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9 A Perspective on the Effects of NAFTA on Korea

Honggue Lee

9.1 Introduction

A free trade agreement (FTA) has significant implications for trade and investment flows in and out of the free trade area, as it reshapes the conditions of competition between member countries and outsiders. A regional preferential arrangement can induce the replacement of a higher-cost source in one member with a lower-cost source in another member, resulting in trade creation. On the other hand, a preferential arrangement often gives rise to the replacement of a more efficient source in a nonmember with a higher-cost source in a member, causing trade diversion. The members of the agreement are concerned with the net effect of trade creation and trade diversion. For member countries, preferential liberalization will improve welfare if trade creation exceeds trade diversion. By contrast, nonmembers are mostly concerned with the trade diversion effect. Trade diversion arises when an FTA generates a change in relative prices between the products originating in member countries and products originating in nonmember countries and a switching of import sources from relatively more efficient nonmembers to preferentially treated member suppliers. Nonmembers also worry about an increase in the level of protection against them by member countries. Often, the removal of trade barriers within large markets results in the raising of the actual or potential barrier against the outside world.

The North American Free Trade Agreement (NAFTA) is an "expanded" free trade agreement in the sense that it goes beyond the conventional reduction of tariffs and nontariff barriers. On top of dealing with general market access, NAFTA addressed an array of domestic policy issues ranging from local content requirements to rules of origin, competition policies, intellectual property rights, dispute settlement mechanisms, and foreign direct investment. As such,

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NAFTA could have both negative and positive effects on the rest of the world. Negative effects could stem from the diversion of trade and investment away from countries that do not belong to NAFTA. Negative effects would escalate into "trade suppression" should the agreement result in higher levels of protection against outsiders. On the other hand, positive effects could result from accelerated growth within the three NAFTA partners. The "growth dividend" of NAFTA could offset the agreement's discriminatory effect in the long run.

According to preliminary studies on the effects of NAFTA, the overall net effect for the rest of the world is relatively insignificant (see Primo Braga 1992 for details). NAFTA is not likely to have a serious impact on nonmember countries as far as trade flows are concerned. Moreover, the completion of the Uruguay Round is expected to mitigate the diversion effect of NAFTA. For instance, the average tariff rate of the United States, which stayed around 5 percent, is to be cut by one-third as the result of the Uruguay Round trade talks. This additional cut in tariff rates will reduce the discriminatory effect of preferential liberalization in North America. For another instance, bilateral quotas negotiated under the Multi-Fiber Arrangement (MFA) umbrella are to be phased out over 10 years after the conclusion of the Uruguay Round. This reform will lessen the discriminatory effect of eliminating quotas on Mexico against nonmember countries.

Despite the small aggregate effect, however, the effects on specific sectors or individual countries could be significant. While NAFTA is a movement toward "freer" trade among its partners, it does not imply free trade within North America. Several nontariff barriers at the sectoral level will remain in the form of new rules designed for the benefit of member countries. Consequently, companies in those sectors where rules of origin or local content requirements are applied in a discriminatory fashion could be susceptible to severe losses resulting from trade diversion.

At the same time, the (trade and investment) diversion effects of NAFTA are likely to be felt differently among nonmember countries. NAFTA is based on the experience of CUSFTA (the Canadian-U.S. Free Trade Agreement) or the terms of accession of Mexico to CUSFTA. Countries in Latin America and the Caribbean have shown less concern with the discriminatory effects of NAFTA, as they are more interested in the prospective Western Hemisphere Free Trade Area. By contrast, members of the U.S.–Caribbean Basin Initiative have been concerned with trade diversion, as their existing preferences could be eroded by NAFTA. Outside the Western Hemisphere, it is hard to identify the immediate "victims" of the discriminatory effects of NAFTA. Neither the European Union nor developing countries in Asia and Africa show great concern. Only the Asian newly industrialized economies (NIEs) and Japan seem to be directly concerned about the possibilities of trade and investment diversion.

NAFTA's effects on nonmember countries will depend on the pattern of their international specialization. For instance, the diversion of trade and investment away from Japan will be different from that away from Korea: Japan's special-

ization pattern is less like Mexico's than Korea's is; hence, Korea is more susceptible to the diversion effect than Japan. Like most industrialized economic partners of NAFTA that specialize in technology-intensive industries, Japan is less likely to be affected by Mexico's accession in the U.S.-Canada Free Trade Area. On the other hand, Korea's concern with NAFTA has to do with its potential or actual "rivalry" with Mexico in the U.S. market. Many of Korea's major export items compete with Mexican products in the U.S. market. In view of the role that the United States has played as an outlet for Korean exports, Korea has reason to worry about the emergence of a potentially discriminatory NAFTA.

Most adverse impacts of NAFTA for nonmembers are felt through trade diversion. Yet the main message of quantitative studies focusing on NAFTA highlights the importance of capital flows in determining the impact of NAFTA on both members and nonmembers. In particular, barriers to capital flows, including the cost of international financing, are expected to play a much larger role in shaping NAFTA's welfare effects than its preferential trade liberalization components (see Primo Braga et al. 1994).

While NAFTA consolidates a prior trend toward increased intraregional investment between the three countries, it also encourages inward direct investment from outside the region. Multinational firms from nonmember countries invest in North America in order to exploit the growth prospects of an enlarged market and to escape latent trade barriers. Despite recent economic turbulence resulting from its macroeconomic mismanagement, Mexico is likely to benefit from the increased confidence of investors in the expanded North American market. The projected capacity of intended investment well exceeds domestic demand. Many investments from outside are suspected of taking advantage of Mexico and Canada as export platforms from which to serve the North American market. Yet, other investments are being made to gain access to the Mexican market.

In the following, the diversion effects of NAFTA are discussed in relation to Korea's trade performance. In particular, the extent of trade diversion associated with NAFTA is investigated with regard to competition between Korea and Mexico in the U.S. market. For that purpose, a series of economic indicators, which draws on partial equilibrium analyses of competition between Korea and Mexico, is examined.

9.2 Korea's Economic Ties with NAFTA Members

9.2.1 Trade Relations

Exports and Imports

The amount of trade flow between Korea and NAFTA members started rising rapidly in the early 1980s. It surpassed $30 billion in 1988 ($34 billion), peaked at $38 billion in 1991, and has stayed at $37 billion since then. While

Table 9.1 **Korean Exports (billion U.S. dollars)**

Year	NAFTA	Japan	EC11	APEC11	United States	Canada	Mexico
1975	1.682186	0.999604	0.729258	0.416475	1.480498	0.196794	0.004894
1976	2.756692	1.463806	1.101120	0.631974	2.433963	0.313542	0.009187
1977	3.312916	1.518486	1.341487	0.755377	3.002117	0.297261	0.013539
1978	4.280469	2.051529	1.817312	1.058086	3.943307	0.326047	0.011115
1979	4.656868	2.642944	2.301391	1.479617	4.246108	0.386378	0.024381
1980	4.868155	2.382991	2.602920	2.310194	4.481955	0.341536	0.044663
1981	6.035316	2.739962	2.657748	2.746709	5.505332	0.480015	0.049970
1982	6.602964	2.693962	2.795941	2.680638	6.118009	0.441977	0.042978
1983	8.792832	2.689189	2.991306	2.639403	8.114244	0.627750	0.050838
1984	11.234928	3.808912	3.192705	3.275508	10.338910	0.876695	0.019323
1985	11.886684	3.766509	3.111112	3.610784	10.634998	1.225603	0.026083
1986	15.003972	4.366943	4.173768	3.826197	13.709028	1.244287	0.050657
1987	19.594209	7.058927	6.488212	5.310175	18.013200	1.447860	0.133149
1988	23.135853	10.321734	7.992441	8.322185	21.168185	1.688199	0.279470
1989	22.766880	11.841780	7.254621	9.527817	20.432270	1.872945	0.461665
1990	21.455263	10.959775	8.721625	11.395328	19.172382	1.724817	0.558064
1991	20.804532	10.909689	9.579618	14.125746	18.369764	1.661005	0.773763
1992	20.456137	10.145717	9.114189	20.089892	17.941072	1.608600	0.906465
1993	20.377811	10.271920	9.323735	24.011579	18.003603	1.376907	0.997301

Source: Korea Customs Research Institute, *Statistical Yearbook of Foreign Trade* (Seoul, 1995).

Korea has maintained a strong economic relationship with the United States, its relationship with the other NAFTA members has been less substantial. The amount of trade flow (exports plus imports) between Korea and the other two NAFTA countries was less than $1 billion until 1983 (see tables 9.1 and 9.2).

Korea's major exports to North American markets are household electronic goods, industrial electronics (including semiconductors), textiles and apparel, machinery, and footwear. Korea's major imports from North America include agricultural products, chemical products, metal products, and machinery. The United States constitutes the second largest source of imports for Korea. Yet its share began to decline recently as a result of a rapid increase in the import share garnered by Asian NIEs and ASEAN countries. The Asian NIEs and ASEAN countries as a group are becoming a major source of imports (see table 9.2).[1]

Korea's market share in North America peaked in 1988; however, it began to decrease as products made in China and Southeast Asian countries rushed into these markets. This decline of Korea's market share is attributable to a

1. The import market share of Asian NIEs has been increasing as more electric machinery and industrial electronic devices and parts are being imported from these countries. The import market share of ASEAN has increased as imports of raw materials have expanded. Australia's import market share has also been on the rise as the result of an increase in demand for nonferrous metals and other raw materials. China's share increased abruptly in 1991 to account for 5.7 percent of total imports. (China's share was insubstantial in the 1980s.)

Table 9.2 **Korean Imports (billion U.S. dollars)**

Year	NAFTA	Japan	EC11	APEC11	United States	Canada	Mexico
1975	1.003345	2.395788	0.539375	0.319125	0.876854	0.124520	0.001971
1976	1.018761	3.031103	0.647458	0.281972	0.951402	0.066805	0.000553
1977	1.334810	3.867749	0.786231	0.385788	1.248787	0.085017	0.001006
1978	1.761153	5.895952	1.365201	0.631397	1.620344	0.133945	0.006864
1979	2.961535	6.481254	2.072619	0.879439	2.759888	0.195174	0.006472
1980	2.874717	5.622481	1.544028	1.251654	2.636908	0.224002	0.013807
1981	3.546411	5.966598	1.875969	1.684179	3.204788	0.321262	0.020360
1982	4.288328	5.123092	1.702774	2.126466	3.806494	0.246683	0.235151
1983	4.391132	6.075369	2.121939	2.371375	4.009561	0.209124	0.172447
1984	5.147443	7.478236	2.703215	3.034364	4.673832	0.300976	0.172635
1985	4.916301	7.372691	2.966435	3.249493	4.514586	0.288706	0.113009
1986	5.032281	10.714075	3.064150	2.466605	4.553151	0.332956	0.146175
1987	6.734879	14.034761	4.733229	3.613989	6.167769	0.436490	0.130620
1988	10.524139	15.953447	5.979241	4.779502	9.619804	0.729283	0.175053
1989	14.207214	17.610135	6.513836	6.314504	13.044830	1.033606	0.128779
1990	14.174441	17.829387	7.929549	8.674053	13.099968	0.846514	0.227958
1991	17.059077	20.229941	9.284450	8.178432	15.747200	1.109908	0.201969
1992	16.268878	18.635443	9.001606	11.373990	15.211794	0.907984	0.149100
1993	16.306717	19.325485	9.601873	11.942687	15.236629	0.939183	0.130904

Source: Korea Customs Research Institute, *Statistical Yearbook of Foreign Trade* (Seoul, 1995).

recession in the United States and Korea's loss of competitiveness. At the same time, Korea's trade surpluses triggered protectionist pressure from the United States. (Korea had continuously recorded trade surpluses with NAFTA countries.) However, Korea's market share loss in North America has been supplemented by its market share gains in the Asian NIEs and ASEAN countries due to Korea's market diversification efforts and the economic growth of these countries.

Structure of Interdependence

The relative intensities of Korea's trade linkages with NAFTA countries delineate a structure of interdependence between Korea and NAFTA. These intensities are often expressed in terms of gravity coefficients (or trade intensity indexes). The gravity coefficients summarize each country's bias toward its trade partners. One version of gravity coefficients can be obtained from the ratio of an exporter's share in a given market to its share in a given region, which can be expressed as follows:

$$g(i, j) = \frac{x(i, j) / x(*, j)}{x(i, *) / x(*, *)},$$

where i and j denote the origin and the destination, respectively, and x the volume of trade.

The coefficients have been calculated for the Asia Pacific economies with a

Table 9.3 **Gravity Coefficients of APEC Countries in 1986 (import)**

	Destination															
Origin	Korea	U.S.	Canada	Mexico	Japan	China P.R.	Indo-nesia	Malaysia	Philippines	Thailand	Brunei	Singa-pore	Taiwan	Hong Kong	Australia	New Zealand
Korea		1.23	0.41	0.04	1.51	–	0.40	0.64	0.98	0.76	0.26	0.74	0.43	1.09	0.66	0.42
United States	1.25		3.59	3.76	1.63	0.75	0.72	1.05	1.47	0.89	0.70	0.93	1.36	0.45	1.46	1.12
Canada	0.23	2.04		0.18	0.46	0.27	0.17	0.11	0.08	0.13	0.01	0.04	0.18	0.05	0.22	0.26
Mexico	0.21	2.00	0.35		0.51	0.10	0.02	0.01	0.04	0.13	0.01	0.01	–	0.02	0.07	0.06
Japan	1.78	1.31	0.30	0.30		1.70	1.30	0.98	0.86	1.41	0.87	1.06	1.66	0.93	1.28	1.16
China P.R.	–	0.49	0.14	0.13	1.66		0.85	0.76	0.71	0.93	0.57	1.81	–	8.24	0.49	0.21
Indonesia	0.81	0.65	0.05	0.07	4.04	0.51		0.73	1.53	0.41	0.37	–	0.77	0.29	0.52	1.19
Malaysia	1.75	0.46	0.07	0.06	2.24	0.29	0.25		2.47	2.65	3.42	8.39	0.85	0.40	0.72	0.30
Philippines	0.66	1.08	0.14	0.01	1.93	0.61	0.38	1.81		1.36	0.32	1.26	0.86	0.92	0.62	0.45
Thailand	1.15	0.73	0.15	0.01	1.68	0.99	0.76	4.78	0.73		3.86	3.89	0.75	1.26	0.97	0.42
Brunei	1.60	0.08	–	–	4.99	0.00	0.03	0.04	1.04	8.41		2.32	0.51	0.01	0.23	–
Singapore	0.40	0.85	0.09	0.04	0.79	0.85	4.56	8.11	1.39	3.96	14.28		1.20	2.04	1.30	1.47
Taiwan	0.34	1.43	0.30	–	0.99	–	0.75	0.68	1.23	0.85	0.51	0.94		1.75	0.93	0.54
Hong Kong	0.49	1.09	0.31	0.04	0.38	5.69	0.29	0.74	1.88	0.61	0.49	0.94	1.54		0.88	0.00
Australia	1.60	0.40	0.18	0.12	3.02	1.72	1.55	1.82	1.41	0.85	1.14	0.84	1.41	0.60		8.09
New Zealand	0.75	0.64	0.26	0.37	1.74	1.11	1.12	1.41	1.53	0.70	0.51	0.74	0.61	0.47	8.36	

Data Source: International Monetary Fund, *Direction of Trade Statistics Yearbook* (Washington, D.C., 1993).

view to comparing them with NAFTA and East Asian countries. According to its gravity coefficients, Korea's trade in North America has been concentrated mostly in the United States. Korea has maintained much less intense relations with Canada and Mexico. The situation has not changed over the years. By contrast, Korea's trade relationship with APEC members has intensified. In 1986, Korea maintained intense trade relationships with only three regional partners (3 out of 15 countries): the United States, Japan, and Hong Kong (see table 9.3). That is, the gravity coefficient of Korea's exports to its trading partners in the region is greater than 1 for these three countries. In 1992, the number of countries increased to seven, adding Indonesia, China, Thailand, and Singapore (see table 9.4).

Small changes in Korea's trade pattern with NAFTA members can be attributed to the absence of structural linkages with Canada and Mexico driven by intraindustry trade or intrasectoral comparative advantage based on differences in labor costs. Korea's intensified trade linkages with China, Thailand, Indonesia, and Singapore have been established at the "expense" of Korean trade linkages with the United States. This development implies that Korean trade relations with APEC members (particularly East Asian countries) have become more diversified than before. Yet, Korea's extended trade relations with member countries in the region cannot be attributed to geography or policy-related (horizontal) ties with these countries.[2] Instead, it resulted from the changing pattern of comparative advantage and specialization, reflecting increasing vertical linkages between Korea and other NIEs.[3]

9.2.2 International Industry Linkages: Backward Linkages and Net Export Earnings

Backward Effects

The degree of trade interdependence can be measured further in terms of linkages between industrial sectors participating in international transactions and their domestic counterparts. The extent to which the Korean economy is integrated into the North American economy can be inferred from its standard input-output matrices.[4] The input-output matrix contains information on a key aspect of economic integration: international linkages through imported inputs

2. Peter Petri (1993) has suggested three different kinds of structural linkages: geographical linkages, vertical linkages, and horizontal linkages.

3. Another version of gravity coefficient, calculated from the ratio of an exporter's share in a given market to its share in all world trade, shows that Korea has maintained a very intense trading relationship with Asia Pacific countries and that its intensity increased during the 1980s. Korea has shown an increasingly strong regional bias: while Korea's gravity coefficients were greater than 1 with 10 out of 15 countries in 1986, they were greater than 1 with 12 countries in 1990 (see tables 9.5 and 9.6).

4. An international input-output system would delineate detailed information on the economic structures of several national economies and on relationships among these economies. Yet, for the present purpose, only Korea's input-output matrices are considered.

Table 9.4 **Gravity Coefficients of APEC Countries in 1992 (import)**

	Destination															
Origin	Korea	U.S.	Canada	Mexico	Japan	China P.R.	Indo-nesia	Malaysia	Philippines	Thailand	Brunei	Singa-pore	Taiwan	Hong Kong	Australia	New Zealand
Korea		1.02	0.35	0.40	1.67	1.03	2.40	0.81	0.23	1.30	0.09	1.34	0.94	1.15	0.87	0.46
United States	1.34		3.33	3.57	1.50	0.69	0.68	0.84	1.09	0.69	1.27	0.79	1.25	0.37	1.44	1.17
Canada	0.26	2.66		0.12	0.49	0.34	0.20	0.08	0.16	0.13	0.01	0.05	0.15	0.05	0.23	0.22
Mexico	0.08	2.74	0.61		0.23	0.06	0.13	0.01	0.02	0.05	–	0.03	0.09	0.02	0.06	0.03
Japan	1.54	1.25	0.40	0.36		1.15	1.48	1.48	1.49	1.86	0.48	1.15	1.88	0.93	1.24	0.95
China P.R.	0.69	0.81	0.22	0.04	1.23		0.29	0.33	0.22	0.45	0.07	0.42	–	4.67	0.67	0.40
Indonesia	1.61	0.53	0.13	0.06	3.35	1.16		0.81	0.64	0.40	0.43	1.37	1.06	0.33	1.36	0.38
Malaysia	0.96	0.74	0.15	0.09	1.40	0.48	0.93		1.37	1.72	3.14	5.77	0.78	0.50	0.83	0.52
Philippines	0.56	1.54	0.27	0.04	1.88	0.35	0.50	0.91		0.50	0.10	0.63	0.67	0.51	0.54	0.29
Thailand	0.55	1.09	0.24	0.11	1.99	0.39	0.82	1.54	0.73		0.84	2.72	0.60	0.72	0.10	0.58
Brunei	2.62	0.04	0.00	–	4.42	0.04	–	0.03	4.15	3.60		1.74	0.66	0.00	–	–
Singapore	1.56	0.89	0.14	0.06	0.58	0.64	2.76	5.48	1.23	2.83	11.30		0.84	1.34	1.00	0.86
Taiwan	0.41	1.28	0.37	0.16	1.15	–	1.27	1.26	1.68	1.38	0.09	0.88		1.92	1.02	0.68
Hong Kong	0.33	0.67	0.22	0.29	0.33	8.95	1.01	0.67	2.43	0.40	0.52	1.44	1.94		0.52	0.43
Australia	1.77	0.36	0.20	0.05	2.78	1.02	2.42	1.10	0.98	1.03	0.44	1.78	1.20	0.36		9.91
New Zealand	1.29	0.56	0.26	0.35	1.76	0.79	1.14	1.26	1.33	0.71	0.45	0.47	0.71	0.35	10.59	

Data Source: International Monetary Fund, *Direction of Trade Statistics Yearbook* (Washington, D.C., 1993).

Table 9.5 **Gravity Coefficients in 1986 (export + import)**

	Destination															
Origin	Korea	U.S.	Canada	Mexico	Japan	China P.R.	Indo-nesia	Malaysia	Philippines	Thailand	Brunei	Singa-pore	Taiwan	Hong Kong	Australia	New Zealand
Korea		2.241	0.765	0.227	7.257	–	1.376	2.659	1.911	1.749	3.844	1.301	0.858	2.155	2.046	0.944
United States	2.125		4.905	4.501	5.149	0.681	1.186	1.206	2.071	1.118	0.534	1.306	2.862	1.375	1.136	1.160
Canada	0.752	4.823		0.405	1.799	0.452	0.274	0.245	0.289	0.333	–	0.144	0.667	0.369	0.468	0.525
Mexico	0.333	4.864	0.645		1.640	0.145	0.050	0.040	0.061	0.165	–	0.049	–	0.050	0.133	0.272
Japan	2.993	2.272	0.687	0.802		2.874	4.678	2.699	2.121	2.495	6.570	1.784	2.387	1.533	3.008	2.181
China P.R.	–	0.782	0.384	0.297	5.940		1.056	1.016	1.254	1.692	–	2.361	–	14.413	1.707	1.167
Indonesia	1.539	1.290	0.252	0.092	11.371	1.056		1.347	2.784	1.119	0.337	–	1.895	1.356	2.048	2.341
Malaysia	2.495	1.045	0.161	0.070	5.660	0.760	0.766		4.614	6.293	3.831	20.748	1.586	1.033	1.989	1.123
Philippines	1.601	2.010	0.230	0.050	5.401	1.358	1.842	5.186		1.912	2.046	3.111	2.203	2.970	1.469	1.590
Thailand	1.636	1.079	0.251	0.235	5.354	1.387	1.409	7.392	2.238		15.740	7.531	1.696	2.177	1.446	0.760
Brunei	2.527	0.597	–	–	12.352	0.055	0.159	1.968	1.881	14.572		12.762	0.956	0.191	0.555	–
Singapore	1.093	1.331	0.146	0.042	3.966	2.309	8.418	15.682	2.725	7.493	11.451		2.310	3.337	1.933	1.849
Taiwan	0.765	2.775	0.610	–	5.292	–	1.781	1.747	2.574	1.641	1.165	2.001		3.580	2.196	1.110
Hong Kong	1.998	1.314	0.361	0.055	3.528	13.068	1.092	1.370	3.035	1.739	0.246	2.730	3.978		1.375	0.490
Australia	1.966	1.129	0.384	0.141	6.681	1.750	1.818	2.423	1.861	1.439	1.051	1.925	2.038	1.350		12.981
New Zealand	1.015	1.117	0.461	0.383	4.744	1.107	2.045	1.444	1.734	0.859	0.362	1.777	1.115	0.925	14.338	

Data Source: International Monetary Fund, *Direction of Trade Statistics Yearbook* (Washington, D.C., 1993).

Table 9.6 **Gravity Coefficients in 1992 (export + import)**

	Destination															
Origin	Korea	U.S.	Canada	Mexico	Japan	China P.R.	Indo-nesia	Malaysia	Philippines	Thailand	Brunei	Singa-pore	Taiwan	Hong Kong	Australia	New Zealand
Korea		1.679	0.566	0.550	2.691	1.579	3.000	1.693	0.351	1.663	3.301	2.158	1.188	1.651	2.362	1.540
United States	1.758		5.297	5.444	1.963	0.784	0.943	1.300	2.312	1.243	0.852	1.263	1.954	1.137	1.175	1.209
Canada	0.586	5.503		0.801	0.739	0.441	0.341	0.219	0.504	0.335	0.012	0.182	0.515	0.306	0.466	0.448
Mexico	0.494	5.481	0.776		0.631	0.116	0.194	0.128	0.072	0.154	–	0.089	0.274	0.201	0.113	0.458
Japan	2.611	1.933	0.756	0.640		1.984	3.793	2.570	3.303	3.156	3.978	1.785	2.545	1.499	2.855	1.995
China P.R.	1.402	1.198	0.508	0.089	1.735		1.191	0.744	0.576	0.754	0.118	0.917	–	11.478	1.257	0.807
Indonesia	3.485	0.964	0.340	0.193	4.006	1.552		1.824	1.243	1.010	0.499	–	2.185	0.841	3.352	1.256
Malaysia	1.798	1.255	0.253	0.138	2.487	0.852	1.721		2.989	3.232	3.474	12.370	2.159	0.994	1.783	1.624
Philippines	1.774	2.021	0.420	0.060	2.785	0.594	1.133	2.437		1.033	5.475	2.129	2.386	1.754	1.690	1.591
Thailand	1.515	1.298	0.313	0.165	3.108	0.855	1.146	3.358	1.323		5.325	5.033	1.978	1.157	1.080	1.091
Brunei	3.363	0.793	0.013	–	4.341	0.147	–	3.094	7.204	5.482		–	0.818	0.230	–	–
Singapore	2.542	1.305		0.092	1.729	1.198	4.759	11.967	2.032	4.879	11.335	1.676	2.075	2.763	1.174	0.183
Taiwan	1.092	1.956	0.518	0.285	2.549	–	2.080	2.079	2.824	1.869	0.808		1.630	3.036	1.947	1.239
Hong Kong	1.763	0.794	0.257	0.274	1.637	14.184	1.121	1.251	2.883	1.123	0.326	2.626	4.023		1.131	0.747
Australia	2.394	1.152	0.403	0.116	3.038	1.240	3.217	1.932	1.722	1.757	1.232	2.849	1.923	1.028		17.620
New Zealand	1.533	1.053		0.460	1.963	0.871	1.206	2.392	1.992	0.897	–	1.125	1.215	0.758	19.718	0.390

Data Source: International Monetary Fund, *Direction of Trade Statistics Yearbook* (Washington, D.C., 1993).

and exported outputs. The information contained in the input-output matrix reveals the structure of "international production chains." In particular, the input-output matrix can be used to infer "international backward linkages," measures of which are very useful tools in assessing a relationship between trade and the domestic economy. International backward linkage measures indicate the direct and indirect import requirements of a particular demand sector (see Petri 1993 for details).

$$IM = M(I - A_d)^{-1}F,$$

where IM denotes the vector of imports due to a change in F (a final demand vector), A_d is the domestic input coefficient matrix, and M is the import coefficient matrix. This measure indicates the amount of imports required to produce a unit of output in a particular industry, and hence the degree of dependence on foreign resources (see tables 9.7–9.10 for the following analysis).

Korea's imports from NAFTA (APEC) countries induced by the increase in its exports to these countries amounted to $5.6 billion ($11.2 billion) in 1990, while they were $3.14 billion ($4.97 billion) in 1985 (see table 9.9). In five years, Korea's induced imports from NAFTA countries less than doubled, while its induced imports from APEC members more than doubled. The United States accounted for 56 percent of Korea's total induced imports in 1985 and 44 percent in 1990. Canada accounted for 6.8 percent in 1985 and 4.0 percent in 1990. The combined share of these two countries declined from almost 63 percent to 48 percent. Mexico's share rose to 1.3 percent in 1990. This change implies that Korea's backward linkages with these countries have lessened a lot during the 1985–90 period. On the other hand, induced imports from Japan increased more than three times, while those from the United States less than doubled. These developments indicate that it will take time for Korea to expand the basis of its integration into North America (and into the APEC area as a whole) and that Korea's dependence on Japanese inputs has indeed deepened despite Korea's deliberate efforts to reduce its trade dependence on Japan.

When it comes to sectoral linkages, induced imports from North America are largest in the metal products and machinery sector (see table 9.9). The chemicals and chemical products, primary metal products, and textiles and leather sectors follow the metal products and machinery sector in order of importance. Yet, the rate of increase between 1985 and 1990 was fastest in the food, beverages, and tobacco products sector. This sector is followed by the paper, printing, and publishing and lumber and wood products sectors in order of magnitude.

Net Export Earnings

Given the structure of export supply, net export earnings reflect another aspect of international linkages. Net export earnings are export revenues net of imported inputs used for the production of exportables. Thus, sectoral contri-

Table 9.7 **Korean Exports to APEC Countries (million U.S. dollars)**

Country	Industry 1	2	3	4	5	6	7	8	9	Total
					Year = 1990					
Australia	13.6	257.3	1.6	23.5	109.4	10.8	64.5	401.1	63.6	945.4
Brunei	0.2	0.1	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.5
Canada	19.0	648.4	2.6	7.0	106.3	11.2	37.3	806.4	86.6	1,724.8
China	3.6	107.1	5.4	37.0	194.3	15.0	78.9	133.9	4.5	579.6
Hong Kong	66.4	1,456.5	18.5	145.7	357.5	20.9	195.3	1,221.3	177.6	3,659.6
Indonesia	28.0	328.5	0.4	13.0	149.2	6.9	117.8	401.4	15.9	1,061.2
Japan	331.2	3,665.8	175.9	35.6	1,166.6	352.3	1,546.2	3,259.4	426.7	10,959.8
Malaysia	2.4	49.7	0.4	5.2	47.8	4.5	103.9	472.8	11.8	698.6
New Zealand	1.2	38.0	0.3	4.9	15.6	1.9	14.4	39.9	9.7	125.9
Philippines	1.8	100.9	2.3	5.8	89.2	3.3	62.1	224.0	4.3	493.7
Singapore	11.0	226.6	2.6	6.2	125.0	8.6	137.7	1,181.5	36.9	1,736.1
Taiwan	21.8	176.8	19.8	5.9	197.8	17.0	182.8	511.6	31.0	1,164.5
Thailand	3.3	216.5	0.7	9.5	185.0	4.8	153.0	337.5	18.9	929.2
United States	108.1	6,837.6	64.1	106.8	703.7	113.7	700.0	9,187.7	1,350.7	19,172.4
Mexico	17.4	139.5	0.8	1.1	15.7	0.7	16.1	344.9	21.8	558.1
APEC	628.9	14,249.4	295.5	407.1	3,463.3	571.7	3,410.1	18,524.5	2,259.9	43,810.4
					Year = 1985					
Australia	7.2	125.5	0.9	2.8	46.4	3.7	35.5	115.2	29.1	366.3
Brunei	0.0	0.0	0.0	0.0	0.0	1.5	2.5	0.5	0.0	4.8
Canada	11.3	392.3	0.6	1.6	38.0	8.5	35.7	688.3	49.3	1,225.6
China	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong	20.8	408.5	5.6	24.6	148.7	23.3	121.9	745.2	47.6	1,546.1
Indonesia	0.2	20.1	0.2	0.5	68.9	2.5	42.5	53.8	0.8	189.6
Japan	157.2	1,095.7	45.9	9.2	841.3	93.0	468.8	946.1	109.4	3,766.5
Malaysia	0.6	18.2	0.3	2.8	17.0	5.0	27.6	370.2	2.6	444.3
New Zealand	0.3	19.2	0.0	0.1	3.9	0.2	3.3	7.1	2.1	36.3
Philippines	0.0	21.3	0.1	0.7	96.3	1.6	33.6	82.4	0.2	236.2
Singapore	2.1	116.2	2.9	4.1	37.3	13.7	22.0	276.9	5.2	480.3
Taiwan	2.6	27.8	0.2	1.0	56.1	0.6	38.6	38.1	4.4	169.5
Thailand	0.7	18.6	0.0	1.0	60.5	0.8	23.7	29.4	2.5	137.3
United States	62.0	4,115.0	42.1	47.1	460.3	98.6	602.2	4,445.0	762.6	10,635.0
Mexico	0.0	12.2	0.0	0.1	0.5	0.0	3.4	8.5	1.3	26.1
APEC	264.9	6,390.6	98.9	95.9	1,875.4	253.2	1,461.3	7,806.6	1,017.2	19,264.0

Data Sources: Bank of Korea, *Input-Output Tables* (Seoul, 1985, 1990); Korean Customs Administration, *Statistical Yearbook of Foreign Trade* (Seoul, 1985, 1990).

Note: Industries—1, food, beverages, and tobacco products; 2, textiles and leather; 3, lumber and wood products; 4, paper, printing, and publishing; 5, chemicals and chemical products; 6, nonmetallic mineral products; 7, primary metal products; 8, metal products and machinery; 9, miscellaneous manufactured products.

butions to net export earnings reveal the extent of sectoral import dependence. The export earnings ratio calculates the sectoral ratio of net export earnings to exports. For instance, a high export earnings ratio indicates low import dependence. Such sectoral net export earnings are obtained from the following formula:

Table 9.8 **Korean Imports from APEC Countries (million U.S. dollars)**

Country	Industry 1	2	3	4	5	6	7	8	9	Total
					Year = 1990					
Australia	324.9	35.2	0.5	10.6	86.9	2.6	508.3	62.5	4.1	1,035.5
Brunei	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada	23.6	21.7	18.8	168.8	269.8	3.6	175.6	122.8	3.5	808.2
China	159.9	572.3	8.5	0.4	328.7	201.9	236.2	42.8	36.4	1,587.2
Hong Kong	1.3	60.5	2.1	11.6	27.2	6.0	25.2	432.6	14.1	580.5
Indonesia	23.4	32.8	292.5	28.3	112.0	12.2	36.8	9.7	9.3	557.0
Japan	52.6	743.3	60.7	171.5	3,482.6	257.2	1,806.9	11,048.3	207.0	17,830.2
Malaysia	73.7	8.7	128.3	0.3	76.5	4.3	58.1	164.3	0.9	515.0
New Zealand	36.2	8.8	6.9	39.2	68.4	0.0	53.2	1.8	0.0	214.7
Philippines	34.6	5.1	2.2	0.5	59.0	1.5	46.2	70.5	3.8	223.3
Singapore	11.1	2.1	4.0	9.4	354.6	5.5	42.5	448.6	2.2	880.2
Taiwan	14.0	313.5	3.6	45.6	166.5	28.3	193.1	537.6	52.9	1,355.1
Thailand	191.8	12.2	3.4	1.7	15.8	8.3	3.8	87.5	1.6	326.1
United States	364.2	267.3	116.9	787.7	2,783.1	96.5	1,202.5	7,326.3	155.1	13,099.5
Mexico	1.1	3.2	0.5	1.4	112.7	2.2	31.8	6.9	0.1	160.0
APEC	1,312.4	2,086.7	649.0	1,277.0	7,943.6	630.2	4,420.1	20,362.3	491.0	39,172.4
					Year = 1985					
Australia	90.3	11.4	0.2	3.0	30.0	0.3	119.4	13.7	0.3	268.5
Brunei	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada	6.9	7.7	2.5	48.3	142.2	5.6	33.6	41.7	0.2	288.7
China	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong	1.1	37.2	0.6	2.5	5.1	0.6	4.1	411.0	6.4	468.6
Indonesia	23.2	6.6	17.3	2.9	18.1	0.0	10.0	1.2	0.0	79.4
Japan	41.3	492.4	8.4	71.4	1,323.3	181.0	962.1	4,210.9	82.0	7,372.7
Malaysia	43.3	3.8	25.7	0.1	8.2	0.0	8.9	215.8	0.2	306.1
New Zealand	29.9	6.8	0.4	7.3	7.3	0.0	24.9	0.3	0.0	76.9
Philippines	25.3	0.7	1.1	0.0	9.0	0.1	18.5	67.9	0.1	122.7
Singapore	13.1	0.8	4.0	4.0	85.5	0.7	1.8	137.8	0.1	247.8
Taiwan	11.7	66.4	0.6	12.6	50.7	4.6	40.7	88.9	3.1	279.2
Thailand	22.5	4.5	5.1	0.8	2.1	0.0	4.3	30.0	0.0	69.4
United States	72.3	109.0	25.6	257.6	1,002.3	50.3	303.4	2,661.7	32.3	4,514.6
Mexico	0.0	0.0	0.0	0.1	62.9	0.0	2.6	7.4	0.0	73.2
APEC	380.9	747.2	91.4	410.6	2,747.0	243.3	1,534.1	7,888.4	124.9	14,167.9

Data Sources: Bank of Korea, *Input-Output Tables* (Seoul, 1985, 1990); Korean Customs Administration, *Statistical Yearbook of Foreign Trade* (Seoul, 1985, 1995).

Note: See table 9.7 note for key to industries.

$$NX = E - M(I - A_d)^{-1}E,$$

where A_d is the domestic input coefficient matrix, E denotes Korea's exports (to the Asia Pacific region), and M indicates the import coefficient matrix.

Net export earnings ratios in North American markets were around 82–98 percent in 1990 (80–96 percent in 1985) in the textiles and leather, metal prod-

Table 9.9 **Backward Effects of Korea's External Linkages with APEC Countries (million U.S. dollars)**

Country	Industry 1	2	3	4	5	6	7	8	9	Total
					Year = 1990					
Australia	15.2	31.7	1.6	7.8	61.4	3.0	44.3	73.8	1.0	239.9
Brunei	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.4
Canada	35.9	76.9	2.6	9.0	104.3	4.9	66.0	144.8	2.0	446.3
China	6.9	13.2	0.9	8.0	54.3	2.0	28.8	28.2	0.3	142.7
Hong Kong	81.3	172.5	6.4	39.1	246.7	9.7	137.1	232.6	4.3	929.7
Indonesia	19.1	38.6	0.9	6.4	72.8	3.2	55.7	75.2	0.9	272.7
Japan	212.6	434.9	29.5	53.7	715.2	38.7	602.6	648.3	10.9	2,746.3
Malaysia	3.7	6.7	0.8	3.2	32.9	2.8	55.3	82.0	0.4	187.8
New Zealand	2.2	4.7	0.2	1.3	8.5	0.4	6.4	7.8	0.1	31.8
Philippines	6.0	12.1	0.6	2.8	34.6	1.7	29.8	40.8	0.3	128.8
Singapore	14.6	28.4	2.2	7.5	87.5	6.4	110.6	203.6	1.1	461.9
Taiwan	11.9	22.2	3.2	5.5	77.4	4.3	78.1	94.5	0.8	297.7
Thailand	12.8	26.0	0.9	5.2	68.9	3.1	59.5	64.3	0.7	241.4
United States	378.0	822.1	37.0	105.2	1,081.0	56.7	821.2	1,650.6	23.8	4,975.7
Mexico	8.4	16.8	0.8	2.5	27.5	1.7	27.2	59.8	0.5	145.3
APEC	808.7	1,706.7	87.6	257.4	2,673.1	138.5	2,122.5	3,406.4	47.1	11,248.1
					Year = 1985					
Australia	5.2	15.6	0.4	2.0	23.4	1.6	17.3	24.8	1.0	91.1
Brunei	0.0	0.0	0.0	0.0	0.2	0.0	0.6	0.2	0.0	1.1
Canada	15.3	45.9	1.3	5.5	62.2	6.6	62.2	134.6	2.9	336.5
China	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong	16.8	48.7	1.7	9.8	87.0	8.2	85.2	148.8	3.0	409.3
Indonesia	1.1	2.9	0.1	0.8	15.2	1.0	13.3	11.8	0.2	46.2
Japan	48.4	131.7	4.4	16.7	269.8	15.4	178.7	209.7	7.9	882.7
Malaysia	1.2	2.8	0.5	2.1	17.6	3.4	34.4	70.2	0.2	132.5
New Zealand	0.7	2.2	0.0	0.2	2.5	0.1	1.3	1.7	0.1	8.9
Philippines	1.3	3.2	0.1	1.0	19.8	1.1	13.7	17.1	0.2	57.6
Singapore	4.7	13.5	0.5	2.5	25.3	2.8	26.4	53.9	0.8	130.5
Taiwan	1.4	3.7	0.1	0.8	13.4	0.8	11.3	8.8	0.2	40.6
Thailand	1.0	2.7	0.0	0.7	12.4	0.6	7.5	6.8	0.2	31.8
United States	158.9	491.7	13.3	53.6	593.9	49.8	492.2	908.3	31.0	2,792.8
Mexico	0.5	1.4	0.0	0.1	1.5	0.1	1.4	1.8	0.0	6.9
APEC	256.5	765.9	22.6	95.9	1,144.3	91.5	945.5	1,598.4	47.9	4,968.5

Data Sources: Bank of Korea, *Input-Output Tables* (Seoul, 1985, 1990); Korean Customs Administration, *Statistical Yearbook of Foreign Trade* (Seoul, 1985, 1990).

Note: See table 9.7 note for key to industries.

ucts and machinery, and miscellaneous manufactured products sectors (see table 9.10). The high export earnings ratio implies that import dependence is quite low in these sectors. By contrast, import dependence is high in such sectors as food, beverages, and tobacco products; paper, printing, and publishing; chemicals and chemical products; and primary metal products. Their indexes

Table 9.10 **Net Export Earnings of Korean Exports to APEC Countries (million U.S. dollars)**

Country	Industry 1	2	3	4	5	6	7	8	9	Total
					Year = 1990					
Australia	−1.6	225.6	0.0	15.7	48.0	7.7	20.2	327.3	62.6	705.6
Brunei	0.1	0.1	−0.0	−0.0	0.0	0.0	−0.0	0.9	−0.0	1.1
Canada	−16.9	571.5	0.0	−2.1	2.0	6.4	−28.7	661.7	84.6	1,278.5
China	−3.3	93.9	4.5	29.0	140.0	13.0	50.1	105.6	4.2	436.9
Hong Kong	−14.9	1,284.1	12.1	106.5	110.9	11.2	58.1	988.7	173.3	2,730.0
Indonesia	8.8	289.9	−0.5	6.6	76.5	3.7	62.2	326.3	15.0	788.4
Japan	118.6	3,230.9	146.5	−18.1	451.4	313.6	943.6	2,611.2	415.8	8,213.5
Malaysia	−1.3	43.0	−0.3	2.0	14.9	1.7	48.6	390.8	11.4	510.8
New Zealand	−1.0	33.3	0.0	3.6	7.0	1.5	8.0	32.0	9.6	94.2
Philippines	−4.3	88.8	1.7	2.9	54.7	1.7	32.3	183.2	4.0	365.0
Singapore	−3.7	198.2	0.3	−1.3	37.5	2.2	27.1	978.0	35.8	1,274.2
Taiwan	9.9	154.6	16.6	0.4	120.4	12.7	104.8	417.1	30.2	866.8
Thailand	−9.4	190.5	−0.2	4.3	116.0	1.8	93.5	273.1	18.2	687.8
United States	−269.9	6,015.5	27.0	1.6	−377.3	57.0	−121.2	7,537.1	1,326.9	14,196.7
Mexico	9.0	122.7	−0.0	−1.4	−11.8	−1.0	−11.1	285.1	21.3	412.8
APEC	−179.8	12,542.7	207.9	149.8	790.2	433.1	1,287.5	15,118.1	2,212.8	32,562.3
					Year = 1985					
Australia	2.0	110.0	0.5	0.8	23.0	2.1	18.3	90.4	28.1	275.2
Brunei	0.0	0.0	0.0	0.0	−0.1	1.5	1.9	0.3	0.0	3.8
Canada	−4.1	346.3	−0.6	−3.9	−24.2	1.9	−26.5	553.7	46.5	889.1
China	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hong Kong	4.0	359.7	3.9	14.8	61.6	15.1	36.7	596.4	44.6	1,136.8
Indonesia	−1.0	17.3	0.0	−0.2	53.8	1.6	29.2	42.0	0.6	143.4
Japan	108.7	964.0	41.5	−7.5	571.5	77.6	290.1	736.4	101.4	2,883.8
Malaysia	−0.6	15.4	−0.2	0.7	−0.6	1.6	−6.8	300.0	2.4	311.8
New Zealand	−0.4	17.0	0.0	−0.0	1.4	0.1	2.0	5.4	2.0	27.4
Philippines	−1.3	18.1	−0.0	−0.2	76.4	0.4	19.9	65.3	0.0	178.6
Singapore	−2.6	102.7	2.4	1.6	11.9	10.9	−4.4	222.9	4.4	349.8
Taiwan	1.1	24.1	0.0	0.2	42.7	−0.1	27.2	29.3	4.2	128.9
Thailand	−0.4	15.9	−0.0	0.4	48.2	0.3	16.2	22.7	2.4	105.5
United States	−96.9	3,623.3	28.8	−6.6	−133.6	48.9	110.0	3,536.7	731.6	7,842.2
Mexico	−0.4	10.8	−0.0	−0.0	−0.9	−0.0	2.0	6.7	1.2	19.2
APEC	8.5	5,624.7	76.3	−0.0	731.1	161.7	515.8	6,208.2	969.3	14,295.5

Data Sources: Bank of Korea, *Input-Output Tables* (Seoul, 1985, 1990); Korean Customs Administration, *Statistical Yearbook of Foreign Trade* (Seoul, 1985, 1990).

Note: See table 9.7 note for key to industries.

were negative in both years (except for paper, printing, and publishing in 1990 and primary metal products in 1985).

Several sectors have experienced a substantial increase in earnings ratio: nonmetallic mineral products, metal products and machinery, and miscellaneous manufactured products. This increase in earnings ratio implies that the

extent of these sectors' import dependence has declined. On the other hand, export earnings indexes went down in the primary metal products and chemicals and chemical products sectors, reflecting an increase in dependence on these imported inputs.

Yet, Korea's overall dependence on imports from North America increased slightly during that period (from 73.6 percent in 1985 to 74.1 percent in 1990). It was not much different from Korea's overall dependence on imports from Asia Pacific, which was 74.2 percent in 1985 and 74.3 percent in 1990. These results again show that Korea's dependence on imports from APEC countries has not changed much and that there is room for Korea to deepen interindustry linkages with its neighbors in the region.

9.2.3 Foreign Direct Investment

The pattern of foreign direct investment reveals the extent to which the Korean economy is integrated into the North American economy. The majority of foreign direct investment in Korea has come from the United States, which accounted for more than 29 percent of the total investment stock ($11.2 billion) as of the end of 1993.[5] The U.S. share of investment inflows into Korea grew over the past three decades: 37 percent (1960s), 55 percent (1970s), and 48 percent (1980s). After 1989, however, U.S. investment flows declined rapidly until 1992. Since then, they have resumed their growth. Canada's investment share is less than 1 percent of total inward direct investment to Korea (see tables 9.11 and 9.12).

Similarly, Korea's outward investment is destined for only a few countries: the United States, Indonesia, China, and Canada.[6] The combined stock of Korea's investment in the United States ($1.7 billion, or 31 percent of its total outward investment outstanding) and Canada ($409 million, or 7 percent) accounted for around 38 percent as of the end of 1993.[7] (It was 47 percent in 1990.) By contrast, Korea's investment in APEC countries constituted 79 percent of its total outward investment stock in 1990. APEC's share, however, declined slightly to 75 percent in 1993.

Almost half of Korea's overseas investment went to the manufacturing sector ($2.7 billion), of which around 80 percent ($2.2 billion) went to APEC countries and 34 percent ($930 million) to NAFTA countries. A closer look at manufacturing subindustries reveals more information. Korea's overseas investment went to selected industries in a limited number of countries. For instance,

5. The U.S. share remained at almost the same level in 1994 (28.5 percent of a total of $12.5 billion).

6. Although it tends to decline over time, the combined share of the top four host countries was around 68–74 percent in the late 1980s. Those countries are the United States, Indonesia, North Yemen, and Canada, in order of magnitude. Their combined share was 74 percent as of 1987, 73 percent as of 1988, and 68 percent as of 1989.

7. Indonesia and China accounted for $796 million (14 percent of the total) and $475 million (8.5 percent of the total), respectively. Yet, these numbers do not properly reflect the importance of China as a Korean investment destination. While investment in China was a new phenomenon, it increased eightfold over the three-year period (1991–93).

Table 9.11 **Korea's Investment Relationship with APEC Countries (thousand U.S. dollars)**

Country		1986	1987	1988	1989	1990	1991	1992
United States	Inward	71,379	50,328	163,801	172,591	224,452	213,488	245,242
	Outward	58,477	167,705	92,896	168,520	342,627	395,244	346,872
	Sum	129,856	218,033	256,697	341,111	567,079	608,732	592,114
Canada	Inward	112	360	1,157	808	7,134	953	2,990
	Outward	20,728	9,467	3,386	114,399	92,335	68,066	44,770
	Sum	20,840	9,827	4,543	115,207	99,469	69,019	47,760
Mexico	Inward	–	–	–	–	–	–	–
	Outward	0	0	0	347	0	10,835	324
	Sum	0	0	0	347	0	10,835	324
Japan	Inward	246,021	268,604	297,606	307,477	295,372	173,310	165,355
	Outward	1,968	1,279	6,503	10,179	10,925	14,934	63,617
	Sum	247,989	269,883	304,109	317,656	306,297	188,244	228,972
China	Inward	0	0	0	0	0	0	0
	Outward	0	0	0	6,360	15,974	42,468	141,161
	Sum	0	0	0	6,360	15,974	42,468	141,161
Indonesia	Inward	–	–	–	–	–	–	–
	Outward	1,519	125,048	18,998	75,390	163,979	170,075	164,408
	Sum	1,519	125,048	18,998	75,390	163,979	170,075	164,408
Malaysia	Inward	0	0	103	0	181	0	0
	Outward	116	794	1,294	3,081	17,529	69,555	23,661
	Sum	116	794	1,397	3,081	17,710	69,555	23,661
Philippines	Inward	0	0	153	0	0	280	0
	Outward	101	440	500	2,645	32,147	48,269	20,508
	Sum	101	440	653	2,645	32,147	48,549	20,508
Thailand	Inward	–	–	–	–	–	–	–
	Outward	45	180	8,052	9,141	12,807	32,489	26,357
	Sum	45	180	8,052	9,141	12,807	32,489	26,357
Brunei	Inward	–	–	–	–	–	–	–
	Outward	–	–	–	–	–	–	–
	Sum	0	0	0	0	0	0	0
Singapore	Inward	113	6,400	2,089	602	12,536	2,542	2,291
	Outward	0	324	198	158	2,777	5,526	13,426
	Sum	113	6,724	2,287	760	15,313	8,068	15,717
Taiwan	Inward	0	115	108	960	661	287	0
	Outward	0	0	0	185	2,007	3,972	5,163
	Sum	0	115	108	1,145	2,668	4,259	5,163
Hong Kong	Inward	876	36,257	14,906	11,327	16,260	6,095	8,371
	Outward	3,354	2,571	3,937	12,989	4,568	13,193	44,460
	Sum	4,230	38,828	18,843	24,316	20,828	19,288	52,831
Australia	Inward	2,288	50	0	447	0	0	0
	Outward	696	3,416	624	4,655	14,829	8,758	16,385
	Sum	2,984	3,466	624	5,102	14,829	8,758	16,385
New Zealand	Inward	18	18	18	18	18	18	18
	Outward	0	13	0	100	0	44	3,797
	Sum	18	31	18	118	18	62	3,815
APEC	Inward	320,789	362,114	479,923	496,302	561,112	396,955	425,529
	Outward	87,004	311,237	136,388	408,149	712,504	883,428	914,909
	Sum	407,793	673,351	616,311	904,451	1,273,616	1,280,383	1,340,438

Sources: Ministry of Finance, *Trends in Foreign Investment* (Seoul, July 1994); Bank of Korea, *Overseas Direct Investment Statistics Yearbook* (Seoul, 1993).

Note: Inward (arrival basis); outward (arrival basis).

Table 9.12 **Korea's Investment Relationship with APEC Countries (share in percent)**

Country		1986	1987	1988	1989	1990	1991	1992
United States	Inward	22.25	13.90	34.13	34.78	40.00	53.78	57.63
	Outward	67.21	53.88	68.11	41.29	48.09	44.74	37.91
	Sum	31.84	32.38	41.65	37.71	44.53	47.54	44.17
Canada	Inward	0.03	0.10	0.24	0.16	1.27	0.24	0.70
	Outward	23.82	3.04	2.48	28.03	12.96	7.70	4.89
	Sum	5.11	1.46	0.74	12.74	7.81	5.39	3.56
Mexico	Inward	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Outward	0.00	0.00	0.00	0.09	0.00	1.23	0.04
	Sum	0.00	0.00	0.00	0.04	0.00	0.85	0.02
Japan	Inward	76.69	74.18	62.01	61.95	52.64	43.66	38.86
	Outward	2.26	0.41	4.77	2.49	1.53	1.69	6.95
	Sum	60.81	40.08	49.34	35.12	24.05	14.70	17.08
China	Inward	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Outward	0.00	0.00	0.00	1.56	2.24	4.81	15.43
	Sum	0.00	0.00	0.00	0.70	1.25	3.32	10.53
Indonesia	Inward	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Outward	1.75	40.18	13.93	18.47	23.01	19.25	17.97
	Sum	0.37	18.57	3.08	8.34	12.88	13.28	12.27
Malaysia	Inward	0.00	0.00	0.02	0.00	0.03	0.00	0.00
	Outward	0.13	0.26	0.95	0.75	2.46	7.87	2.59
	Sum	0.03	0.12	0.23	0.34	1.39	5.43	1.77
Philippines	Inward	0.00	0.00	0.03	0.00	0.00	0.07	0.00
	Outward	0.12	0.14	0.37	0.65	4.51	5.46	2.24
	Sum	0.02	0.07	0.11	0.29	2.52	3.79	1.53
Thailand	Inward	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Outward	0.05	0.06	5.90	2.24	1.80	3.68	2.88
	Sum	0.01	0.03	1.31	1.01	1.01	2.54	1.97
Brunei	Inward	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Outward	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sum	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Singapore	Inward	0.04	1.77	0.44	0.12	2.23	0.64	0.54
	Outward	0.00	0.10	0.15	0.04	0.39	0.63	1.47
	Sum	0.03	1.00	0.37	0.08	1.20	0.63	1.17
Taiwan	Inward	0.00	0.03	0.02	0.19	0.12	0.07	0.00
	Outward	0.00	0.00	0.00	0.05	0.28	0.45	0.56
	Sum	0.00	0.02	0.02	0.13	0.21	0.33	0.39
Hong Kong	Inward	0.27	10.01	3.11	2.28	2.90	1.54	1.97
	Outward	3.85	0.83	2.89	3.18	0.64	1.49	4.86
	Sum	1.04	5.77	3.06	2.69	1.64	1.51	3.94
Australia	Inward	0.71	0.01	0.00	0.09	0.00	0.00	0.00
	Outward	0.80	1.10	0.46	1.14	2.08	0.99	1.79
	Sum	0.73	0.51	0.10	0.56	1.16	0.68	1.22
New Zealand	Inward	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Outward	0.00	0.00	0.00	0.02	0.00	0.00	0.42
	Sum	0.00	0.00	0.00	0.01	0.00	0.00	0.28
APEC	Inward	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Outward	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Sum	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Sources: Ministry of Finance, *Trends in Foreign Investment* (Seoul, July 1994); Bank of Korea, *Overseas Direct Investment Statistics Yearbook* (Seoul, 1993).

Note: Inward (arrival basis); outward (arrival basis).

Table 9.13 **U.S. Market Share**

Country	1983	1985	1987	1989	1991	1993
Canada	19.3	18.9	16.7	18.0	18.2	19.1
Mexico	6.4	5.4	4.9	5.6	6.3	6.9
United Kingdom	4.8	4.3	4.2	3.8	3.8	3.7
France	2.4	2.8	2.7	2.8	2.7	2.6
Germany	4.9	5.9	6.6	5.2	5.3	5.1
Italy	2.2	2.9	2.8	2.6	2.4	–
Japan	16.2	20.2	20.9	19.8	18.7	18.5
China	0.9	1.2	1.6	2.6	4.0	5.4
Korea	2.9	3.0	4.3	4.2	3.5	2.9
Taiwan	4.5	5.0	6.3	5.2	4.8	4.3
Hong Kong	2.5	2.5	2.5	2.1	1.9	1.6
Singapore	1.1	1.2	1.5	1.9	2.0	2.2

Source: OECD Trade Tapes (database; Paris, various issues).

investment in textiles and apparel is mostly concentrated in China and Indonesia; food and beverages and petroleum in Indonesia; leather products and footwear in China; and nonmetals in the United States. But, investment in fabricated metals has been locationally diversified, going to the United States, China, Malaysia, Indonesia, Thailand, and the Philippines.[8]

9.3 An Assessment of the Effects of NAFTA

9.3.1 The Potential Extent of Trade Diversion: Evidence

It is of interest to assess the extent of trade diversion attributable to NAFTA. From the Korean perspective, trade diversion is likely to arise because of preferential treatment granted to Mexico in the U.S. market. While it is difficult to measure directly the scope of trade diversion away from Korea, some useful indicators can be employed to assess indirectly the diversion effect.

Market Share

Market share is a good indicator of competitiveness, as it reflects the relative strength of a trading nation in a given market. Korea's share in the U.S. market increased to a peak of 4.6 percent in 1988 and declined continuously thereafter. In 1993, Korea's market share was at the same level it had attained in 1983. The decrease in market share can be partly attributed to a slowdown in growth and delayed recovery of the U.S. economy, but it is more attributable to the emergence of China and the East Asian NIEs, which replaced Korea as major producers of "low value-added" products (see table 9.13). At the same time, market share changes in the United States can be indirectly attributed to trade diversion due to the accession of Mexico to CUSFTA. An increase in Mexico's

8. See Bank of Korea (1994) for detailed statistical information.

market share seems to have contributed to declines in the market shares of its competitors. As shown in table 9.13, almost every country except China and Canada suffered a loss in market share after 1989–90. Although it is difficult to sort out the trade diversion effect from this data, it is not unreasonable to suspect that the scope of trade diversion will be substantial if the current trend continues.

Export Similarity Index

The trade diversion effect is likely to depend on the degree to which the exports of Mexico and Korea to the U.S. market are similar to each other. The export similarity index quantifies the trade diversion effect by measuring the extent to which Mexico's exports overlap Korea's exports. In the following equation, one version of the export similarity index is employed to assess the intensity of competition in exports between various countries to the markets of the United States and Canada:[9]

$$SI(a, b, c) = \sum_i \left| EX_i(ac) - \frac{EX_i(ac) + EX_i(bc)}{2} \right|.$$

This formula measures the *difference* in the export patterns of countries a and b to market c. If the commodity distributions of the exports of a and b are identical, then the index will take on a value of zero. $EX_i(ac)$ is the share of commodity i in a's exports to c. The data are from the OECD Series C import data available from 1981 to 1991. The data were disaggregated at the level of Standard International Trade Classification (SITC) two- to four-digit revision 3 categories. All calculations were made over manufactured exports and total exports. Export similarity indexes are reported in table 9.14 for 1981, 1986, and 1991 (or 1990).

Although the Korea-Mexico indexes became smaller throughout the years (from 0.87 in 1981 to 0.70 in 1990), they were still very large in comparison with that of any other pair in each year considered. This implies that Korean and Mexican exports to the combined U.S.-Canadian market were not similar and that the intensity of the competition between Korea and Mexico in the combined market was less significant than the competition between any other pair in every year considered. Korea competed in the U.S.-Canadian market less with Mexico than with Taiwan, Japan, APEC 11, and China. Taiwan was Korea's fiercest competitor in the U.S.-Canadian market in 1981, while Japan and APEC 11 (excluding Japan and NAFTA countries) replaced Taiwan as Korea's major export competitors in 1990. Almost the same results were obtained for the U.S. market alone.

Similarity indexes were also calculated for selected sectors: (1) food and live animals (SITC 0), (2) mineral fuels, lubricants, and related materials (SITC 3),

9. Finger and Kreinin (1979) developed an index of export similarity that measures the proportion of a country's exports matched by a competitor's exports in the same product category.

Table 9.14 **Similarity Indexes in the United States and Canada (total items)**

Year	KR-MX	KR-CN	KR-JP	KR-TW	KR-AP11	KR-EC	EC-AP12
				Combined U.S.–Canadian Market			
1981	0.87809	0.72818	0.49099	0.38417	0.57112	0.78384	0.65225
1986	0.76635	0.63513	0.35603	0.38570	0.44582	0.66793	0.63382
1990	0.69884	0.57381	0.38342	0.50819	0.47285	0.68935	0.67190
				U.S. Market Alone			
1981	0.87660	0.74097	0.49720	0.39183	0.57634	0.79196	0.65254
1986	0.76258	0.64033	0.35760	0.38695	0.44526	0.68406	0.64828
1991	0.70567	0.56148	0.39341	0.52811	0.47079	0.69015	0.68200

Source: OECD, *Foreign Trade by Commodities* (Paris, various issues).
Note: AP11 = AP12 − Korea.

(3) textile yarn, fabrics, made-up articles, n.e.s., and related products (SITC 65), (4) iron and steel (SITC 67), and (5) road vehicles including air-cushion vehicles (SITC 78). According to the results, reported in table 9.15, the export patterns of Mexico and Korea were very different in the agricultural (SITC 0) and primary input (SITC 3) sectors. The two countries showed highly dissimilar trade patterns even in the textiles and apparel (SITC 65) sector. Only in the automobiles sector were Mexico-Korea similarity indexes lower. Again, Mexico was not one of Korea's major competitors in North America except in the automobiles sector.

These results seem to imply that possible trade diversion caused by NAFTA would be limited in scope. Preferential treatment granted to Mexico would not then drastically reduce Korea's market share in the North American market.[10]

Specialization Structure

Revealed comparative advantage (RCA) indexes show the pattern of sectoral comparative advantage. They can be used to infer whether Korea's trade with NAFTA members is consistent with the principles of comparative advantage and whether its trade relationship with them is complementary or supplementary.

RCA indexes, which are supposed to identify the structural sources of specialization, were initially constructed by Balassa (1965). The original Balassa index measures whether a particular product's share of the exports of a certain

10. Similarity indexes reported in table 9.14 imply that Korea and Taiwan compete with each other increasingly less fiercely in U.S. and Canadian markets. At the same time, the sectoral similarity indexes selectively reported in table 9.15 do not show any tendency toward more serious competition between the two countries in these markets. Despite apparent similarity between their economic conditions, Korea and Taiwan do not seem to run against each other as serious contenders, at least in U.S. and Canadian markets. In this regard, Taiwan is likely to experience different sectoral impact effects of NAFTA than Korea. However, this does not imply that these two countries will face different levels of "total impact effects." As one of the discussants indicated, Taiwan also experienced "the same lack of impact of NAFTA" as Korea did.

Table 9.15 Similarity Indexes in the United States and Canada (five items)

Year	SITC[a]	KR-MX	KR-CN	KR-JP	KR-TW	KR-AP11	KR-EC	EC-AP12
				Combined U.S.–Canadian Market				
1981	0	0.89045	0.67159	0.77003	0.47536	0.79533	0.71219	0.69410
	3	0.99950	0.76446	0.93525	0.46813	0.93685	0.88714	0.09430
	65	0.84049	0.66491	0.47575	0.61729	0.60200	0.53684	0.54613
	67	0.49494	0.98461	0.10535	0.30907	0.41529	0.56143	0.56439
	78	0.69646	0.28711	0.20898	0.29075	0.23430	0.76302	0.75951
1986	0	0.81027	0.69330	0.58943	0.51171	0.61887	0.74578	0.64802
	3	0.97304	0.76166	0.90009	0.99701	0.91095	0.74640	0.18731
	65	0.69050	0.62070	0.40932	0.56801	0.53930	0.49605	0.50061
	67	0.35671	0.86047	0.13989	0.41816	0.35364	0.35392	0.36051
	78	0.60891	0.93284	0.33233	0.87432	0.87802	0.13948	0.24195
1990	0	0.85772	0.75642	0.61579	0.56599	0.63778	0.73902	0.71161
	3	0.98999	0.99177	0.98595	0.90192	0.98955	0.97622	0.38001
	65	0.73438	0.73438	0.44983	0.59652	0.59811	0.57052	0.54871
	67	0.60730	0.95962	0.24377	0.45847	0.52175	0.57183	0.48116
	78	0.29447	0.83333	0.32060	0.79145	0.66486	0.14080	0.26319
				U.S. Market Alone				
1981	0	0.88592	0.71962	0.76690	0.51860	0.79277	0.71976	0.70265
	3	0.99946	0.76446	0.93527	0.46813	0.93687	0.88342	0.09803
	65	0.89104	0.65037	0.49787	0.65002	0.62010	0.60396	0.61905
	67	0.50177	0.98549	0.09586	0.29390	0.39326	0.58715	0.58020
	78	0.69295	0.29841	0.22784	0.30030	0.25915	0.76271	0.76365
1986	0	0.80245	0.69464	0.58671	0.50584	0.61766	0.74768	0.66316
	3	0.97234	0.76166	0.90009	0.99701	0.91095	0.70490	0.26131
	65	0.76680	0.60143	0.41450	0.56974	0.53259	0.58305	0.55453
	67	0.35733	0.87252	0.14422	0.41749	0.35839	0.33264	0.35226
	78	0.54706	0.92284	0.37535	0.90566	0.90422	0.12755	0.29860
1991	0	0.86817	0.73150	0.67102	0.55826	0.69381	0.74741	0.71072
	3	0.96423	0.97637	0.80388	0.72524	0.82328	0.69847	0.47661
	65	0.79404	0.75346	0.49259	0.63426	0.64159	0.60329	0.60230
	67	0.68364	0.95802	0.26028	0.48377	0.60212	0.59978	0.50771
	78	0.31573	0.90805	0.36482	0.88184	0.70947	0.21101	0.26770

Source: OECD, *Foreign Trade by Commodities* (Paris, various issues).

Note: AP11 = AP12 − Korea.

[a] 0: Food and live animals
3: Mineral fuels, lubricants, and related materials
65: Textile yarn, fabrics, made-up articles, n.e.s., and related products
67: Iron and steel
78: Road vehicles (including air-cushion vehicles)

economy is greater or less than the average of a given reference zone. This index is useful for understanding the trade pattern and the structure of comparative advantage. In the Balassa index the structural sources of specialization are revealed by actual trade data. On the other hand, a qualitatively same measure can be obtained from import data, except for the fact that it should be read

in the opposite direction: the measures obtained indicate comparative disadvantage. Thus, the Balassa index can be used to infer whether a certain product meets the conditions for comparative advantage or disadvantage. Yet, the index can be contradictory if it is obtained from a different data set: while the export measure of a certain product shows comparative advantage, the import measure of the same product may show comparative disadvantage.

In this case, a measure of comparative advantage based on the trade balance (the difference between the value of exports and imports) is more useful. This measure, the Lafay indicator, determines whether the item concerned has comparative advantage or disadvantage by comparing its attributed trade balance with its actual trade balance in relation to GDP. The attributed trade balance is calculated with reference to an equilibrium trade balance by allocating to each product a fraction of the overall surplus or deficit. This attribution is made on a pro rata basis in relation to the economy's total trade. The Lafay indicator thus calculated can then be used for ranking products according to their comparative advantage status. Lafay's point is that the comparative advantage for a given item will be enhanced when the production of that item in the country increases faster than domestic demand for it, other things being equal. In other words, the comparative advantage of the item concerned will improve when the difference between the export and import ratios or the self-sufficiency ratio increases.[11] Although it is not free from several methodological problems, the refined Lafay RCA index eliminates distortions inherent in the Balassa index by taking into consideration the evolution of intratrade flows, macroeconomic conditions, and a weighting scheme reflecting the characteristics of the product at the world level.[12]

This Lafay indicator, f_{ik}, is defined as follows:[13]

$$f_{ik} = y_{ik} - z_{ik},$$

where

$$y_{ik} = a(e_k^t X_{ik} - i_k^t M_{ik})/Y_i,$$

$$z_{ik} = g_{ik} y_{ik},$$

$$g_{ik} = (e_k^t X_{ik} + i_k^t M_{ik})/(e_k^t X_i + i_k^t M_i),$$

$$X_i = \sum_k X_{ik},$$

$$M_i = \sum_k M_{ik},$$

11. Obviously not satisfied with the export-import ratio as an indicator of specialization, Lafay suggested taking account of domestic economic structure, emphasizing the importance of internal economic conditions in the evolution of specialization.

12. The data used here are compiled from the UN *International Trade Statistics Yearbook* and the Bank of Korea *Economic Statistics Yearbook*. The aggregation level is mostly SITC three-digit with a few SITC two-digit or SITC four-digit classifications.

13. World weights adjusted to a given base year would eliminate the impact of trade volume changes that are not specific to the economy in question. See Lafay (1992) for details.

Table 9.16 **Lafay Indexes of Korean Industries (million U.S. dollars)**

	SITC[a]																
Year	51	52	651	652–655	672–675	75	763	764	776	781	784	793	761	762	775	84	85
1981	−13.03	−2.42	7.17	24.22	8.01	−2.36	1.62	−3.09	1.05	1.85	−1.82	10.63	13.15	5.91	1.51	99.58	25.50
1982	−13.07	−1.52	4.81	19.93	12.62	−3.64	1.28	−5.14	2.34	1.05	−1.58	20.73	10.24	5.29	1.49	82.46	23.17
1983	−11.49	−1.27	4.90	18.19	7.37	−2.42	0.28	−2.40	0.44	1.49	−1.80	19.21	12.86	5.87	1.82	70.04	21.10
1984	−12.47	−1.76	4.60	16.88	3.18	0.91	0.17	−2.07	1.51	2.54	−1.43	18.25	14.31	6.82	3.54	70.51	19.88
1985	−12.96	−1.81	4.17	15.41	1.83	1.97	1.93	−0.02	0.62	6.61	−0.83	13.51	10.50	5.76	3.32	64.35	20.47
1986	−14.22	−1.82	2.05	14.67	4.63	1.48	3.55	1.25	−2.75	11.75	−2.01	13.80	11.36	6.10	4.61	54.93	20.06
1987	−15.05	−1.98	−0.27	13.90	2.06	4.91	5.33	3.41	−4.80	17.43	−2.74	5.42	12.59	7.57	5.26	53.11	20.44
1988	−16.18	−2.01	0.78	12.11	3.10	4.76	6.75	1.98	−1.89	17.35	−2.27	9.16	9.17	6.69	6.38	46.93	21.60
1989	−13.84	−1.85	1.21	12.00	2.88	5.36	6.13	3.55	2.59	9.50	−1.20	7.22	7.36	5.87	4.75	41.74	18.36
1990	−10.24	−1.84	1.14	13.67	4.77	4.34	5.27	4.13	4.79	7.52	−0.87	9.01	6.29	5.73	3.16	33.25	18.42

[a] 51: Organic chemicals
52: Inorganic chemicals
651: Textile yarn
652–655: Woven textiles
672–675: Ingots and plates of iron and steel
75: Office machinery
761: Television receivers
762: Radio receivers
763: Sound recorders and VTRs
764: Telecommunication equipment
775: Household electric equipment
776: Thermionic valves and semiconductors
781: Passenger motor vehicles
784: Motor vehicle parts
793: Ships and boats
84: Apparel and accessories
85: Footwear

and Y_i is *GDP*, a is a constant, e_k^i and i_k^i are weights $(W_k^0/W^0)/(W_k^t/W^t)$, and W is the volume of world trade.

The Lafay indexes reveal how the specialization structure evolves.[14] In the case of Korea, apparel and accessories (SITC 84) ranked first in the list of RCA indexes in 1981 among the items that have comparative advantage (see table 9.16). It was followed by footwear (SITC 85), woven textiles (SITC 652–655), television receivers (SITC 761), and ships (SITC 793). Among items with comparative disadvantage (with negative RCA indexes), organic chemicals (SITC 51) was the lowest. Telecommunications equipment (SITC 764), inorganic chemicals (SITC 52), and office machinery (SITC 75) in that order were among the next least advantageous items.

In 1990, apparel and accessories, footwear, and woven textiles, in that order, still topped the list of items with comparative advantage. However, ships and passenger motor vehicles (SITC 781) ranked fourth and fifth, respectively; while television receivers ranked sixth, down from fourth. The ranking also changed on the comparative disadvantage side. Organic chemicals, inorganic chemicals, and motor vehicle parts (SITC 784) were still at the bottom. Yet two items, office machinery and telecommunications equipment, gained comparative advantage in the middle of 1980s.

In sum, apparel, footwear, and fabrics remained the three most important items with comparative advantage throughout the 1980s. But, as revealed by the narrowing of their surpluses, their strength has declined. On the other hand, the organic chemicals group had the greatest comparative disadvantage. However, its deficit has been improving steadily.

Textile yarn was the item whose comparative advantage was most seriously eroded. The comparative advantage of steel products such as iron ingots and plates also declined. Other items with declining comparative strength included television receivers, sound recorders and videotape recorders (VTRs), and household electric equipment. On the other hand, telecommunications equipment and passenger motor vehicles were the two most important items whose comparative advantages improved. Office machinery and semiconductors also enhanced their positions in the comparative advantage chain.

During the 1980s, Korea's comparative advantage structure changed dramatically. Most important, the spectrum (the range between the index values of the greatest comparative advantage and those of the greatest comparative disadvantage items) narrowed, and the rank order changed. The specialization patterns have "deepened" in the sense that product diversification became easier than before. These data suggest that Korea's trade structure changed rapidly in the 1980s—although less drastically near the end of the decade.[15]

14. The RCA indices of the 57 major import and export items (SITC three-digit) have been calculated in accordance with the Lafay method for the period 1981–90. These indexes reveal the evolution of comparative advantage for Korea's industries in the 1980s. The RCA indexes of 17 major export goods are provided in table 9.16.

15. The results shown in Lafay (1992) indicate that West Germany and Japan are the two most stable economies in the sense that their pattern of dynamic comparative advantages remained

Korea's comparative advantage structure could be compared with the RCA indexes of NAFTA members. The comparison of the sectoral comparative advantage structure across countries should shed light on the patterns of Korea's trade relationship with NAFTA countries. NAFTA members' comparative strengths reflected in their respective trade data would reveal whether Korea's trade with those countries is consistent with the pattern of comparative advantage and whether Korea's trade relationship with NAFTA members is complementary or competitive.[16]

RCA indexes should be comparable across different countries. For that purpose, 24 common export items (SITC three-digit) have been selected for which national rankings are given. The export items have been graded according to their RCA values for four selected years: 1980, 1984, 1988, and 1992.

The chain of comparative advantage is listed in tables 9.17 and 9.18 for each of six countries and the European Community. As evidenced by the list, Korea was able to maintain comparative advantage in 12 to 14 sectors in the four selected years. For instance, Korea continued to have comparative advantage in footwear (SITC 851), man-made fabrics (SITC 653), ships and boats (SITC 793), and passenger motor vehicles (SITC 781). On the other hand, Korea had comparative disadvantage in petroleum products (SITC 334) and measuring and controlling instruments (SITC 874).

Canada maintained comparative advantage in 10 to 11 sectors except for 1988, when it had comparative advantage only in 8 sectors. Canada continued to have comparative advantage in paper products (SITC 641), crude oil (SITC 333), fertilizers (SITC 562), passenger motor vehicles (SITC 781), and iron (SITC 672–674). On the other hand, Canada's greatest comparative disadvantage lay in labor-intensive manufactured goods. Canada imported labor-intensive manufactured products and consumer goods from the Asia Pacific region and exported natural resources and resource-based products.

The number of sectors in which Mexico had comparative advantage continued to increase from 4 in 1980 to 9 in 1988, but it declined to 5 in 1992. Mexico's comparative advantage lay in crude oil (SITC 333), textile yarn (SITC 651), passenger motor vehicles (SITC 781), and internal combustion engines (SITC 713). Mexico had comparative disadvantage in motor vehicle parts (SITC 784), metalworking machine tools (SITC 736), and textile and leather machinery (SITC 724).

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unchanged over the 1967–86 period. On the other hand, Brazil exemplifies a rapidly changing economy with volatile comparative advantage chains.

Comparative advantage is distinct from competitiveness. Two essential points can be identified. First, competitiveness is related to the relative strength or weakness of a country in producing a given product, while comparative advantage is related to the strength or weakness of products for a given country. Second, competitiveness is often subject to macroeconomic fluctuations (exchange rate or wage rate), while comparative advantage is structural. See Lafay (1992) for details.

16. The following discussion of RCA indexes draws on the background papers of APEC countries submitted to the Pacific Economic Outlook Structural Meeting, held in Osaka, 27–28 September, 1993. See Asia Pacific Economic Cooperation (1994) for details.

Table 9.17 Lafay RCA Rankings by SITC Code

EC10	U.S.	Canada	Mexico	Japan	China	Korea
			Year = 1980			
781	792	641	333	781	894	851
821	752	562	651	674	874	653
784	874	334	851	793	851	651
724	81	673	821	673	821	674
736	784	674	334	653	793	894
713	713	11	653	784	792	562
674	562	793	11	713	784	673
673	651	781	752	776	781	793
874	793	81	776	736	776	641
651	653	672	894	672	752	781
793	776	821	81	724	736	821
672	672	724	562	651	724	11
653	724	651	781	894	713	81
562	736	653	673	641	674	776
792	821	851	793	874	673	752
851	11	894	641	562	672	784
11	894	752	672	821	653	874
894	673	792	713	752	651	724
776	641	776	874	851	641	736
752	674	736	792	81	562	672
334	851	874	724	792	334	713
81	334	713	736	11	333	792
641	781	784	674	334	81	334
333	333	333	784	333	11	333
			Year = 1984			
781	792	641	333	781	894	851
784	874	781	334	674	874	793
792	81	333	713	793	851	653
674	752	562	781	784	821	894
724	784	11	651	673	793	651
736	562	334	894	653	792	674
821	651	674	851	736	784	562
713	793	673	672	776	781	673
673	713	821	821	713	776	334
793	653	81	673	752	752	781
874	11	672	653	724	736	821
672	672	793	81	894	724	752
653	724	724	641	874	713	641
851	736	792	792	672	674	776
651	776	651	11	651	673	11
11	821	653	724	641	672	81
562	673	851	674	821	653	784
894	894	894	752	562	651	672
776	641	736	874	851	641	792
752	851	776	776	81	562	736
81	674	874	562	792	334	713
641	334	752	784	11	333	874
334	781	713	736	334	81	724
333	333	784	793	333	11	333

(*continued*)

Table 9.17 (continued)

EC10	U.S.	Canada	Mexico	Japan	China	Korea
			Year = 1988			
781	792	333	333	781	333	851
784	81	641	713	784	81	781
793	874	781	781	674	851	793
674	562	562	651	713	11	653
724	752	11	673	793	894	894
776	793	334	752	776	653	752
736	651	673	851	752	821	673
673	11	81	562	736	334	651
792	653	821	334	724	672	674
874	736	672	641	673	793	821
713	724	793	821	653	713	562
821	672	724	894	874	752	672
651	776	674	672	641	736	641
653	713	651	776	672	641	11
11	673	653	793	651	781	776
672	784	851	653	894	784	81
851	674	736	674	562	792	713
894	821	894	81	821	776	784
81	641	874	874	851	874	724
752	894	776	736	81	651	334
562	851	752	724	792	724	736
641	334	713	792	11	673	874
334	781	792	11	334	674	792
333	333	784	784	333	562	333
			Year = 1992			
11	792	333	333	781	333	793
784	874	641	781	784	851	653
724	81	781	713	793	894	851
792	562	562	651	674	821	781
736	11	334	562	713	11	674
674	793	673	793	776	81	752
793	651	672	776	724	793	894
781	736	11	851	752	752	776
673	784	792	894	736	673	673
874	653	674	672	673	713	651
713	776	81	752	653	672	562
653	713	793	821	874	874	821
821	724	724	653	334	784	672
672	672	821	792	641	736	641
651	752	651	81	651	653	784
851	673	736	641	894	781	81
776	821	653	674	672	641	713
894	641	851	724	562	792	724
81	674	894	874	821	334	11
752	894	874	673	851	651	736
562	851	776	11	792	674	874
334	334	752	736	81	724	792
641	781	713	334	11	562	334
333	333	784	784	333	776	333

Table 9.17 (continued)

Sources: United Nations, *International Trade Statistical Yearbook* (New York, 1984, 1992); International Monetary Fund, *International Financial Statistics* (Washington, D.C., 1994).

[a] 11: Meat
81: Animal feed
333: Crude oil
334: Petroleum products
562: Fertilizers
641: Paper products
651: Textile yarn
653: Man-made fabrics
672: Iron, ingots
673: Iron, steel shapes
674: Steel shapes and steel plates
713: Internal combustion engines
724: Textile and leather machinery
736: Metalworking machine tools
752: Automatic data-processing machines
776: Thermionic valves, tubes, photocells
781: Passenger motor vehicles
784: Motor vehicle parts
792: Aircraft
793: Ships and boats
821: Furniture
851: Footwear
874: Measuring and controlling instruments
894: Toys, games, and sporting goods

The United States had comparative advantage in 12 sectors in 1980. But since then it has maintained comparative advantage in only 7 to 9 sectors. The United States' comparative advantage remained in aircraft (SITC 792), measuring and controlling instruments (SITC 874), and fertilizers (SITC 562). Automatic data-processing machines (SITC 752) was in the comparative advantage chain, but it lost its place in 1992. By contrast, motor vehicle parts (SITC 784) regained comparative advantage in 1992 after a lapse in 1988. On the other hand, the United States had comparative disadvantage in passenger motor vehicles (SITC 781), footwear (SITC 851), and iron shapes, plates, and sheets (SITC 673–674).

While the comparative advantage chain of an individual country reveals its vertical structure of trade specialization, a comparison of comparative advantage chains between a country outside an FTA and member countries would reveal the extent to which one country's export commodities could be eclipsed by "internal source exports." The number of sectors in which both Korea and Mexico had comparative advantage was 6 (out of 16 sectors in which either had comparative advantage) in 1988: passenger motor vehicles, textile yarn, iron, steel shapes, automatic data-processing equipment, footwear, and fertilizers. But in 1992, Korea's export commodities were matched by Mexico's in only 3 (out of 17) sectors: passenger motor vehicles, textile yarn, and fertilizers.

Korea and the United States had common comparative advantage in around 3 to 5 sectors (out of 19 to 24 sectors in which one country had comparative advantage). For example, in 1992 Korea's commodity items overlapped U.S. commodity items in the automatic data-processing equipment, fertilizer, and textile yarn sectors. On the other hand, the number of matched export commodities between Korea and Canada was around 4 to 6 (out of 22 to 23). In 1992, Korea's export items overlapped Canadian export items in 4 sectors: passenger motor vehicles, fertilizers, iron, and steel shapes and steel plates. In view of these results, the extent to which Korea's export commodity items compete with those of the United States, Canada, and Mexico is limited. This

Table 9.18 Lafay RCA Indexes

SITC[a]	EC10	U.S.	Canada	Mexico	Japan	China	Korea
			Year = 1980				
11	−0.27	−0.27	0.72	−0.20	−1.35	–	0.14
81	−1.16	1.01	0.25	−0.38	−0.51	–	−0.09
333	−23.03	−15.45	−10.41	18.88	−26.62	–	−57.39
334	−0.67	−3.69	2.41	0.00	−5.71	–	−7.45
562	0.08	0.41	3.57	−0.46	0.05	–	4.78
641	−1.54	−0.46	12.33	−0.93	0.31	–	0.88
651	0.16	0.21	−0.75	0.57	0.61	–	7.63
653	0.13	0.14	−0.89	−0.16	2.11	–	9.86
672	0.13	0.02	0.11	−0.94	1.17	–	−2.80
673	0.55	−0.44	0.97	−0.61	2.86	–	2.71
674	0.77	−0.58	0.84	−2.78	4.55	–	5.88
713	0.77	0.57	−4.65	−1.07	1.54	–	−3.31
724	0.88	−0.08	−0.70	−1.68	1.11	–	−2.40
736	0.85	−0.12	−1.86	−2.01	1.22	–	−2.58
752	−0.49	1.43	−1.06	−0.23	−0.18	–	−1.31
776	−0.49	0.05	−1.25	−0.27	1.46	–	−0.14
781	2.44	−4.56	0.43	−0.52	12.64	–	0.79
784	1.76	0.71	−8.11	−5.73	1.91	–	−1.62
792	0.03	3.57	−1.23	−1.37	−0.85	–	−3.43
793	0.13	0.21	0.59	−0.75	3.70	–	2.12
821	2.02	−0.26	−0.12	0.06	−0.07	–	0.47
851	−0.00	−1.04	−0.90	0.16	−0.20	–	13.17
874	0.25	1.23	−2.27	−1.11	0.14	–	−2.08
894	−0.31	−0.37	−0.91	−0.29	0.55	–	4.81
			Year = 1984				
11	0.02	−0.12	0.82	−0.31	−1.60	–	−0.68
81	−1.20	0.50	0.11	−0.18	−0.34	–	−0.81
333	−22.32	−11.97	5.26	37.34	−32.01	–	−74.99
334	−3.06	−3.69	0.68	3.65	−4.41	–	1.55
562	−0.11	0.14	3.19	−0.64	−0.11	–	2.29
641	−1.45	−0.78	10.37	−0.22	0.22	–	−0.28
651	0.16	0.02	−0.60	0.30	0.28	–	4.30
653	0.18	−0.08	−0.81	−0.15	1.78	–	9.97
672	0.28	−0.14	0.03	−0.13	0.34	–	−1.32
673	0.46	−0.64	0.49	−0.15	2.37	–	2.04
674	1.17	−1.20	0.51	−0.40	3.98	–	3.21
713	0.49	−0.08	−2.62	3.05	1.63	–	−2.38
724	0.98	−0.25	−0.52	−0.39	1.18	–	−2.81
736	0.93	−0.30	−0.91	−1.05	1.72	–	−1.85
752	−0.72	0.44	−1.58	−0.50	1.36	–	0.03
776	−0.49	−0.32	−0.99	−0.59	1.68	–	−0.29
781	2.34	−4.67	7.74	0.44	10.97	–	1.51
784	1.37	0.23	−7.31	−0.71	2.78	–	−1.08
792	1.25	1.92	−0.52	−0.28	−0.61	–	−1.62
793	0.43	0.02	−0.38	−1.37	3.11	–	10.50
821	0.81	−0.54	0.47	−0.15	−0.08	–	0.63
851	0.17	−1.18	−0.82	0.09	−0.21	–	12.19
874	0.39	0.70	−1.07	−0.56	0.34	–	−2.69
894	−0.23	−0.66	−0.89	0.30	0.39	–	6.02

Table 9.18 (continued)

SITC[a]	EC10	U.S.	Canada	Mexico	Japan	China	Korea
			Year = 1988				
11	0.00	0.01	0.50	−1.74	−1.30	1.02	0.00
81	−0.53	0.58	0.00	−0.69	−0.24	1.76	−0.87
333	−18.34	−14.88	8.24	67.12	−16.57	25.56	−53.94
334	−2.29	−3.61	0.32	0.05	−3.90	0.11	−1.92
562	−0.76	0.15	1.63	0.09	−0.11	−7.16	0.57
641	−1.15	−0.63	7.75	−0.03	0.04	−0.85	0.10
651	0.10	0.06	−0.48	0.83	−0.06	−2.01	0.97
653	0.04	−0.06	−0.53	−0.52	0.50	0.46	7.22
672	−0.03	−0.14	−0.24	−0.20	−0.04	−0.10	0.28
673	0.33	−0.47	0.29	0.29	0.59	−2.95	1.20
674	0.76	−0.52	−0.40	−0.63	1.64	−5.02	0.88
713	0.24	−0.34	−2.17	4.22	1.24	−0.23	−1.14
724	0.70	−0.12	−0.32	−1.00	0.65	−2.37	−1.71
736	0.59	−0.11	−0.71	−0.95	0.88	−0.81	−1.92
752	−0.67	0.14	−1.27	0.20	0.90	−0.45	1.60
776	0.70	−0.17	−0.81	−0.23	1.13	−1.32	−0.19
781	1.32	−3.94	3.43	1.51	5.44	−1.11	10.01
784	0.93	−0.51	−5.13	−2.44	1.90	−1.12	−1.31
792	0.33	2.34	−2.25	−1.05	−0.49	−1.16	−5.87
793	0.82	0.08	−0.24	−0.30	1.14	−0.11	7.48
821	0.16	−0.53	−0.01	−0.11	−0.15	0.33	0.64
851	−0.04	−1.02	−0.71	0.14	−0.23	1.57	10.62
874	0.32	0.53	−0.80	−0.92	0.35	−1.32	−2.87
894	−0.32	−0.68	−0.75	−0.17	−0.07	0.63	3.90
			Year = 1992				
11	17.93	0.22	0.28	−1.98	−1.45	0.72	−1.36
81	−0.53	0.57	−0.00	−0.87	−0.44	0.20	−1.01
333	−23.47	−19.59	12.95	58.12	−22.52	9.95	−85.66
334	−0.82	−2.37	2.04	−3.69	0.30	−3.16	−4.65
562	−0.77	0.32	2.67	0.32	−0.09	−9.11	0.34
641	−1.07	−0.32	7.53	−0.91	0.11	−2.18	−0.24
651	0.00	0.06	−0.21	0.49	0.06	−4.19	0.46
653	0.10	−0.05	−0.38	−0.66	0.44	−1.76	7.35
672	0.05	−0.17	0.48	−0.42	−0.02	−1.25	−0.00
673	0.34	−0.22	0.65	−1.45	0.54	−0.93	0.51
674	0.46	−0.40	0.03	−0.92	1.57	−4.61	4.13
713	0.14	−0.12	−2.94	1.60	1.34	−1.12	−1.20
724	0.78	−0.13	−0.19	−0.97	0.99	−5.16	−1.31
736	0.48	0.01	−0.34	−2.06	0.91	−1.73	−2.68
752	−0.54	−0.17	−1.15	−0.45	0.95	−0.11	1.06
776	−0.35	−0.11	−1.00	−0.15	1.07	−12.18	0.80
781	0.45	−2.70	3.84	4.48	5.17	−2.08	4.59
784	0.86	0.00	−4.30	−10.08	2.07	−1.42	−0.82
792	0.50	2.48	0.13	−0.76	−0.41	−2.41	−3.02
793	0.46	0.16	−0.06	−0.08	1.76	−0.10	8.28
821	0.09	−0.30	−0.19	−0.51	−0.19	1.09	0.11
851	−0.16	−0.97	−0.69	−0.18	−0.28	5.64	5.17
874	0.19	0.61	−0.89	−1.37	0.43	−1.39	−2.75
894	−0.36	−0.57	−0.72	−0.41	0.01	3.74	0.93

Sources: United Nations, *International Trade Statistical Yearbook* (New York, 1984, 1992); International Monetary Fund, *International Financial Statistics* (Washinton, D.C., 1994).

[a]See table 9.17 note for key to SITC numbers.

limited competition implies that Korea's trade pattern is "complementary" to those of the United States, Canada, and Mexico.[17] As a result, the extent of overall trade diversion is expected to be limited.

Trade Elasticities

Potential trade diversion away from Korea due to NAFTA is relatively weak, as evidenced by "qualitative" indicators. Yet, it remains to be seen to what extent the effects of NAFTA on Korea can be quantified. The scope of trade diversion is determined by the size of preferential treatment and the efficiency loss attributable to replacement of more efficient nonmember suppliers. Preferential liberalization within an FTA changes the relative prices of goods produced in member countries and goods originating outside the FTA. The import source is then switched from more efficient outside suppliers to less efficient, but preferentially treated, member suppliers. In this regard, it is of interest to assess the responsiveness of exports or imports to changes in relative prices.

A production theory approach is a convenient way to measure the possible scope of trade diversion resulting from NAFTA. In this approach, price elasticities are derived from a restricted profit function that has aggregator functions as net outputs or from aggregator functions at the sublevel, both of which retain the properties of the neoclassical production function. Own price elasticity measures the extent of reduction in Korean exports directly attributable to a change in relative prices due to NAFTA. Cross-price elasticity assesses the substitution possibilities between, for example, NAFTA and other destinations. When the cross-price elasticity of two particular destinations is negative, exports to these two markets are substitutes rather than complements. That is, an increase of export price in one of these destinations will result in an increase in the amount of exports to the other. Thus, price elasticities combined with data on trade barriers can be used to infer the percentage reduction in Korean exports to NAFTA (see appendix tables 9A.1, 9A.2, and 9A.3 for the following discussion.)

The own price elasticity of Korea's export supply has ranged from 2.2 to 2.9 since 1980. Korea's export supply has been very responsive to price change. For instance, in 1993 a 1 percent increase in the export price level would have increased Korea's total export supply by 2.68 percent. But Korea's import demand is not so elastic with respect to price change. The own price elasticity of Korea's import demand was much less than 1 throughout the 1980s and early 1990s, reflecting the relatively inflexible demand for imports. In 1993, for ex-

17. Number of Sectors with Common Comparative Advantage

	1980	1984	1988	1992
Korea-U.S.	4/24	3/19	5/22	3/21
Korea-Canada	6/22	5/23	4/22	4/22
Korea-Mexico	3/16	4/19	6/23	3/17

Table 9.19 Korean Exports to the U.S. Market, 1992

Export Type	Number of Items	Amount (million U.S.$)
A. Korea's exports to the United States	5,003	16,230.638
B. Korea's exports to the United States matched by Mexico's	3,927	14,419.833
C. No-tariff exports	361	2,899.200
D. Mexico's exports under GSP	2,444	6,032.518
E. Exports directly affected by NAFTA	1,122	5,488.115

Source: Ministry of Commerce and Industry, unpublished internal source (1994).

ample, a 1 percent increase in the import price level would have decreased Korea's import demand merely by 0.06 percent.

Elasticities with regard to export destinations (import sources) show regional response subject to a fixed aggregate labor input and a given level of aggregate exports (imports). Own price elasticities of Korea's exports to North America have continuously stayed above 5.0 throughout the 1980s and early 1990s. Own price elasticities are much lower for Japan (1.65–1.84), the European Community (1.77–2.10), and APEC (1.25–1.65) during the same period. These results imply that Korea's exports to the North American market are more sensitive to relative price changes than its exports elsewhere. Imports from North America also exhibit a very high price responsiveness, with own price elasticities ranging from -2.48 to -3.87, while those from Japan range from -1.96 to -3.60. Own price elasticities are low for both the European Community and APEC.

Price elasticities and the NAFTA tariff reduction schedule have been combined to calculate the impact effect of NAFTA on Korea's exports to the U.S. market. The calculation has been applied to Korea's exports to the U.S. market in 1992. As a proxy for the "NAFTA effect" on tariff rates, applied U.S. tariffs on East Asian exporters have been used.[18] Obviously, the tariff margins are not translated into an increase in "net" export price. The net export price that the exporters face is likely to fall as a result of NAFTA. In the present calculation, it has been assumed that 50 percent of tariff margins are translated into depression of the net export price.

The product of the price elasticity and the trade barrier figure yields the percentage reduction in Korean exports attributable to preferential liberalization of the North American market. Among all the export items in 1992, 1,122 items ($5.5 billion) would be directly affected by NAFTA (see table 9.19). The resulting reduction in Korea's exports to the U.S. market would amount to around 1.7 percent ($274 million) of its total exports. Leather goods ($53 million) and textiles and apparel ($112 million) would be most seriously affected. Steel products ($36 million) and footwear ($29 million) would also be substan-

18. These data have been adopted from Primo Braga et al. (1994, tables 2 and 4).

Table 9.20 **Reduction in Exports, 1992 (million U.S. dollars)**

Sector	Exports to United States (A)	Directly Affected by NAFTA (B)	Expected Reduction (C)	A/C (%)
Chemical products	661	31	2	0.3
Leather goods	1,040	936	53	5.1
Textiles and apparel	2,529	1,744	112	4.4
Footwear	1,527	1,020	29	1.9
Steel products	893	679	36	4.0
Nonferrous metals	191	42	1	0.7
Machinery	1,971	38	1	0.1
Electrical machinery	4,961	538	19	0.4
Automobiles	860	298	10	1.2
Misc. manufactures	1,598	164	11	0.7
Total	16,231	5,488	274	1.7

Source: Ministry of Commerce and Industry, unpublished internal source (1994).

tially affected (see table 9.20). The results of the present calculation fall within the range suggested by other studies.[19]

9.3.2 "Hidden Protectionism": Selected Sectoral Impacts

Prospective diversion effects due to NAFTA will be felt differently by each sector. Highly protected sectors are more likely to cause trade and investment diversion. The possibilities for trade and investment diversion are likely to be most pronounced in those sectors, such as agriculture, automobiles, textiles and apparel, and iron and steel, where existing trade barriers are relatively high or the rules of origin are strict.

Textiles and Apparel

The textiles and apparel sector has been heavily protected in both Canadian and U.S. markets. As a result of NAFTA, however, all tariffs on textiles and apparel will be eliminated within 10 years. Tariffs between the United States and Mexico will be phased out in six years. Moreover, U.S. quotas on Mexican textile and apparel products will be immediately eliminated, provided that the Mexican products satisfy the new rules of origin. The elimination of tariffs and quotas on Mexican products will enhance Mexico's price competitiveness vis-à-vis Korea in low- to medium-priced products, whose competitiveness has already been eclipsed by China and East Asian NIEs. Mexico's share in the U.S. market (apparel sector) increased from 2 percent in the early 1980s to 6 percent in 1992. On the other hand, the phasing out of the MFA in 10 years following the conclusion of the Uruguay Round will mitigate the adverse effect on the competitiveness of Korean producers vis-à-vis Mexican producers.

19. E.g., Noland (n.d.) reported export diversion losses in the range of 1–3 percent of Korea's total exports.

While eliminating tariffs and quotas on intraregional trade, NAFTA established protective rules of origin for textiles and apparel. The new rules of origin make more difficult the conditions for preferential treatment. To qualify for NAFTA preferences, finished products must pass a "triple transformation test," which virtually requires that products be made of North American fibers (Hufbauer and Schott 1993, 44). This rule of origin is much stricter than the existing rule in CUSFTA, which requires a "double transformation" in order to qualify for FTA preferential treatment.

Among 1,239 textile items (HS 10-digit) exported to the U.S. market in 1992, Korean producers have 586 items directly competing with Mexican products. When the items subject to duty exemptions or the Generalized System of Preferences (GSP) are excluded, 543 items ($1.74 billion) will be directly influenced by NAFTA. This adds up to around 43.8 percent (or 69.0 percent) of the total number (or the total amount) of textile products exported to the U.S. market. The corresponding amount of export reduction is estimated to be around $112 million (4.4 percent of the total amount).[20]

Korea's market share of the footwear sector in the United States decreased from 26 percent in 1989 to 15 percent in 1992. Among 186 footwear products exported to the U.S. market, 87 items ($1.02 billion) are expected to be affected by NAFTA. The expected reduction in exports to the U.S. market due to the preferential treatment of Mexico amounts to around $29 million (1.9 percent of the total).

The United States has maintained higher tariff rates on leather imports than the average tariff rate imposed on manufacturing goods. NAFTA will phase out tariffs on Mexican leather goods in 10 years. Most Korean producers of leather goods have not exported their products under their own brand names. With the rapid emergence of Chinese and Thai competitors in lower-end products, Korea's market share in the United States decreased from almost 29 percent ($1.5 billion) in 1989 to 19 percent ($1.0 billion) in 1992. On the other hand, Mexico's share slightly increased from 2.2 percent in 1989 to 2.7 percent in 1992. Korea exported 127 leather products, in 50 items ($936 million) of which Korea and Mexico directly compete with each other. The reduction in

20. As the fourth largest exporter of textiles to the U.S. market, Korea's textile industry holds a large amount of quotas. At the same time, Korea's quota utilization rate is so high that 90 percent of Korea's textile goods were exported out of quotas in 1993. Thus, a question arises as to whether it is meaningful to estimate the effects of price changes on Korea's textile exports to the United States. Two excuses can be made for following the production theory approach in the current study: the equivalence between tariffs and quotas and the characteristics of the data used in the estimation process.

In calculating "NAFTA effects," "U.S. tariff margins on East Asian exporters" (Primo Braga et al. 1994) were used as approximate measures reflecting both tariff and nontariff barriers. This kind of exercise can be justified in the case where there exists a basic equivalence between tariffs and quotas in perfectly competitive markets. In this regard, U.S. tariff rates used in the calculation of NAFTA effects were indeed "tariff equivalents" of tariff and nontariff barriers. The production model used in the estimation process posits perfect competition. Given these constraints, however, the estimates on textiles and apparel reported in table 9.20 should be interpreted as at best first-order approximation.

leather exports due to NAFTA is estimated to be around $53 million (5.1 percent of the total).

Electrical Machinery and Electronic Goods

Korea's market share of electrical machinery and electronic goods in the U.S. market was 8.9 percent ($5.2 billion) in 1989, but it was down to 7.3 percent ($5.0 billion) in 1992. On the other hand, Mexico's share increased from 12.6 percent ($7.3 billion) in 1989 to 14.0 percent ($9.6 billion) in 1992.

In 1992 Korea was the third biggest exporter of electronic components and accessories to the U.S. market with its market share of 9.6 percent ($2.18 billion). The top two exporters were Japan (28.9 percent, $6.6 billion) and Canada (10.7 percent, $2.4 billion). Korea was followed by Malaysia and Mexico, whose market shares were 9.5 percent ($2.17 billion) and 8.3 percent ($1.9 billion), respectively. Among other items, Korea has focused on semiconductors and related devices, and its share was 13.0 percent ($1.98 billion out of a total $15.3 billion).[21]

In 1992 Korea was the fifth largest exporter of computer equipment with a share of 4.3 percent ($1.4 billion). Korea was preceded by Japan (34.9 percent, $11.2 billion), Singapore (17.1 percent, $5.5 billion), Taiwan (13.7 percent, $4.4 billion), and Canada (6.9 percent, $2.2 billion). On 13 computer products that Korea exports, the United States maintains tariffs. However, as the United States had already given Canada and Mexico tariff exemptions before NAFTA, the effects of the preferential arrangement on Korean computer exports would not be substantial. On the other hand, the new rules of origin require third-country producers to use electron tubes made in North America to be eligible for NAFTA preferences. But the huge fixed investment cost is likely to prevent Korean producers from setting up tube-producing plants.

Korea exported 621 kinds of electronic products to the U.S. market in 1992, but it competed with Mexico in only 19 percent of those items (118 items, $537 million). The preferential treatment of Mexico is estimated to reduce Korea's exports to the U.S. market by around $19 million (0.4 percent of the total).

Steel Mill Products

Korea has experienced a reduction in steel exports to the U.S. market due to the worldwide recession that began 1989 and a series of bilateral disputes that followed the expiration of a voluntary restraint agreement. Korea's exports to the U.S. market were recorded at $893 million in 1992, which was less than the amount of previous years. On the other hand, Mexico has been successful recently in increasing its export volume in the U.S. steel market. Mexican steel exports increased from $481 million in 1989 to $656 million in 1992.

The major Mexican steel exports to the U.S. market were mostly lower-

21. See the U.S. Department of Commerce (1994, chap. 15) for related statistics.

quality steel products such as semifinished steel, pipe and tube, and other sheet and strip, which used to constitute Korea's major exports. Mexico expanded its steel production on the basis of relatively lower labor costs, while Korea specialized in more capital-intensive production such as plates. As a result, the extent of direct competition in the U.S. steel market between Mexico and Korea is not likely to be significant.

Among 335 steel products exported to the U.S. market, in 112 items (worth $677 million) Korea competed with Mexico. In view of this situation, the degree of export reduction is expected to be $36 million (4.0 percent of the total).

Automobiles

NAFTA rules of origin for the motor vehicles sector stipulates that assembled autos contain 62.5 percent North American content in order to be eligible for duty-free treatment. This new rule is stricter than the existing one in CUSFTA. Moreover, the new rule will eliminate duty-waiver programs for all U.S. imports of automotive products from Canada. This implies an end to preferential duty waivers for foreign transplant producers in Canada such as Hyundai, Honda, Toyota, and General Motors–Suzuki (see Hufbauer and Schott 1992, 161). As a result, the NAFTA rule of origin for the automotive sector will give the U.S. Big Three carmakers and their unionized workers an effective weapon with which to strike back at foreign transplant production in North America. Under NAFTA, the calculation of regional content will be based on a net-cost method that traces key foreign components to measure their North American content. Along with the stricter rules of origin, the new tracing test should eliminate the roll-up problem.

Although rules of origin have become stricter, foreign producers who export assembled autos to the United States are likely to be less significantly affected by them than those foreign producers who export to Canada or Mexico. Foreign firms transplanted in North America will be forced to source more parts regionally if they want smoother access to the Canadian and Mexican markets.

In 1992, Korea exported $860 million of automobile-related products to the United States, of which $101 million (12 percent of the total) were subject to the rules of origin test. On the other hand, Mexico exported $1.9 billion of automobile products to the United States, 37 percent of which were subject to the new origin rules. The high ratio of Mexican exports to Korean exports affected by the new rules of origin indicates that the possibility of trade diversion is great. The reduction in automobile exports would be around $10 million (1.2 percent of total automobile exports).

9.3.3 Investment Diversion

With respect to the possibility of investment diversion, an important question arises as to whether regional firms (particularly U.S. firms) prefer a location within the region or whether they are truly global when looking for an export platform to serve the U.S. market. Regional integration is a natural re-

sult of geographical and cultural proximity, not the outcome of political negotiations. Regional arrangements, often initiated by those producers (in large part, multinational firms) who aim at taking advantage of a regional division of labor, help expedite trade and investment with neighboring countries, which has been "suppressed" by political barriers. In this regard, NAFTA is not the cause but the effect of "corporate" integration efforts on the part of U.S. producers.

Trade and investment are influenced by preferential arrangements, but institutional arrangements follow regional economic integration, not the other way around. No doubt NAFTA will invigorate intraregional investment, which is driven by the potential for a regional division of labor and by expectations of an enlarged market. Yet, export-oriented production in Mexico has enjoyed preferential treatment such as the GSP and the maquiladora program. These special treatments were allowed because U.S. multinationals wanted to use Canada and Mexico as export platforms. In view of this evidence, the amount of additional intraregional investment (and hence intrafirm trade) that would result from NAFTA should not be exaggerated.

To the extent that geographical proximity is important in shaping patterns of trade and investment, the scope for investment (and intraregional trade) diversion is not likely to be substantial. Intrafirm trade in North America has always been regional. U.S. multinational firms have preferred neighboring countries. They account for most of the trade flow between the United States and Canada, which constitutes the largest bilateral trade flow in the world. These firms are also responsible for almost one-half of U.S. manufacturing imports from Mexico. American multinationals have long taken advantage of a regional division of labor through the U.S.-Canada Automotive Pact and the maquiladora program. At the same time, their Mexican affiliates are the most strongly oriented toward the U.S. market of affiliates in any major country. Thus, in the case of the North American market, there is clear evidence that regional firms have a regional bias in choosing their export locations to serve the U.S. market in almost all sectors. Even those firms that are regarded as global firms opt for a regional strategy, often resulting in multiregional production. For example, almost all U.S. intrafirm imports in the automotive sector come from Canada and Mexico. There is virtually no interregional trade among affiliates in the automotive sector. However, in other sectors, where standardized or "low value-added" products are traded, U.S. intrafirm imports are likely to come from countries other than Mexico and Canada. But in any case, interregional exports are less than what is sold locally and regionally. As multinational firms organize their production on a regional basis, intraregional trade prevails.

Unless U.S. multinational firms are willing and able to pursue "complex integration strategies" and to change their structures accordingly, the geographical scope of their international production will be confined to regional

clusters in North America and Latin America.[22] The same tendency has been the case in the European Community and in East Asia. Many multinational firms are achieving their global objectives through a regional organization of "value chains." In the future, competitive pressures are likely to force multinational firms to spread their activities more widely around the world. At present, however, only a few firms are involved in integrating production beyond the regional level and for only a limited number of corporate functions (see United Nations 1993, chap. 5). On the other hand, regional economic arrangements may restrict the growth of global strategies by establishing barriers to extraregional trade.[23]

9.4 Concluding Remarks

There are some signs of trade diversion away from Korea due to Mexico's accession to CUSFTA. Yet the scope of trade diversion is not likely to be significant, as evidenced by the quantitative analysis of the present study. This observation, however, overlooks the structural changes associated with regional trade arrangements in which dynamic effects are generally much larger than static ones and in which potential effects are much larger than transitional and transformational realized effects. At the same time, regional arrangements are likely to have negative impacts on the perceptions and behavior of nonmembers.

NAFTA is an ambitious vertical integration between disparate economies. Its success is likely to depend on market size effects applied at a regional or local level. Market size effects generate what amounts to an external economy, as they will eliminate uncertainty associated with increasing returns to scale.[24] Porter (1990) has emphasized the point that international competitiveness is often the product of successful geographical clusters among countries. Geographic concentration is the most convincing evidence of the importance of external economies in real economies. In this regard, NAFTA will pose a great challenge for nonmembers, as it will enhance the competitiveness of the North American economy through externalities attributable to market size effects.

22. See United Nations (1993) for a discussion of strategies of multinational firms regarding integrated international production.

23. International trade is even more regionally concentrated than foreign direct investment (FDI). That pattern emerges from a comparison of shares of regional and other partners in international trade with their shares in FDI and, even more clearly, from a comparison of trade intensities with FDI intensities. Moreover, intrafirm trade between multinational parent firms and their affiliates represents the largest share of world trade. Intrafirm trade often constitutes the only way in which services, technology, and patents are internally transferred.

24. External economies are most likely to occur at the regional or local level rather than at the national or international level. Each individual manufacturing facility stayed within the manufacturing belt because of the advantages of being near other manufacturers. See Krugman (1993) for this interesting observation.

Appendix
Export Supply and Import Demand Elasticities

For the estimation of price elasticities, a producer theory approach is employed. Drawing on an economy-wide GNP function that treats imports as an input to the production process and exports as an output, the producer approach generates export supply and import demand functions. These functions in turn can be used to calculate various elasticities with which the extent of trade replacement can be estimated. The production theory approach was initiated by Kohli (1978), who regarded imports as an intermediate input into the production process and exports as an output not destined for domestic use. When imported goods are treated as intermediate goods, only the private production sector of the economy needs to be modeled. Then the difficult problems associated with modeling the consumer sector can be avoided.[25]

In this study, a restricted profit function (the GDP function) was used, which had domestic sales supply, capital, exports, and imports as aggregate net output. Labor input was assumed to be fixed. In addition, exports and imports each were disaggregated into four destinations and origins (namely, NAFTA, Japan, the European Community, and APEC 11).

Specifically, let the production possibilities set for a country in period t be a set $T_t = \{(x, v)\}$, where x is a vector of net outputs and v is a vector of primary inputs.[26] Let p be the vector of domestic and international prices. Then the country's restricted profit (GDP) function can be defined as

$$\Pi(p, L) = \max \{p'x : (x, L) \in T\},$$

where L is a vector of labor stocks utilized by the production sector in period t. The restricted profit function is supposed to satisfy the properties of the neoclassical profit function. Then, from Hotelling's lemma, the net output supply functions are derived (from the derivatives of the restricted profit function with respect to p):

$$x = \nabla_p \Pi(p, L).$$

The net supply vector is the vector of first-order derivatives of the restricted profit function with respect to the components of the price vector.[27] This system of equations contains the economy's short-run domestic output supply, capital demand, export supply, and import demand functions. Constant returns to scale are assumed with respect to the labor stock.

The functional form for the unit profit function adopted is the symmetric-

25. This approach no doubt falls short of taking account of general equilibrium effects. The resulting model is partial equilibrium in nature. Yet it is simple and straightforward.

26. The subscript t will be suppressed in the following to reduce notational complexities.

27. See Diewert and Morrison (1988) for related discussion.

normalized-quadratic function.[28] For the case of homogeneous labor, the restricted profit function in period t is defined as

$$\frac{\Pi(p, L)}{L} = \frac{p'B\,p}{2\,p's} + p'a + p'd\,\tau,$$

where s is the exogenous parameter, the variable τ is a time trend indicating technical progress, and B, a, and d are parameters to be estimated subject to the Slutsky symmetry and Cournot aggregation conditions. The form of corresponding net output supply functions is

$$\frac{x_i}{L} = \frac{p'B}{p's} - s_i \frac{p'B\,p}{2\,(p's)^2} + a_i + d_i * \tau.$$

The restricted profit function is supposed to be globally convex in prices p. This implies that the matrix of estimated coefficients B should be positive semidefinite. But when the estimated matrix is not positive semidefinite, the coefficient matrix is replaced by the product of a lower triangular matrix and its transpose to ensure the global convexity of the profit function.

The estimated matrix B of the present model was not positive semidefinite: its eigenvalues were not all nonnegative. Thus, positive semidefiniteness had to be imposed on the coefficient matrix by a reparameterization that was designed by Wiley, Schmidt, and Bramble (1973). Reparameterization required replacing the matrix B by a product of two lower triangular matrices C and C', where

$$B = C\,C', \quad C = [c_{ij}], \quad c_{ij} = 0 \text{ for } j > i.$$

Then the reparameterized system was estimated by means of nonlinear regression methods (see table 9A.1).

The export supply and import demand functions derived from the restricted profit functions are aggregator functions that can be disaggregated into components of exports and imports. With the assumption that exports and imports are weakly separable from the other inputs and outputs, a two-stage optimization process is possible in which the total demand for imports and supply of exports are estimated and then aggregate imports and exports are disaggregated in separate submodels. Again a symmetric-normalized-quadratic function can be adopted for the disaggregation of the aggregator function.

Then the unit profit function for export or import aggregates takes the form

$$\frac{R(q, X)}{X} = \frac{q'F\,q}{2\,q's} + q'e + q'g\,\tau,$$

28. This is an adaptation of the generalized symmetric McFadden cost function defined in Diewert and Wales (1987).

Table 9A.1 Parameter Estimates

	Coefficient	Standard Error	*T*-Ratio
GDP function			
D1	1.5798	0.0298	52.9340
C11	0.2413	0.0475	5.0792
C21	−0.7926	0.0776	−10.2080
C22	−0.3784	0.0995	−3.8037
C31	0.1059	0.0208	5.0940
C32	0.0661	0.0362	1.8247
C33	0.0518	0.0272	1.9029
B1	0.0202	0.0033	6.0969
D2	2.2268	0.2002	11.1250
B2	0.0140	0.0250	0.5582
D3	−0.1615	0.0557	−2.9010
B3	−0.0004	0.0021	−0.2055
D4	0.3437	0.0196	17.5010
B4	0.0115	0.0007	15.4040
Iteration number		124	
Log-likelihood function		143.6627	
Export aggregator			
F1	1.3403	0.0324	41.3270
E11	−0.4873	0.0833	−5.8482
E21	−0.4524	0.0494	−9.1527
E22	−0.2189	0.1315	−1.6644
E31	−0.3468	0.0642	−5.4011
E32	−0.1575	0.1415	−1.1125
E33	0.1054	0.0329	3.1995
A1	−0.0071	0.0030	−2.3690
F2	−0.4518	0.1106	−4.0843
A2	−0.0021	0.0010	−2.0475
F3	−0.5136	0.0927	−5.5395
A3	−0.0027	0.0010	−2.6022
F4	−0.2784	0.0572	−4.8692
A4	0.0116	0.0020	5.6780
Iteration number		300	
Log-likelihood function		227.1960	
Import aggregator			
H1	0.7797	0.1066	7.3127
G11	1.0453	0.0560	18.6660
G21	−0.0014	0.0133	−0.1037
G22	0.1272	0.0444	2.8667
G31	−0.0635	0.0447	−1.4212
G32	−0.0347	0.0245	−1.4161
G33	−0.0446	0.0411	−1.0851
B1	0.0101	0.0012	8.4094
H2	−0.6640	0.1621	−4.0954
B2	−0.0274	0.0018	−14.9700
H3	0.1555	0.0176	8.8200
B3	0.0029	0.0004	7.3249
H4	0.2353	0.0369	6.3729
B4	0.0096	0.0006	15.6030
Iteration number		78	
Log-likelihood function		221.9865	

where s is the exogenous parameter, the variable τ is a time trend indicating technical progress, and F, e, and g are parameters to be estimated subject to the Slutsky symmetry and Cournot aggregation conditions. The form of corresponding net output supply functions is given by[29]

$$\frac{x_i}{X} = \frac{q'F}{q's} - s_i \frac{q'E\,q}{2\,(q's)^2} + e_i + g_i * \tau.$$

The disaggregation of aggregator functions can be made according to the types of commodities and services or the origins and destinations of exports and imports. For the purpose of assessing the scope of trade diversion, disaggregation based on the geographical distribution of foreign trade is more useful. A closer look at the geographical composition will uncover some information concerning the substitution possibilities between different origins and destinations as well as the own price elasticities of the supply of exports and demand for imports.

In this regard, it is of interest to estimate the various elasticities of regional destinations or origins. The cross-price elasticity between regions i and j, given a constant level of exports (imports) and the share of export (import) in region j, s_j, is obtained as

$$E^L_{ij} = E^X_{ij} + s_j E^L_{XX},$$

where E^L_{XX} is the own price elasticity of aggregate exports (imports) for a given fixed labor stock.[30] For the export (import) aggregator function, the four export destinations (import sources) were formed. Only a subset of Korea's major trade partners was included: North American countries, Japan, the European Community, and the APEC countries excluding Japan and NAFTA countries.

Domestic supply, capital demand, export supply, and import demand elasticities are presented in table 9A.2. Both export and import component own-supply elasticities are also listed in tables 9A.3 and 9A.4.

29. The iterative Zellner SYSTEM command in SHAZAM (version 6) has been applied to each of the three linear systems to obtain the maximum likelihood estimates. RESTRICT options were used to impose symmetry conditions. But the curvature properties of the production technology were not satisfied: for each system, the matrix of second-order partial derivatives was not positive semidefinite. With a reparameterization due to Wiley et al. (1973), the new parameters were estimated using the nonlinear command in SHAZAM. The systems converged from the differing starting coefficient values within 200 iterations.

30. For details, see Diewert and Morrison (1988) and Kohli (1991).

Table 9A.2 **Net Output Elasticities**

X1P1	X1P2	X1P3	X1P4
0.1376	0.0882	−0.2738	0.0480
0.1223	0.0808	−0.2405	0.0374
0.1125	0.0755	−0.2206	0.0326
0.1072	0.0733	−0.2093	0.0288
0.1120	0.0748	−0.2165	0.0297
0.1668	0.0686	−0.2763	0.0409
0.1583	0.0609	−0.2566	0.0374
0.1609	0.0577	−0.2563	0.0377
0.1915	0.0633	−0.2966	0.0419
0.2157	0.0694	−0.3308	0.0456
0.2513	0.0723	−0.3752	0.0516
0.2414	0.0767	−0.3688	0.0507
0.2409	0.0830	−0.3782	0.0543
0.2183	0.0860	−0.3578	0.0535
0.1994	0.0811	−0.3286	0.0482
0.2088	0.0751	−0.3294	0.0455
0.1940	0.0730	−0.3088	0.0417
0.1862	0.0729	−0.2995	0.0404
0.1852	0.0759	−0.3029	0.0417

X2P1	X2P2	X2P3	X2P4
−0.0333	−0.0482	0.0984	−0.0168
−0.0302	−0.0489	0.0930	−0.0139
−0.0283	−0.0489	0.0899	−0.0127
−0.0263	−0.0511	0.0890	−0.0116
−0.0283	−0.0486	0.0884	−0.0115
−0.0443	−0.0287	0.0852	−0.0122
−0.0438	−0.0259	0.0811	−0.0114
−0.0447	−0.0241	0.0802	−0.0114
−0.0492	−0.0239	0.0847	−0.0116
−0.0523	−0.0245	0.0887	−0.0118
−0.0569	−0.0233	0.0926	−0.0123
−0.0552	−0.0255	0.0932	−0.0124
−0.0546	−0.0279	0.0959	−0.0134
−0.0510	−0.0311	0.0961	−0.0139
−0.0485	−0.0310	0.0927	−0.0132
−0.0507	−0.0275	0.0902	−0.0121
−0.0486	−0.0280	0.0880	−0.0115
−0.0473	−0.0287	0.0874	−0.0114
−0.0467	−0.0302	0.0887	−0.0118

X3P1	X3P2	X3P3	X3P4
−1.9131	−1.8182	4.5532	−0.8218
−2.0766	−2.1455	5.0148	−0.7927
−2.1212	−2.3076	5.2058	−0.7769
−2.2497	−2.6632	5.6992	−0.7862
−2.1058	−2.2705	5.0755	−0.6992
−1.6719	−0.7979	2.9112	−0.4414

Table 9A.2 (continued)

X3P1	X3P2	X3P3	X3P4
−1.6765	−0.7365	2.8363	−0.4233
−1.6879	−0.6817	2.7906	−0.4209
−1.5953	−0.5856	2.5496	−0.3687
−1.5426	−0.5489	2.4352	−0.3437
−1.4688	−0.4604	2.2454	−0.3163
−1.4776	−0.5186	2.3227	−0.3264
−1.4808	−0.5702	2.4049	−0.3539
−1.5137	−0.6850	2.5971	−0.3984
−1.5482	−0.7292	2.6793	−0.4019
−1.5214	−0.6174	2.4904	−0.3516
−1.5436	−0.6616	2.5578	−0.3526
−1.5584	−0.7012	2.6195	−0.3599
−1.5640	−0.7440	2.6854	−0.3775
X4P1	**X4P2**	**X4P3**	**X4P4**
−0.3508	−0.3249	0.8598	−0.1842
−0.3019	−0.2998	0.7407	−0.1390
−0.2677	−0.2783	0.6635	−0.1175
−0.2411	−0.2705	0.6118	−0.1002
−0.2389	−0.2447	0.5781	−0.0945
−0.3110	−0.1438	0.5547	−0.0998
−0.2872	−0.1223	0.4976	−0.0881
−0.2758	−0.1081	0.4675	−0.0837
−0.2930	−0.1042	0.4796	−0.0823
−0.3009	−0.1036	0.4860	−0.0814
−0.3160	−0.0960	0.4947	−0.0827
−0.2954	−0.1003	0.4750	−0.0792
−0.2818	−0.1052	0.4690	−0.0819
−0.2544	−0.1117	0.4477	−0.0815
−0.2333	−0.1064	0.4133	−0.0736
−0.2337	−0.0917	0.3909	−0.0655
−0.2172	−0.0899	0.3672	−0.0601
−0.2056	−0.0892	0.3523	−0.0574
−0.2176	−0.0999	0.3811	−0.0636

Note: X1 = domestic sales, X2 = capital formation, X3 = exports, and X4 = imports. P1–P4 represent respective price indexes.

Table 9A.3 **Export Destination Elasticities**

EX1P1	EX1P2	EX1P3	EX1P4
6.3781	−0.4450	−0.4326	−0.9472
6.5705	−0.3198	−0.4002	−0.8357
6.3753	−0.2073	−0.2877	−0.6745
6.4301	−0.0376	−0.2051	−0.4883
5.9875	−0.1624	−0.3040	−0.4456
5.4895	−0.8391	−0.8701	−0.8691
5.4300	−0.8716	−0.8901	−0.8319
5.4027	−0.8462	−0.9552	−0.8108
5.5061	−1.0127	−1.0950	−0.8488
5.7156	−1.1430	−1.2207	−0.9167
5.7742	−1.2298	−1.3245	−0.9745
5.0614	−0.9500	−1.0761	−0.7126
5.0858	−0.9412	−1.0748	−0.6649
5.3824	−0.9986	−1.1249	−0.6618
5.3004	−0.9474	−1.0950	−0.5787
5.2286	−1.0005	−1.1470	−0.5908
5.3616	−1.0462	−1.1842	−0.5733
5.4404	−1.0677	−1.2062	−0.5470
5.3523	−0.9982	−1.1221	−0.5465

EX2P1	EX2P2	EX2P3	EX2P4
−0.6927	2.1365	1.8928	1.2165
−0.5391	2.2223	2.0168	1.3148
−0.4210	2.2365	2.0164	1.3738
−0.1758	2.2942	2.1196	1.4611
−0.5289	2.1807	1.9874	1.4362
−1.6937	1.7774	1.5660	1.2614
−1.7599	1.7703	1.5476	1.2783
−1.9014	1.7589	1.5970	1.3361
−2.0391	1.7340	1.5530	1.3017
−2.1097	1.7082	1.5273	1.3093
−2.1942	1.6497	1.4890	1.3010
−2.3156	1.7049	1.5582	1.3752
−2.3581	1.7402	1.5904	1.4324
−2.2857	1.7746	1.6066	1.5016
−2.3474	1.8089	1.6497	1.5681
−2.4947	1.7921	1.6346	1.5583
−2.5114	1.8184	1.6443	1.6066
−2.5494	1.8433	1.6610	1.6646
−2.3852	1.8336	1.6468	1.5902

EX3P1	EX3P2	EX3P3	EX3P4
−1.0430	2.1249	2.0872	1.3840
−0.9240	2.2155	2.2314	1.4919
−0.8404	2.2377	2.2453	1.5631
−0.6694	2.3081	2.3886	1.6718
−1.0773	2.2102	2.2808	1.6619
−2.1739	1.7960	1.8201	1.4689

Table 9A.3 (continued)

EX3P1	EX3P2	EX3P3	EX3P4
−2.2574	1.7948	1.8090	1.4899
−2.4548	1.7913	1.8884	1.5657
−2.5999	1.7728	1.8493	1.5273
−2.6584	1.7452	1.8183	1.5301
−2.7242	1.6813	1.7726	1.5157
−2.9851	1.7682	1.9054	1.6342
−3.0804	1.8171	1.9610	1.7072
−2.9949	1.8503	1.9694	1.7723
−3.1294	1.9022	2.0458	1.8607
−3.3207	1.8980	2.0507	1.8623
−3.3640	1.9338	2.0705	1.9175
−3.4430	1.9705	2.1039	1.9881
−3.2008	1.9404	2.0565	1.8892
EX4P1	**EX4P2**	**EX4P3**	**EX4P4**
−3.9850	3.0855	3.0496	2.4032
−3.3163	2.9759	3.0331	2.3221
−2.7653	2.8475	2.8823	2.2412
−2.2662	2.7990	2.9297	2.2366
−2.1539	2.5408	2.6334	2.0552
−2.5837	1.9134	1.9291	1.6524
−2.3121	1.7948	1.7942	1.5594
−2.1694	1.6805	1.7494	1.5301
−2.0437	1.5708	1.6130	1.4095
−1.8881	1.4720	1.5054	1.3460
−1.7779	1.3524	1.3951	1.2758
−1.6120	1.3018	1.3621	1.2707
−1.4463	1.2651	1.3187	1.2674
−1.2464	1.2578	1.2894	1.2963
−1.0970	1.2193	1.2539	1.3031
−1.0828	1.1455	1.1789	1.2488
−0.9764	1.1265	1.1452	1.2626
−0.8773	1.1029	1.1129	1.2810
−1.0001	1.1908	1.2042	1.2906

Note: EX1 = exports to NAFTA, EX2 = exports to Japan, EX3 = exports to the European Community, and EX4 = exports to APEC 11. P1–P4 represent respective price indexes.

Table 9A.4 **Import Origin Elasticities**

IM1P1	IM1P2	IM1P3	IM1P4
−2.4447	2.6256	−0.0054	−0.3597
−4.0784	4.2927	0.0221	−0.3754
−4.3142	4.5380	0.0270	−0.3683
−4.0263	4.2416	0.0255	−0.3410
−3.6365	3.8423	0.0197	−0.3201
−3.0375	3.2619	0.0129	−0.3371
−3.1646	3.3938	0.0163	−0.3336
−2.4865	2.6476	0.0126	−0.2574
−2.8802	3.0516	0.0178	−0.2714
−2.9372	3.1063	0.0175	−0.2681
−3.1176	3.3036	0.0189	−0.2876
−3.8738	4.0197	0.0311	−0.2562
−3.8085	3.9464	0.0288	−0.2486
−3.7923	3.9176	0.0288	−0.2357
−3.5618	3.6860	0.0261	−0.2239
−3.3267	3.4640	0.0245	−0.2273
−3.3472	3.4849	0.0256	−0.2234
−3.0848	3.2147	0.0230	−0.2103
−3.3172	3.4602	0.0243	−0.2309

IM2P1	IM2P2	IM2P3	IM2P4
1.3707	−1.7516	−0.0190	0.2157
1.3864	−1.6360	−0.0145	0.1251
1.4390	−1.6630	−0.0124	0.1188
1.5061	−1.7187	−0.0105	0.1229
1.5836	−1.8024	−0.0100	0.1343
1.6877	−1.9613	−0.0105	0.1844
1.7591	−2.0190	−0.0093	0.1811
1.9272	−2.1951	−0.0085	0.1927
1.9679	−2.2176	−0.0086	0.1760
2.0646	−2.3146	−0.0088	0.1774
2.1465	−2.4059	−0.0091	0.1857
2.1575	−2.3547	−0.0090	0.1270
2.2785	−2.4816	−0.0095	0.1308
2.4083	−2.6099	−0.0097	0.1297
2.5943	−2.8022	−0.0084	0.1427
2.8216	−3.0527	−0.0070	0.1726
3.0063	−3.2404	−0.0060	0.1801
3.3422	−3.5995	−0.0053	0.2051
2.8223	−3.0563	−0.0066	0.1770

IM3P1	IM3P2	IM3P3	IM3P4
−0.0097	−0.0951	−0.1451	0.0658
0.0396	−0.0783	−0.1409	0.0407
0.0452	−0.0638	−0.1353	0.0363
0.0452	−0.0504	−0.1298	0.0348
0.0391	−0.0442	−0.1240	0.0346
0.0278	−0.0426	−0.1277	0.0427

Table 9A.4 (continued)

IM3P1	IM3P2	IM3P3	IM3P4
0.0327	−0.0357	−0.1247	0.0395
0.0309	−0.0287	−0.1211	0.0353
0.0373	−0.0289	−0.1219	0.0311
0.0362	−0.0274	−0.1186	0.0284
0.0361	−0.0274	−0.1194	0.0280
0.0499	−0.0276	−0.1185	0.0170
0.0471	−0.0273	−0.1166	0.0149
0.0466	−0.0257	−0.1147	0.0123
0.0448	−0.0203	−0.1105	0.0124
0.0434	−0.0152	−0.1085	0.0147
0.0447	−0.0122	−0.1069	0.0143
0.0425	−0.0094	−0.1045	0.0139
0.0435	−0.0144	−0.1085	0.0158
IM4P1	**IM4P2**	**IM4P3**	**IM4P4**
−1.2908	1.4004	0.0787	−0.3725
−1.4337	1.4488	0.0842	−0.2383
−1.2228	1.2231	0.0698	−0.1877
−1.0183	1.0168	0.0569	−0.1556
−0.8591	0.8570	0.0454	−0.1378
−0.7084	0.7184	0.0375	−0.1472
−0.6549	0.6613	0.0345	−0.1290
−0.5601	0.5556	0.0285	−0.1077
−0.5476	0.5343	0.0270	−0.0960
−0.5154	0.4984	0.0237	−0.0882
−0.4905	0.4721	0.0216	−0.0859
−0.4976	0.4609	0.0209	−0.0634
−0.4692	0.4298	0.0178	−0.0603
−0.4465	0.4050	0.0157	−0.0558
−0.4170	0.3819	0.0146	−0.0530
−0.3886	0.3623	0.0142	−0.0534
−0.3716	0.3480	0.0138	−0.0503
−0.3496	0.3282	0.0126	−0.0487
−0.3870	0.3628	0.0145	−0.0539

Note: IM1 = imports from NAFTA, IM2 = imports from Japan, IM3 = imports from the European Community, and IM4 = imports from APEC 11. P1–P4 represent respective price indexes.

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Comment

Tain-Jy Chen

This is a comprehensive study of possible impacts of NAFTA on Korea. I enjoyed reading it and agreed with its major conclusion; that is, NAFTA is not likely to have a major impact on Korea's trade with the United States. In fact, a study conducted by the Chung-Hua Institution for Economic Research on NAFTA's impact on Taiwan reached a similar conclusion. The underlying reason for this conclusion is that the trade structures of Mexico and Korea (or Taiwan) are dissimilar, and therefore, the likely diversion arising from trade

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preferences extended by the United States to Mexico is minimal. My comments are focused on a few specific points made, and some points not mentioned, in the paper.

The export structure of Korea has shifted rapidly over time, particularly in the 1980s. The share of NAFTA countries in Korea's export decreased and that of East Asian countries increased. The author attributes this to changing comparative advantage and foreign direct investment (FDI). Although this reasoning seems plausible, it can not explain Korea's rising exports to Singapore. There may be other reasons. Did policy not matter at all? For example, how much of this change can be attributed to the U.S. repeal of the General System of Preferences for Korea in January 1989? And to what degree is Korea's trade diversification effort a response to U.S. antidumping and countervailing duty cases filed against Korea? How much of Korean FDI in the United States can be said to be a response to the formation of NAFTA?

Although the author generally believes that trade diversion is small, in section 9.3.2, he calculates the degree of trade diversion based on export price elasticities and comes up with some fairly big numbers. For example, trade diversion for leather products amounts to 5.1 percent of trade volume in 1992, and for textiles and apparel, 4.4 percent. There seems to be a conceptual problem in using price elasticities based on the assumption of perfect competition. If the export market were a perfectly competitive market, then tariff preference in favor of Mexican products would wipe out all exports from Korea. An imperfect competition model within the framework of differentiated products seems to be more suitable for measuring the trade diversion effect. In that model, the degree of substitution between Mexican and Korean products matters. I wonder whether the assumption used here, that is, that a 1 percent tariff preference for Mexico leads to a 0.5 percent decrease in export price for Korean products, overestimates the substitutability.

The author correctly points out the potential damage of investment diversion. He concludes that investment diversion among U.S. multinationals is likely to be small because the maquiladora program has been in place for many years. His conclusion on investment diversion among multinationals based elsewhere is unclear, however. My personal view is that the latter investment diversion effect could be substantial. Fears of trade protectionism coupled with rules of origin and regional content regulations may encourage substantial FDI from non-NAFTA countries, not only to Mexico, but to the United States and Canada as well. If this occurs, the agglomeration effect will make Mexican industries more competitive in a dynamic sense, and the trade diversion effect that we deemphasize today may loom larger in the future, particularly in high-technology areas. For that matter, I wonder what Hyundai will do if it pulls out of Canada? Will it not consider investing in Mexico?

It is recognized in the paper that the rules of origin embedded in NAFTA are important protectionist measures. It would have been nice had the paper

presented an estimate of this hidden protective measure, that is, the equivalent tariff. From this, the paper could also have measured the adverse effect of these rules of origin on Korean exports of automobile parts and textile products.

The paper argues that it is the lack of structural linkage between Korea and NAFTA that contributes to the declining share of Korean exports going to NAFTA. But the paper also estimates that each dollar of Korea's export to the United States generates 44–56 cents of "induced import" from the United States. This can hardly justify the "lack" of structural linkage. Does Korea have a stronger structural linkage with Japan? Presumably. But Korea's export to Japan does not seem to have increased much in recent years. The meaning of the term "structural linkage" needs to be clarified and its relationship with trade explained.

Since the paper focuses on the negative impact of NAFTA, it may only be fair to also mention some possible positive impacts of NAFTA on Korea.