEs3	ASEAN 6	ANZ	NAFTA	(US)	APEC18	EU12
Mining	70	0.11	0.29	0.18	1.94	1.46	0.93	0.60	0.81	0.54
	80	0.07	0.85	0.07	1.63	0.83	0.58	0.31	0.56	0.41
	90	0.09	0.71	0.12	1.57	2.06	0.77	0.43	0.64	0.43
Agriculture	70	0.31	3.14	0.70	3.51	3.57	1.11	1.11	1.28	0.74
	80	0.16	1.81	0.56	2.12	3.64	1.49	1.58	1.30	0.84
	90	0.10	1.44	0.41	1.56	3.32	1.18	1.16	0.94	0.95
Labor	70	1.01	1.18	2.61	0.26	0.15	0.35	0.43	0.59	0.77
Intensive	80	0.94	2.47	3.71	0.72	0.57	0.63	0.75	1.06	1.26
	90	0.58	2.23	2.45	1.18	1.05	0.62	0.71	1.08	0.98
Capital	70	1.44	0.76	0.62	0.22	0.53	1.06	1.02	1.02	1.37
Intensive	80	1.22	0.75	0.79	0.25	0.71	1.02	0.99	0.93	1.41
	90	0.67	0.73	0.65	0.42	0.45	0.97	0.94	0.76	1.30
Technology	70	1.61	0.12	0.51	0.13	0.25	1.49	1.63	1.27	1.36
Intensive	80	2.30	0.17	0.95	0.40	0.28	1.38	1.58	1.33	1.29
	90	1.97	0.51	0.97	0.82	0.18	1.24	1.34	1.24	1.09

Note: Author's calculation. The figures in the table are revealed comparative advantage indexes with respect to exports (RCAx). The definition is shown below. For commodity classification, see Appendix Table.

RCAxih＝(Xih/Xi)／(Wh/W), where

RCAxih:revealed comparative advantage index of Country i in commodity h,

Xih:exports of commodity h from Country i to the rest of the world,

Xi:Country i's total exp ort,

Wh/W:share of commodity h in world trade

Thirdly, the developing groups in the region they generally held a comparative advantage in primary commodities. However, we can also see that their advantage gradually shifted towards labor-intensive commodities. For primary commodities such as mining and agriculture, China and ASEAN had an advantage, but the extent of the advantage shrank over time. As for the shift towards labor-intensive commodities, China strengthened its advantage over time, while NIEs maintained it over time[8]. In addition, the RCAx of NIEs

aggregate indexes.

[8] Comparative advantage structure of NIEs may be affected by that of China because Hong Kong

and ASEAN technology-intensive commodities rose recently[9]. All of these observations may be regarded as a reflection of industrialization efforts in these developing APEC groups over the past two decades. Among the APEC members, ANZ is impressive in that they generally kept an advantage in primary commodities, especially agricultural products. However, ANZ also moved towards industrialization, as indicated by an above-unity RCA index of the labor-intensive sector in 1990.

1.6. Complementarity Analysis

With the APEC comparative advantage structure in hand, we can now measure complementarity between two selected economies. The complementarity index can be defined as follows[10]:

$$C_{ij} = \Sigma_h \quad [(RCA_{xih})*(RCA_{mih})*(W_h/W)] \text{----------} (3)$$

where Cij is the complementarity index between Country i and j, i being the exporting economy and j the importing economy. Subscript h denotes commodity classification, RCAx and RCAm are revealed comparative advantage indexes of exports and imports, respectively, Wh is world trading volume of commodity h, and W is world total trade volume. The world average of Cij is unity, so Cij greater than unity implies that the export structure of Country i and import structure of Country j are more complementary.

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historically proxied Chinese international trade by re-exports. If China increases garment exports via Hong Kong, then Hong Kong's garment re-exports will also increase, and this leads to Hong Kong's higher RCAx index of labor-intensive products, since exports in this analysis include re-exports. For the discussion of re-exports in interport economies, see Sections 2 and 3.

[9] Strengthened advantage in electronics in most of the economies in ASEAN and NIEs lead to a rising advantage in technology-intensive commodities as a whole. RCAx of electronics in 1990 for Korea, Taiwan, Hong Kong, Singapore and Malaysia registered

2.23, 1.74, 1.75, 2.40, 2.86,

respectively.

[10] See Yamazawa and Nohara (1985) p145.

Table 11 Complementarity Indexes in APEC

		Japan	China	NIES	ASEAN	ANZ	NAFTA	(US)	EU12	APEC16
Japan	70	-----	1.28	1.18	1.14	1.28	1.07	1.01	0.95	1.11
	80	-----	1.23	1.09	1.17	1.30	1.14	1.03	0.96	1.15
	90	-----	1.13	1.00	1.13	1.16	1.15	1.12	0.97	1.12
China	70	1.43	-----	1.62	1.10	0.86	0.94	1.02	1.20	1.09
	80	1.09	-----	1.18	0.94	1.07	0.89	0.92	1.11	0.97
	90	1.12	-----	1.15	0.85	0.89	1.00	1.05	1.03	1.03
NIES	70	0.61	0.59	0.89	0.77	0.87	1.08	1.20	1.00	0.94
	80	0.54	1.21	1.01	0.92	1.18	1.02	1.05	1.15	0.93
	90	0.78	1.05	1.04	1.00	1.06	1.05	1.09	1.00	1.01
ASEAN	70	2.41	1.29	1.44	1.02	0.66	0.85	0.99	1.29	1.23
	80	1.58	1.21	1.19	1.08	0.84	0.97	1.04	1.06	1.12
	90	1.23	0.94	1.11	1.04	0.89	0.98	1.04	0.97	1.05
ANZ	70	2.09	1.44	1.34	1.00	0.79	0.97	1.06	1.30	1.24
	80	1.37	1.52	1.13	0.90	0.84	0.83	0.80	1.07	1.01
	90	1.68	0.91	1.01	0.89	0.73	0.87	0.88	1.01	1.04
NAFTA	70	1.15	1.08	1.06	1.04	1.14	1.23	0.37	1.07	1.15
	80	0.91	1.24	1.07	1.02	1.06	1.19	0.28	1.00	1.03
	90	0.98	1.05	0.95	1.01	1.07	1.05	0.29	1.00	1.00
(US)	70	1.03	1.06	1.12	1.08	1.18	1.22	-----	1.04	1.12
	80	0.79	1.36	1.12	1.07	1.13	1.24	-----	1.00	1.03
	90	0.87	1.10	1.00	1.06	1.13	1.05	-----	1.00	1.00
EU12	70	0.73	1.16	1.11	1.13	1.19	1.12	1.08	-----	1.05
	80	0.61	1.11	1.03	1.05	1.20	0.98	0.93	-----	0.92
	90	0.81	1.07	0.97	0.98	1.06	0.99	0.97	-----	0.96
APEC16	70	1.29	1.13	1.13	1.05	1.10	1.15	1.10	1.08	1.14
	80	1.00	1.24	1.10	1.04	1.09	1.10	1.01	1.02	1.06
	90	1.01	1.05	1.03	1.03	1.05	1.06	1.07	0.99	1.04

Note: author's calculation. The definition of complementarity indexes is shown below.

$Cij = \Sigma_h [(RCAxih)*(RCAmjh)*(Wh/W)]$, where

Cij:complementarity index for Country i's exports and J's imports,

RCAxih:Country i's revealed comparative advantage index of exports of commodity h

RCAmjh: Country j's revealed comparative advantage index of imports of commodity h

Wh/W: share of commodity h in world trade

However, it should be noted that, unlike Iij, Cij is not based on any actual trade flow between Country i and j, as shown in equation (3). Therefore, Cij implies a "virtual match" between

two countries derived from their comparative advantage structure. It should also be noted that Cij tends to be greater when the comparative advantage structure of two economies are "vertically matching". Suppose Country i exports technology-intensive commodities and imports mineral resources. If another country, j, exports mineral resources and imports technology-intensive commodities, then Cij in this case would show quite a high number. The following table, Table 11, shows the complementarity index in the region[11].

First of all, trade complementarity in the APEC region, as a whole, was relatively high, but the index fell over time. The complementarity among APEC16 went down to 1.04 in 1990 from 1.14 in 1970. This suggests that the vertical match of the trade pattern in the region was disappearing, and maybe
shifting instead towards a "horizontal" pattern[12].

Secondly, complementarity was stronger for trade between developed groups and developing groups. Japan's exports showed above-unity complementarity to all of the subgroups, and the U.S. exports also showed above-unity complementarity with all of the subgroups except for Japan. However, among developing groups and ANZ, where trade

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[11] Like in the case of comparative advantage, the table is somewhat aggregated by subgroup. Cij is firstly calculated among 17x17 economies(16 APEC members and EU), and then it is aggregated by subgroup. Transformation of equation (3) proves that aggregation can be done by averaging Cij of group members, weighted by total imports in the case of column-wise aggregation (by total exports in the case of row-wise aggregation). It should be noted that when calculating a group aggregate, own-complementarity must be excluded. For example, when calculating Japan-APEC16 complementarity, Japan's imports must be excluded in the calculation of the weight.

[12] The decreasing variance of RCA indexes is another indication of the lessening complementarity in the region. Across 16 members of APEC (sample size is 384=24x16), the variances of RCAx in 1970, 80 and 90 were 4.05, 2.80 and 1.86, respectively, that of RCAm were 0.64, 0.49 and 0.37, respectively. Identity of variance can be carried out by the F-test, using the ratio of two variances. The Threshold point for F(383,383) with 1% and 5% significance level are 1.278 and 1.187, respectively. Any combination of three variances exceeds the 1% threshold point, so it is hereby statistically proved that variance of RCA in 16 APEC members fell over time.

structures are competitive with each other, complementarity indexes do not always exceed unity. These observations seem to strengthen the hypothesis that intra-APEC trade structure was a kind of "vertical" pattern.

2. DETERMINANTS OF TRADE FLOWS IN APEC: USING GRAVITY MODEL

We have so far reviewed trade growth in the region as well as trade structure. Now, we would like to analyze the determinant of trade flow in the region. In the following, the author tries to explain trade flows using a regression method. In determining the specifications of equations, one should be reminded that complementarity is considered one of the determinants of trade flows. Yamazawa[13] pointed out that Iij, trade intensity index, can be broken down into two factors, complementarity and biasedness, as in the following:

$$\mathbf{I_{ij} = C_{ij} * B_{ij}} \text{ ----------(4)}$$

As mentioned above, Iij is an indicator of actual trade flow between Countries i and j. Decomposition of Iij into Cij and Bij permits the author to introduce Cij as an explanatory variable for the trade flow equation. However, what does Bij represent? Yamazawa argues that Bij includes the size of trade partners, similarity of cultures (such as language and religion), distance, alliance, economic union, etc. Hence, the author would like to adopt the "gravity model"[14] to explain trade flows. Conventional gravity models include income levels of both exporting and importing countries plus the distance between them. The analyzer usually

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[13] See Yamazawa (1970) pp78-81.

[14]Gravity models usually include the income level of both exporting and importing countries plus the distance between them. The model was invented by making an analogy to the famous Newton's Law of Gravity in astronomy, which states that "any two particles of matter attract one another with a force which is proportional to the product of their masses and inversely proportional to the square of their distant apart."

adds other factors such as economic group dummies or cultural dummies[15]. Considering all of these, the specification of the regression analysis used here is as follows:

T_{ij} = f [GDPX, GDPM, DIST, CIJ, HK, SPORE, CHN, MEX, ASEAN, NAFTA, ANZ] ----------(5),

Refer to Table 12 for a detailed description of the variables.

Gravity models are often criticized for including income levels of both exporting and importing countries, GDPX and GDPM. This kind of criticism is based on the fact that import functions almost always include the income level of the importing country only as a demand indicator. However, we should note that import functions, such as what is used in macroeconomic models, usually focus on the total imports of a certain country. On the contrary, the concern here is to determine bilateral trade flow, not total imports of a country.

Table 12 Description of Explanatory Variables

Tij	Exports from Country i to j
GDPX	GDP of exporting country
GDPM	GDP of importing country
DIST	Distance between exporting and importing countries
CIJ	Complementarity index with respect to Country i's exports and j's imports
HK	Hong Kong interport dummy: 1 if the flow involves Hong Kong, 0 otherwise
SPORE	Singapore interport dummy: 1 if the flow involves Singapore, 0 otherwise
CHN	China dummy: 1 if the flow involves China, 0 otherwise
MEX	Mexican export dummy: 1 if Mexican exports. 0 otherwise
ASEAN	ASEAN subregion dummy: 1 if the flow is intra-ASEAN, 0 otherwise
NAFTA	NAFTA subregion dummy: 1 if the flow is intra-NAFTA, 0 otherwise
ANZ	ANZ subregion dummy: 1 if the flow is between Australia and New Zealand, 0 otherwise

[15] A weak point of the gravity model framework is that it usually does not include price variables. Bias in trade flow generated by relative prices between two countries are considered to constitute residual terms. There are several studies elaborating the association between residual terms and price changes. One example is Ichikawa's work in Chapter III.

One way to determine bilateral trade flows is to divide the total imports of a certain economy, which can be derived from usual function, using some weight. If the weight can be specified as a function of a trade partner's income level, distance, other dummies, etc., then the individual import function basically takes the form presented in a gravity model. The expected sign of GDPX and GDPM is therefore positive.

Distance (DIST) entered the equation as a main obstacle to international trade. Freight costs of course are an important element of the obstacle, but at the same time, this variable can be regarded as a "psychological barrier" to the traders. Since this variable is introduced as an impeding factor, the expected sign for the estimated coefficient is negative.

SPORE and HK dummies are added to control the effect of huge re-exports of interports. Note again that Export values used in this analysis include re-exports. Ignoring this would lead to a misleading estimation of each coefficient, because the exceptionally large export values of Hong Kong and Singapore compared to their income and geographical locations, etc, would not be fully explained by a naïve specification model[16]. Expected signs for the coefficients are positive.

Country dummies, CHN and MEX entered the model in order to adjust abnormal residuals measured in preliminary regression runs, which accompanied the trade flows involving China and Mexico. Several reasons lie behind the introduction of China dummy. Firstly, China, for a long time, was relatively closed to other economies under the communist regime. Secondly, China is considered more self-sustaining, as she is endowed with various natural and human resources to produce a wide range of industrial goods. Thirdly, until recently the foreign exchange rate of Renminbi Yuan was over-evaluated, like other centrally planned economies, which made Chinese GDP seemingly larger than reality. So a negative sign is expected to China dummy[17]. The reason for the introduction of the Mexico dummy is

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[16] Kinoshita(1997) pointed out that transit trade in Hong Kong and Singapore bring about seemingly swollen trade values in East Asia (excluding Japan). He also suggested that value added contents of the exports from these two intermediate ports were not high, and that developed economies still shared the site of ultimate demand and supply.

[17] The Chinese economy was thought of as rather closed if we confine our scope to the APEC region.

more technical. The Mexico dummy is "on" for its exports only and mainly in order to adjust for underestimated export values reported to IMF by the Mexican authorities[18]. Possible explanations for the underestimation include past smuggling. The other reason for the Mexico dummy is to control the heavy trade bias towards the adjacent big economy, the U.S.

Sub-region dummies also enter the equation to check whether or not regional integration, such as ASEAN, NAFTA and ANZ, results in a drift of intra-regional trade in those sub-regions. Positive coefficients are expected for those sub-regional dummies.

Estimation Result: Basic Model

Estimates of the bilateral trade flows are shown below in Table 13. The samples selected include trade flows from 17 economies, consisting of 16 members of APEC plus EU12 as a whole. Since the quantitative variables, including Tij, in the equations are natural log transformed, any bilateral relation with a zero observation was excluded. Regression was run for the samples of the years 1970, 1980,1990 and 1995[19], and the method adopted was the ordinary least square (OLS) method.

As a result of regression, most of the coefficients are estimated as expected and statistically significant. However, changes in estimated coefficients over time were also

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However, if we broaden our scope to the rest of the world, indeed, other large developing economies, such as Brazil and India, are often more closed than China. In this current analysis the main scope is the Asia Pacific Region, and in comparison with the countries in the region, which are characterized by their active international trade, China "looks" rather closed.

[18] Trade values released from the Mexican authorities were consistently underestimated, especially the figures for 1991 and before. For example, its total exports and imports in 1990 released from the authority are 27,167 and 31,425 million US dollars, but those values compiled from trade partner's statistics are 41,025 and 40,132 million US dollars, respectively. See IMF(1996) pp6-7.

[19] Because of a lack of sufficient trade data, Cij values for the sample of 1995 were substituted by values for 1990.

interesting. In many cases, absolute values of estimated coefficients shrank over time[20]. GDP of both exporting and importing countries are estimated to hold high explanatory power, and coefficients are relatively stable over time. However, coefficients for the exporting country's GDP dropped by a wider margin, probably implying that the importing country came to have more power in determining trade flows, and that it was getting more and more difficult for developed economies to export their goods just because they are backed by a huge production base.

Coefficients of distance were found to be an important impeding factor to international trade. Again, coefficients shrank over time, and rather drastically. This suggests that distance was becoming less important as a trade barrier. Several factors can be attributed to this phenomenon, including decreased shipping costs and the fact that traded goods became more and more compact during the estimation period. Technological innovation no doubt played an important role in "miniaturization".

The importance of trade complementarity was also estimated to be highly significant, but its effect was weakening over time. This tells us that the vertical match of trade structure was gradually disappearing as a determination of trade flow in the region. We might further infer that horizontal trade was getting enhanced.

Other dummy variables decreased their impact on the trade flows. Coefficients for interport dummies, HK and SPORE, were estimated to be highly significant but generally fell overtime. Positive coefficients imply that trade flows involving Hong Kong and

Table 13 Determinants of Trade Flows in APEC

Dependent Variable : ln Tij
Specification: Equation (5)

	1970		1980		1990		1995	
Dependent Variables	Coefficients	t-values	Coefficients	t-values	Coefficients	t-values	Coefficients	t-values
CNST	12.960**	9.17	12.386**	17.72	11.612**	21.57	10.039**	15.64
GDPX	0.920**	12.02	0.825**	20.77	0.786**	26.40	0.767**	21.09
GDPM	0.861**	11.52	0.839**	21.17	0.824**	27.74	0.775**	21.47

[20] Similar observation is stated in Yamazawa and Nohara (1985) pp131-132.

DIST	-1.003**	-5.62	-0.906**	-10.48	-0.815**	-12.67	-0.593**	-8.11
CIJ	1.994**	5.48	1.249**	5.79	1.535**	6.43	1.205**	4.27
HK	1.875**	4.75	0.822**	4.21	1.035**	7.17	1.204**	7.11
SPORE	1.893**	4.90	1.738**	9.13	1.519**	10.87	1.383**	8.35
CHN	-3.611**	-8.40	-1.227**	-6.18	-0.713**	-4.94	-0.249	-1.54
MEX	-3.331**	-6.48	-2.612**	-9.95	-2.249**	-11.77	-2.157**	-9.84
ASEAN	0.018	0.03	-0.220	-0.85	0.055	0.28	0.603*	2.53
NAFTA	-0.593	-0.68	-0.476	-1.13	-0.314	-1.00	0.881*	2.43
ANZ	1.953	1.50	1.271*	1.99	1.383**	2.84	1.909**	3.31
Adj R2		0.644		0.823		0.904		0.844
F-value		36.20		93.62		172.01		110.43
Sample size		232		233		236		236

Note: **Statistically significant at 1% level.

* Statistically significant at 5% level.

Singapore tend to "swell" in comparison with their income level and distance with trade partners, etc. Hong Kong is famous for its re-exports to and from China, and Singapore is known for re-exports with neighboring economies, as well as its exports and imports related to the petroleum refinery industry[21]. The impact of Hong Kong dummy fell at a larger margin, which might be in line with China's open-door policy after 1980s.

Dummies for China and Mexico were both estimated to be significant for all the sample years. Most impressive is the trend of the China dummy, whose negative impact on trade flows constantly weakened and in 1995 at last lost its statistical significance. In 1970, the political situation of China was turbulent amid the Great Cultural Revolution, and foreign trade was strictly controlled. Also, it should be noted that the Mao administration stressed to the citizens to "sustain themselves." These factors combined to lead to a high coefficient for the 1970 regression. As China opened up her door to the world in the 1980s, the negative impact on trade flows gradually went away. It might be pointed out that the nature of the dummy changed over time: In 1970, its nature was more of "politics" or "regime", in that Maoism overwhelmingly ruled upon China's international trade. But by 1990, the nature of the dummy was more of a "large economy": A large market and rich endowment of natural

[21] For example, in 1995, re-exports occupied 83% of total exports of Hong Kong, and 20% for Singapore. As for the petroleum exports of Singapore, it amounted to 4% of the total exports in 1995.

and human resources enhance domestic trade.

The trend of three sub-region dummies is interesting. The significance of those dummies generally increased over time. In 1995, estimated coefficients of the three dummies proved statistically significant. For ASEAN and NAFTA dummies, coefficients were not significant for the period 1970-90. However, coefficients were estimated to be positive and significant in the regression of the 1995 samples. This could be associated with the launch of AFTA and NAFTA in 1992 and 1994, respectively. Also, "growth triangles" in the South East Asia possibly explains the rising statistical significance of ASEAN dummy[22]. However, the significance was less than of ANZ dummy. As shown in Table 9, trade intensity indexes, Iij, for the intra-regional trade of ASEAN and NAFTA were quite high compared to the world standard. Nevertheless, the regression result tells us that the geographical closeness and complementarity of trade structure among sub-region members can mostly explain the close trade relationship in sub-regions. On the contrary, the rising significance of the ANZ dummy is impressive. Although Iij between Australia and New Zealand was high, their trade structure was not complementary---rather competitive---, as shown in the low Cij value between them. These two countries implemented a lot of measures to promote trade between them. The rising significance of ANZ dummy suggests the possibility of increasing trade flows between the countries with a competitive trade structure.

3. EFFECT OF FDI AND HONG KONG REVERSION ON REGION'S TRADE-----USING MODIFIED MODEL

So far we have not intensively discussed the impact of FDI on trade in this paper. Now we will move on to analyze the effect of FDI on trade. For this purpose, the author would like to add FDI variables to Equation (5) . What is the major expected effect of FDI

[22] McDonald argued that several kinds of growth triangles exist in ASEAN, and that in most of the cases, FDI by overseas Chinese play an important Role. For further discussion see McDonald(1997) pp.8-12

on the trade of both home and host countries? Blackhurst and Otten[23] presented a brief summary about the possible effects of FDI. Based on a literature survey about FDI outflows from major industrialized countries, they pointed out that the impact on the home country's trade tends to be positive but generally weak, and the impact on the exports is marginally distinct. On the contrary, they indicated that FDI's positive impact on the recipient country's exports is evident, while that on the imports is less impressive[24]. The author would like to test whether or not their observation holds to the samples of APEC members.

However, a couple of problems arose in adding FDI variables. The first one concerns availability of data. Because bilateral investment flows on a common statistical base were not available, the author adopted the data released in *IMF, "Balance of Payments Statistics"*. The data in the IMF statistics are not a bilateral flow, but inflow from and outflow to the rest of the world.

To test the observation of Blackhurst and Otten, we need to test the significance of four variables: FDI outflow from the exporting country, FDI inflow into the exporting country, FDI outflow from the importing country and FDI inflow into the importing country. The definition of these variables are as follows.

$$\mathbf{FDIOP_i = \Sigma_{t=68,94}\,[FDIO_{it}*0.9^{(95-t)}] / GDP_{i95}} \text{----------} \mathbf{(6.1)},$$

$$\mathbf{FDIIR_j = \Sigma_{t=68,94}\,[FDII_{jt}*0.9^{(95-t)}] / GDP_{j95},} \text{ ----------} \mathbf{(6.2)},$$

$$\mathbf{FDIOR_j = \Sigma_{t=68,94}\,[FDIO_{jt}*0.9^{(95-t)}] / GDP_{j95}} \text{---------} \mathbf{(6.3)},$$

$$\mathbf{FDIIP_i = \Sigma_{t=68,94}\,[FDII_{it}*0.9^{(95-t)}] / GDP_{i95},} \text{ ----------} \mathbf{(6.4)},$$

where subscripts i and j denote exporting and importing country, respectively,

$FDIOP_i$: presence of outward FDI stock in exporting country

$FDIIR_j$: presence of inward FDI stock in importing country

$FDIOR_i$: presence of outward FDI stock in importing country

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[23] See Blackhurst and Otten (1996) pp20-22.

[24] However, Blackhurst and Otten added that theories cannot *ex ante* determine whether FDI brings about a positive or negative effect on trade.

$FDIIP_j$: presence of inward FDI stock in exporting country

$FDIO_{it}$: FDI outflow from exporting country to the rest of the world in year t

$FDII_{jt}$: FDI inflow into importing country from the rest of the world in year t

$FDIO_{jt}$: FDI outflow from importing country to the rest of the world in year t

$FDII_{it}$: FDI inflow into exporting country from the rest of the world in year t

GDP_{i95}: GDP of exporting country in 1995.

GDP_{j95}: GDP of importing country in 1995.

Note that in calculating FDI stocks, a 10% depreciation was uniformly applied[25]. Those FDI variables represent the relative presence of foreign capital in recipient countries, as well as that in the home country. Considering the properties of the FDI variables used in this analysis[26], the author adopted to test two major hypotheses as follows.

H_o: FDI inflow into exporting country increases its exports and FDI outflow from importing country increases its imports.

H_1: FDI outflow from exporting country increases its exports and FDI inflow into importing

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[25] The 10% depreciation rate of FDI may sound pretty outlying compared to that applied for the domestic investments. However, it should be reminded that FDI is valued not only for its physical capital or money that foreigners bring into the recipient economy , but also for the technology they bring with them. In many cases, the rent of technology runs out more quickly than physical capital. Considering this, the author used 10% depreciation. For further justification of this depreciation rate, refer to Choi and Hyeon (1991).

[26] Investment flows are in reality bilateral, like trade flows. Therefore FDI related variables had better take a form similar to trade related variables, such as Cij and Tij, for consistency. However, as mentioned, due to lack of data, FDI variables available to this analysis represent those to and from the rest of the world. For example, the investment flow from country i to j can be jointly, but only implicitly, signified by two variables, FDI outflow from country i and FDI inflow into country j. This is the case for the opposite direction of FDI flow, hence the adoption of two hypotheses described in the text from various combinations of four variables.

country increases its imports.

Test equations related to H_o and H_1 take the following form.

F_{Ho}=f(.....FDIIR, FDIOP)----------(7.1)
F_{H1}=f(.....FDIOR, FDIIP)----------(7.2)

where, "....." in the above equations implies other explanatory variables in the gravity model which already entered Equation (5). To reject Ho against H_1, ideally speaking, FDIOR and FDIIP in F_{H1} needs to be significant, while FDIIR and FDIOP in F_{Ho} needs to be insignificant. To reject H_1 against Ho, the opposite procedure should be applied. As a result of testing, hypothesis H_1 was rejected in favor of Ho[27]. This implies that outward FDI tends to boost imports, while inward FDI tends to increase exports.

The second problem relates to "no report" of FDI data by some countries. Among such cases the most troublesome is Hong Kong's case. It is supposed that, like in the case of trade, Hong Kong plays a key role as an entrance point of FDI with a final destination of China. For example, most of Taiwanese FDI to China passed Hong Kong. However, the Hong Kong government does not report neither inward nor outward FDI figures. Analysis neglecting this fact would lead to misleading estimations. In order to avoid this, the author devised a case in which China and Hong Kong integrated as one nation. Trade flows involving China and Hong Kong were added up, to form observations for "unified China". A similar operation was performed for GDP. The Hong Kong dummy was then deleted, and trade between Hong Kong and China vanished because it is regarded as a domestic transaction. By making this adjustment, we successfully circumvented the problem of missing FDI figures.

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[27] T-values for FDIOR and FDIIP were -1.65 and 1.67, respectively. This implies that the effect of outward FDI on exports is unclear and so is the effect of inward FDI on imports. Therefore, H_1 was clearly rejected.

Table 14 Determinants of Trade Flows:

Impact of FDI and Hong Kong Reversion

Dependent Variable: Tij

Dependent variables	Coefficients	t-values
Constant	11.235**	15.11
ln GDPX	0.844**	19.98
ln GDPM	0.767**	19.31
ln DIST	-0.854**	-10.33
SPORE	1.203**	6.87
CHN	0.394*	2.39
MEX	-2.163**	-9.92
ASEAN	0.181	0.76
NAFTA	0.441	1.23
ANZ	1.081*	1.98
ln FDIOP	0.038**	2.14
ln FDIIR	0.135**	2.69
Adjusted R^2		0.861
F-statistic		116.14
Sample Size		206

Note: Sample period is 1995.

** Statistically significant at 1% level

* Statistically significant at 5% level

The results of regression analysis are shown in Table 14. The specification is Equation (7.1), and the sample year was 1995[28].

Firstly, the effects of both FDI outflow from the importing country and FDI inflow into the exporting country were estimated to have a positive and highly significant impact on trade flows. A substantially stronger impact was estimated for the exporting country's FDI inflow,

[28]Since FDI figures used here are basically accumulated ones, the author was inclined to allow for a long period of time for the artificially calculated variables to behave themselves. Therefore the author did not try to estimate the model with FDI variables for the samples prior to 1990. Also, the modified model deals with Hong Kong's return to China, which is going to take place in July of 1997. Therefore, it would be better to focus on the most recent data.

which more than tripled the FDI outflow from the importing country.

Secondly, with Hong Kong's reversion to China, the China dummy absorbed the positive effect of Hong Kong dummy. Thus, China's dummy was estimated to be positive and statistically significant at a 5% level. In the estimation of the trade flows in 1995 in the model without FDI variables, the effect of the China dummy was proven to be unclear. However in the modified case here, the value of the coefficient turned positive. This value is regarded as the magnitude of Hong Kong's transit trade function to intermediate third parties, which will remain with her even after reversion.

Thirdly, the effect of income and distance is estimated to be more dominant if FDI variables enter the estimation. This result means that supply capacity, purchasing power, and distance are still major determinants for the trade flow between countries with weak investment ties. The downward trend of estimated coefficients over time in Equation (5) may be associated with the growing explanatory power of FDI as a determinant of international trade flows.

Lastly, sub-region dummies became insignificant as FDI variables entered the regression. The estimation of Equation (5) for 1995 suggests that sub-region dummies have a certain extent of drift effect on trade flows. It is supposed that the sub-region effect measured in Equation (5) was absorbed into FDI variables. Furthermore, we can infer that the essence of the sub-region effect, at least partially, lies in enhanced investments within each sub-region.

These results can translate into a policy implying that both FDI by developed economies and attraction of FDI by developing economies should be promoted to expand exports. Also, if given priority, we should promote the attraction of FDI into developing economies. Furthermore, export expansion through FDI attraction will provide developing economies with an incentive to abide by the "Non-binding Investment Principles," which was declared in the APEC Bogor Meeting in 1994.

4. CONCLUSION

Exports in the APEC region expanded rapidly during the past two and one-half decades. Major findings through descriptive analysis in the first section are listed as follows:

(1) APEC exports expanded more rapidly compared to the world, and APEC's superiority in terms of export growth was more distinct in the 1990s.

(2) In the 1970s, Japan and the U.S. mainly contributed to the region's export growth. However, developing groups in the region gradually increased their contribution to the export growth in the region in the 1980s and 1990s.

(3) Behind the growing power of the developing groups lay substantial change in comparative advantage starting with yen appreciation. Change in comparative advantage induced outward FDI from developed economies, especially Japan, and the increased FDI in turn fed back to increased trade flows in the region.

(4) The increasing intra-APEC trade ratio revealed the deepening interdependence in the region. Increased intra-APEC trade accompanied interdependence in individual sub-regions such as ANZ and NAFTA.

(5) Trade intensity indexes (Iij) visualized the interdependence in individual sub-regions in APEC. Also, geographical closeness and income levels of the importing and exporting economies tended to correlate to the intensity index values. However, it was also shown that APEC members gradually diversified their trade partners.

(6) Revealed comparative advantage indexes (RCAx) visualized the above observation about changing comparative advantage in the region; Japan was losing advantage in labor-intensive goods and instead NIEs, China and ASEAN seized the advantage.

(7) Complementarity indexes (Cij) showed that the region's trade pattern was shifting from a vertical one towards a horizontal one. Lowered Cij values across the region proved the trend of holizontalizaion.

Considering these results, determinants of trade flows in the region were tested in the second section using a gravity model. Three major findings came as a result of econometric analysis.

(1) The income level of both the importing and the exporting countries positively affected bilateral trade flows, and the distance negatively affected bilateral trade flows. This

result confirmed the "gravity" nature of the trade flows in the region.

(2) Estimated coefficients of most variables shrank over time. Miniaturization of traded goods might lead to decreasing the impact of distance, while negative impact of China's dummy told of her open-door policy after the start of the 1980s. The positive impact of intermediate ports, Hong Kong and Singapore dummies shrank, maybe a reflection of China's open-door policy.

(3) Until 1990, closeness and income levels almost always determined strong trade ties in the APEC sub-regions, such as NAFTA and ASEAN. After official implementation of NAFTA and AFTA, all the sub-regional dummies turned out to be significant.

The prior model was modified to test the validity of FDI variables and the effect of Hong Kong's reversion to China. Major findings are as follows.

(1) Attraction of FDI enhanced exports. This is an encouraging result for developing economies who wish to expand exports. Also, FDI outflow tended to increase imports. This contradicts the view of "horizontal FDI" or "tariff jumping FDI", in which imports into the home country tend to decrease.

(2) As China merged with Hong Kong to form a "unified China" by assumption, the negative impact of the China dummy and positive impact of the Hong Kong dummy canceled out. A slight margin of positive impact of China's dummy remained, which signified the extent of Hong Kong's transit trade function to the third parties.

(3) China fully understands the need to contribute more to the global trade liberalization. But it is currently reluctant to join WTO immediately, considering the strong opposition of the public enterprises, and possible policy constraints due to the binding nature of the WTO commitments. Instead, China is involved in APEC rather actively, as an exercise for its future entry to WTO. The positive coefficient of the China dummy confirmed the need for accelerated liberalization. Further, the econometric result suggests China's deeper involvement into APEC process, given the difficulties in persuading the domestic opposing groups.

(4) Enhanced FDI for the past two and one-half decades might lead to the downward trend

of estimated coefficients in the basic model. Also, we can infer that the essence of sub-region effect lies in enhanced FDI within each sub-region.

(5) It was shown that liberalization of FDI brought about expansion of exports. The export expansion effect through increased FDI is expected to get developing economies in the region to abide by the "Non-binding Investment Principle," which the APEC Bogor Meeting declared in 1994. In the Bogor Declaration, the developing members are expected to apply the process of trade and investment liberalization by the 2020. However, developing economies in the region have been generally reluctant to liberalize, fearing the cost and risk that it may bring. Also, the validity of the principle is in doubt just because it is "non-binding". With the incentive of export expansion through investment liberalization, the author expects further progress in investment liberalization and trade development in the APEC.

Appendix Table Commodity Classification

Broad Sectors	Sub-sectors	Commodities	Corresponding SITC Code Numbers (R1)
Minerals	M1	Mineral Materials	27+28
	M2	Mineral fuels	3-332
	M3	Petroleum products	332
	M4	Non-ferrous metals	68
Agricultural Products	A1	Crude food stuff	0-[A3]
	A2	Agricultural materials	2+4-[M1]-251
	A3	Processed food	013+(02-0223-025)+032+(046～048)+053+0554+(06-0611)+0713+0723+073+09
Labor-Intensive Manufactures	L1	Textiles	65
	L2	Clothing	84
	L3	Leather and footwear	61+851
	L4	Furniture and wood products	63+82
	L5	Rubber and plastic products	62+58
	L6	Miscellaneous manufactures	Otherwise specified
Capital-Intensive Manufactures	C1	Beverage and tobacco	1
	C2	Pulp, paper and paper products	251+54+892
	C3	Chemicals	5-58
	C4	Glass and non-metal products	66
	C5	Iron and steel	67
	C6	Metal products	69
Machinery	T1	Industrial materials	71
	T2	Electric machinery	72
	T3	Motor vehicles	732
	T4	Other transport equipments	73-732
	T5	Precision instruments	86
		Total	0～9

* [ ] indicate sub-ector codes

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