CHANGING TRADE POLICY AND ITS IMPACT ON TFP IN THE REPUBLIC OF KOREA

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INTRODUCTION

THE Republic of Korea has long been the subject of great attention in research on economic development. Many books have been written about the success of Korea's economic growth, and there are countless studies delving into the factors that have enabled Korea to achieve this success. Most of them point to the industrialization policies focusing on export promotion or the export-oriented policies adopted from the latter half of the 1960s as the main catalyst to Korea's economic rise.[1]

The main thrust of these studies has been to analyze industry-fostering policies that concentrate on protecting infant industries, as well as export support policies. Here Korea's economic success appears to have been quite naturally regarded as being premised on the protection of fostered industries from overseas competition. That is to say, discussion of the factors contributing to Korea's economic rise at least up to the mid-1980s has not stemmed from any detailed analysis of import protection policies or import liberalization policies. Active debate even within Korea about import liberalization only started from around 1982, just before the government began implementing import liberalization policies in earnest. Debate then, however, tended to focus on the direction of policy, because of the limited time until implementation of import liberalization. There was almost no concrete analysis of the effects of past import policies. Only during the past few years has there been research in which the main focus of analysis is the economic effects of import liberalization.

The purpose of this paper is to examine the impact that import-related trade policies have on the growth of domestic industry, based on the experience of Korea. Section I looks at the aim of Korea's import policies by outlining changes in policies since Korea began promoting industrialization in the 1960s. Section II statistically examines the correlation between degree of protection and total factor

[1] To be more exact, the idea that a flexible policy response based on export orientation is better than the promotion of export-oriented policies itself has recently gained widespread acceptance. However, it is extremely difficult to assess whether individual policies were flexible in a way that is effective for economic growth. So the reality is that judgments are made from general economic performance, which is the end product of various policies, noneconomic policies included. Moreover, it is not so easy to judge in the short run whether policy changes will have a positive effect on long-run economic performance. It is therefore risky to seek the primary factor for economic success in the flexibility of policies. At the very least, we must constantly examine individual policies.

productivity (TFP), using indicators that show the level of protectionism. The paper then concludes with a summary of the correlation between import policies and increases in total factor productivity, together with an examination of future issues.

I. CHANGES IN AND CHARACTERISTICS OF KOREA'S TRADE POLICIES

A. Before 1967: The Period of Import Substitution Promotion

On the premise of industrial promotion for the purpose of breaking away from a colonial economic structure, Korea's trade policy from the establishment of the government in 1948 until 1961 basically proclaimed export promotion and import restraint, but exports did not expand to any great extent. Consequently, Korea came to rely on the provision of foreign capital, mainly in the form of assistance funds. The main objective of trade policy during this period was economic stability through the smooth distribution of assistance funds, as can be seen by the fact that the foreign exchange rate was for many years considerably overvalued.

Under industrialization development policies, which began with the establishment of the Park Chung-Hee regime, the government concentrated on improving the country's international balance of payments through promoting exports and building up key industries by fostering import substitution industries. It also became necessary to strengthen trade management, which until then had been quite lax. Since the exchange rate had been overvalued, initial export promotion measures consisted mainly of direct assistance under the Export Promotion Law (1962). In 1964 the exchange rate became somewhat more realistic with the devaluation of the Korean won from 130 to the U.S. dollar to 255, and price incentives for exports were improved, marking a shift in export promotion measures from direct assistance to indirect assistance through financial and tax support.

Reflecting its strategy of fostering import substitution industries, Korea maintained a positive list system, in which more than 90 per cent of the listed items were subject to import controls until its entry into GATT in 1967 (see Table I). Moreover, tariff rates continued to rise steadily from levels of 20–30 per cent in the 1950s. Because of foreign currency limits, the government introduced quarterly import quota systems, including the export-import link system in which companies could use their export earnings for imports. Thus, the indicators for tariff rates and the ratio of items subject to import controls during this period do not necessarily accurately reflect the actual state of import controls.

B. The Period of Import Liberalization Preparation: 1967–77

The industrialization policies promoted from 1962 successfully placed Korea on the road to economic growth, and brought about a surge in the volume of trade, greater diversification in trading partners, and a change in trade commodities centering on the expanding export of light manufactures. To maintain such a outward-looking strategy, Korea had to become a part of the international trading

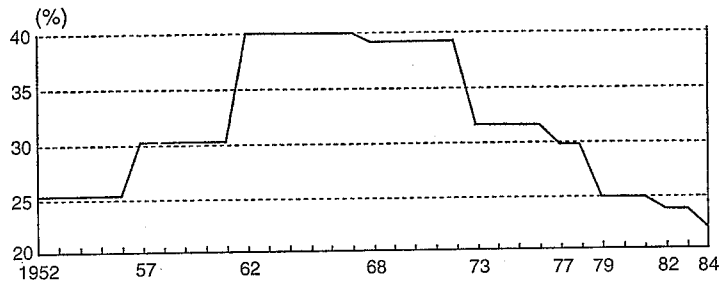TABLE I

TARIFF RATES AND THE RATIO OF IMPORT-CONTROLLED ITEMS

(%)

	Weighted Average Tariff Rates (A)	Actual Tariff Rates (B)	Ratio of Import-Controlled Items		
			(C)	(D)	(E) = (C) + (D)
1961	36.0	13.5	95.9	—	95.9
1962	49.6	12.4	94.4	—	94.4
1963	49.5	8.7	99.6	—	99.6
1964	51.0	8.0	98.0	—	98.0
1965	52.7	10.0	94.0	—	94.0
1966	52.3	9.1	90.7	—	90.7
1967	52.6	9.3	39.6	8.0	47.6
1968	58.9	9.2	42.4	7.5	49.9
1969	58.3	8.1	44.9	8.0	52.9
1970	58.5	8.1	45.7	8.0	53.7
1971	57.9	6.3	45.0	8.0	53.0
1972	57.5	6.0	49.1	7.5	56.6
1973	48.2	4.9	47.9	7.4	55.3
1974	48.1	4.6	49.3	6.9	56.2
1975	48.1	5.1	50.9	7.5	58.4
1976	48.1	6.5	49.0	6.9	55.9
1977	41.3	7.4	50.1	9.1	59.2
1978	41.3	8.9	38.7	9.1	47.8
1979	34.4	7.4	32.4	11.4	43.8
1980	34.4	5.7	30.9	11.7	42.6
1981	34.4	5.0	25.6	13.7	39.3
1982	34.4	5.7	23.4	14.1	37.5
1983	34.4	7.2	19.6	13.8	33.4
1984	26.7	6.5	15.2	9.8	25.0
1985	26.4	5.8	12.3	9.5	21.8
1986	24.7	7.0	8.5	9.5	18.0
1987	23.9	8.0	6.4	9.6	16.0

Sources: (A), (C), and (D) calculated from Tables 2 and 5 of Kim [7]. For (B), National Statistical Office, *Major Statistics of Korean Economy* (Seoul, each year).

Notes: 1. (A) is the average rate of total legal tariffs which includes regular tariff, foreign exchange tax, and special tariff rate on import, weighted by the value of 1975 production.
2. (B) is the ratio of total tariff revenue to imports.
3. (C) is the ratio of the number of import-prohibited and import-restricted items in Semiannual Trade Program to the number of total items in SITC before 1977 and CCCN after then.
4. (D) is the ratio of the number of import-controlled items under special laws to the number of total items in note 3.

system, and in 1967 it joined GATT. It then combined various trade-related laws, beginning with laws concerning assistance to exporting companies, into the Trade Transactions Law (1967), and shifted from the positive list system of import controls to a negative list system. With such a major turnabout in its trade system, Korea took its first step from planned trade based on preliminary approval for each trade transaction to self-determining trade.

Fig. 1. Change in Simple Average Tariff Rates, 1952–84

Source: [7, Table 1].

   Initially Korea advocated wide-ranging import liberalization, but imports con-
tinued to expand at a greater rate than exports, so the basic policy tone remained
one of import restraints, and included such steps as the adoption of comprehensive
import countermeasures in 1969. Figure 1 shows the change in the simple average
tariff rate for a range of items during the major tariff rate revisions between 1952
and 1984. Korea's maintenance of a comparatively high tariff rate from 1962,
when it raised tariffs, to 1973 shows that it was not yet ready to introduce the
principle of competition through import liberalization. The weighted average
tariff rate in Table I also rose slightly as a result of the 1968 revisions. Moreover,
the ratio of items subject to import controls in periodic announcements rose from
48 per cent in 1967 to 57 per cent in 1972, signifying that through membership
in GATT, Korea shifted its import restraint policy from raising tariffs to strengthen-
ing nontariff barriers.
   During this period the government began to adopt seriously an export-oriented
strategy, placing export assistance through such means as increased export financ-
ing at the heart of its development strategy. At the same time the government
introduced policies to promote increased domestic production in the heavy and
chemical industries, which until then had largely been imported. In February 1973
the government lowered the tariff rate to reduce protection for the consumer-
goods-manufacturing sector and strengthen protection for the heavy- and chemical-
products-manufacturing sectors. Through this move, the average tariff rate fell
to pre-1962 levels. However, the oil shock of 1973 caused a sudden decline in
Korea's balance of payments, and this in turn led to a steady increase in the ratio
of items subject to import controls.

C.   The Period of Passive Import Liberalization: 1977–83

   Exports suddenly increased from around 1976, and in 1977 a current account
surplus was recorded for the first time since 1967. Korea's expanding exports
began to create friction with its trading partners, mainly the industrialized coun-
tries, and great pressure was brought to bear on the government to open domestic
markets. Against this background, the government proposed a shift from policies

giving priority to the quantitative expansion of exports to those that emphasized strengthening of competition through the qualitative improvement of export goods. With this, Korea began to see import liberalization as a means of promoting competition. That is to say, internationally, the government aimed at opening its markets by lowering tariffs or reducing the ratio of items subject to import controls, while domestically, it aimed at improving the efficiency of industries recognized as being to some extent internationally competitive by promoting competition with imports. In particular, the key domestic industries were mono-polies or oligopolies, so the government's main goal was to promote competition and stabilize prices in these industries. On the other hand, the government implemented positive assistance policies aimed at giving the materials and parts industries, which were still at their growth stage, some protection from expanding imports as the domestic markets become more open.[2]

Import liberalization measures during this period included two revisions of tariffs in 1977 and 1979, which saw the weighted average tariff rate drop from 48 per cent in 1976 to 34 per cent in 1979, and witnessed a yearly reduction in the range of import controls from 1977 to 1979, bringing the ratio of items subject to import controls in the Semiannual Trade Program down from 50 per cent in 1977 to 32 per cent in 1979. However, in 1980 the deterioration of the export environment because of the second oil shock and growing domestic political instability resulted in negative economic growth for the first time ever and the country's largest trade deficit. And as can be seen in Table I, this put a temporary halt to the move toward import liberalization that Korea had been making since 1977 in both areas of tariffs and import controls. Nevertheless, the ratio of items subject to import controls continued to fall, albeit slightly until 1982, though controls under special laws were strengthened, suggesting that liberalization during this period was directed toward avoiding any substantial impact on the domestic economy.

Meanwhile, a growing number of people were blaming the recession that struck around 1980 on the government's policy of promoting import substitution in the heavy and chemical industries during the 1970s. This marked the beginning of heated debate over the need for "structural adjustment." There was also debate within the government about the promotion of import liberalization in relation to structural adjustment, but the government held back on taking major import liberalization steps until 1983 because of strong opposition and concern expressed within industry, mainly the consumer goods, materials, and parts industries, and within academia about the contraction of domestic industry and the expanding balance-of-payments deficit caused by increasing overseas access to domestic markets.[3] The idea of raising economic efficiency and international competitiveness

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[2] For example, the positive protection and fostering of the motor vehicle parts industry began during this period. It should be noted that the period of protection for the motor vehicle assembly industry was different from that for the parts industry. Refer to Kwak [11].

[3] There were quite emotional reactions among opponents, because one of the things that precipitated debate was the pressure applied by the United States on Korea to open its

TABLE II

CHANGE IN SIMPLE AVERAGE TARIFF RATES SINCE 1982

(%)

	1982	1984	1988	1991	1994
All items	23.7	21.9	18.1	11.4	7.9
Agriculture	31.4	29.6	25.2	19.9	16.6
Nonagriculture	22.6	20.6	16.9	9.7	6.2
Raw material	15.5	11.9	10.6	3.9	2.8
Intermediate goods	25.4	21.5	18.7	10.7	7.0
Final goods	33.1	26.4	24.7	11.2	7.1

Source: [3, p. 36].
Note: The figures for 1994 are targets in liberalization plan.

through a full-scale promotion of import liberalization did not materialize as government policy until the end of 1983.[4]

D. *Since 1983: Full-scale Import Liberalization*

Import liberalization until 1983 can be characterized as a market opening in return for export expansion. However, "import liberalization debate" relating to structural adjustment from the early 1980s was mindful of its real impact on the domestic economy. Therefore, in 1981 the government drew up a wide-ranging plan for liberalization to be implemented over five years until 1988. Publicly announcing in advance tariff reductions and items that would be removed from the import control list, the government pressed domestic industry to search for and take its own steps to compete against increasing imports. All in all the initial plan was implemented quite smoothly, and the positive results that it brought about are shown in Table II.

Tariff rate revisions during this period centered on overall tariff reduction and a leveling off of tariffs among import items.[5] Before, the tariff rate for individual items was changed when necessary, resulting in an overall tariff structure that was complex without clear principles. The revised tariff rates were generally 5–10 per cent for raw materials, 20–30 per cent for intermediate and capital goods, and 40–50 per cent for consumer goods. By 1988, these rates had been lowered to

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markets. However, as explained, import liberalization was already being promoted in Korea from around 1977, and this import liberalization should be looked upon as promoting the opening of markets based on the government's own judgment based on the economic environment. On this point, refer to Kang [6, pp. 72–78].

[4] For a typical example of this idea, see Korea Development Institute [9].

[5] Tariff rate revisions until then were decided behind closed doors within the relevant government agencies; but on this occasion, work on the revisions was carried out by a committee headed by the chairman of the trade association. The committee held more than one hundred public hearings, marking the first time that the policy-making process had been open to the public. Therefore, from this democratization of the policy-making processes in Korea we can see that import liberalization indeed paved the way to "liberalization" in its true sense. For further details refer to Kang [6, pp. 76–77].

TABLE III

RATIO OF IMPORT-CONTROLLED ITEMS PRODUCED
BY MARKET-DOMINANT FIRMS

	Total Items (A)	Import-Controlled Items (B)	Ratio (A/B)
1983	164	84	51.2
1984	202	76	37.6
1985	254	56	22.0
1986	278	26	9.4
1987	298	26	8.7

Source: [10, p. 30].

5–10 per cent, 20 per cent, and 20–30 per cent respectively. The high tariff rates for agricultural products, however, remained virtually the same.

The basic policy for relaxing import controls was between 1983 and 1985 aimed at opening markets in goods with international competitiveness and goods with comparative disadvantage. Then between 1986 and 1987 it aimed at opening markets in goods that appeared to be reasonably internationally competitive and goods related to the stability of national daily life. Finally, in 1988 the complete opening of markets in all goods other than those that would absolutely require protection was implemented. The government focused on relaxing import controls in goods produced under monopoly or oligopoly conditions, areas where until then little progress had been made in import liberalization. In early 1983 the percentage of items in these areas subject to import controls was 55.1 per cent, much higher than the overall ratio of 19.6 per cent; however, as shown in Table III, by the end of 1987 the figure had dropped to 8.7 per cent, or roughly the same level as the overall liberalization rate of 6.4 per cent.

In 1985 the government made minor revisions to its import liberalization plan by bringing forward the deadline for achieving import liberalization in the initial plan and reducing the number of controlled items under special laws as a result of increasing demands by the United States for greater access to Korea's markets. Under these revisions, the percentage of manufactured goods subject to import controls fell below 1 per cent in 1988, and by 1991 the import liberalization rate for manufactured goods had reached virtually 100 per cent. Moreover, in 1991 the simple average tariff rate for manufactured goods fell below 10 per cent to 9.7 per cent.

E. *Summary of Trade Policies Changes*

Summarizing Korea's industrialization strategy based on its import policies, the period between the beginning of industrialization in 1962 and membership in GATT in 1967 can be regarded as a period of perfect import substitution, in which the government maintained high tariff rates and a positive list system for import controls. Then from 1968, as can be seen in Figure 2, the average tariff rate steadily fell, but since the tariff level remained comparatively high until 1977 and drops in the tariff rate were offset by increases in the percentage of controlled

Fig. 2.   Change in Weighted Average Tariff Rates and the Ratio of
Import-controlled Items
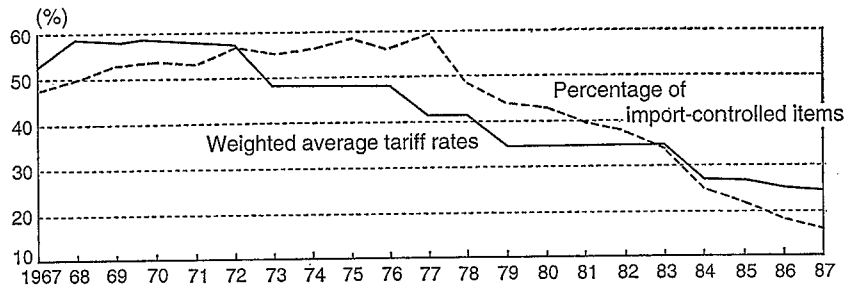
Source: Table I.

imports, 1967 to 1977 really should be looked upon as a period in which funda-
mentally the import substitution strategy was maintained and the concept of
raising efficiency by promoting competition had yet to take root. However, the
expansion of exports and membership in GATT, which occurred during this
period, did pave the way for import liberalization.

   In its move toward import liberalization from 1977, Korea, on the surface,
declared it would promote competition by liberalizing imports, partly because of
external pressure to open its markets. In fact, we can read liberalization-related
indicators, such as declining tariff rates and percentage of items subject to import
controls, as showing that the government made considerable progress in liberalizing
imports during this period. If, however, we look at this in more detail, it is clear
that while easing import controls on the whole, the government sought to
strengthen controls on specific items through special laws, and generally concen-
trated its liberalization efforts on imports that would have only a marginal effect
on domestic industries. This period should, therefore, be characterized as a stage
of "passive" import liberalization.

   The Five-Year Import Liberalization Plan announced in 1983 can be regarded
as constituting a full-scale liberalization policy, both qualitatively and quantita-
tively. The plan was drawn up as a result of heated debate beginning around 1980,
but considering that policy debate and decisions in general tended to take very
little time, the decision-making process for the plan was indeed protracted for
that time. So in this respect as well, the policy and the expected effects can be
looked upon as genuine. That is to say, the plan was not aimed at merely declaring
to the rest of the world the government's intentions regarding import liberalization,
but it was also a serious substantial effort to increase imports and stimulate
domestic industry. Looking at import-liberalization-related indicators, we can say
that the initial plan proceeded as expected, and now in the 1990s Korea is
achieving a level of liberalization comparable to that of an industrialized nation
(Table II).

TABLE IV

CHANGE IN NOMINAL AND EFFECTIVE RATES OF PROTECTION
IN THE MANUFACTURING SECTOR

	Nominal Rate of Protection	Effective Rate of Protection		
	(A)	(B)	(C)	(D)
1970	—	—	—	19.3
1975	12.2	−4.6	−5.3	20.8
1978	23.6	11.2	11.3	—
1980	43.5	21.9	26.1	33.2
1983	42.9	19.6	23.7	—
1985	30.1	10.7	13.4	26.2
1990	21.9	5.8	7.0	—

Sources: For (A), (B), and (C), Hong [5]. (D) calculated from the Bank of Korea
[1].

Notes: 1. (A) is extended from the basic year's NRP, which is estimated from legal
and actual tariff rates, and the data of international price comparison.
2. (B) is calculated from (A) by Corden's method.
3. (C) is calculated from (A) by Balassa's method.
4. (D) is calculated from actual tariff rates. Non-tradable intermediary input
was not considered when calculating (D).

The character of Korea's import policies mentioned above can be summed up
by changes in the nominal and effective rate of protection for the manufacturing
industry contained in Table IV. First of all, the nominal protection rate, which
is prepared from domestic and overseas price comparison data taking into account
legal and actual tariff rates, rose sharply from around 1978, peaked in 1980, then
dropped sharply after 1983, although an inter-temporal absolute comparison is
not always accurate because of the connection to price indices. Moreover, all
three kinds of effective protection rates show a similar trend. Import protection
was substantially strengthened from 1977, and reached its peak level in 1979 and
1980 in the face of a massive balance-of-payments deficit and a serious slump in
the domestic economy. We should therefore regard Korea's full-scale import
liberalization period as occurring from 1983, and look upon the government's
series of liberalization policies beginning in 1977 as passive liberalization through
the internationalization of the economy or export expansion. The period of institu-
tional development beginning with GATT membership in 1967 should be considered
as merely the preparatory stage.

II. EFFECTS OF IMPORT POLICIES ON TOTAL
FACTOR PRODUCTIVITY

Much research and analysis has been done on the economic effects of import
liberalization in Korea, not least of which has been done in Korea itself, especially
with the lively debate about import liberalization that has taken place since the
1980s. However, most of this research and analysis has gone no further than to
observe how such economic variables as domestic production, labor input, imports,

and exports were affected by changes in tariff rates and the import liberalization rate.[6] In this case, most changes in economic variables are usually caused by factors other than import policies. That is to say, even if we find a correlation between import liberalization rate and changes in production, for example, there is a strong possibility that it is a false correlation. To step beyond this we decided to examine the relationship between the total factor productivity index and the degree of liberalization: that is, we shall attempt to explain the total factor productivity index, excluding the effect of changes in labor or capital input and in trade, using such import policy indicators as import liberalization rates and effective protection rates.

Examples of research on the relationship between import liberalization and changes in total factor productivity in Korea using this method are Nishimizu and Robinson [14] and Kim and Hong [8]. Nishimizu and Robinson attempted to explain changes in total factor productivity by classifying changes in outputs in each of thirteen manufacturing sectors between 1960 and 1977 in terms of export expansion and import substitution using the ratios of exports and imports to output, and confirmed that the lower the level of import substitution (i.e., the more advanced the import liberalization),[7] the higher the total factor productivity growth rate. Kim and Hong concentrated on factors that determined changes in total factor productivity in thirty-six manufacturing sectors between 1967 and 1988, and confirmed that the lower the ratio of imports to output, the higher the total factor productivity growth rate. However, import liberalization indicators such as nominal and effective protection rates and the "comprehensive import liberalization rate" (which is calculated from the tariff rate and the ratio of items subject to import controls) were not statistically significant. Even though there are differences between these two studies in the periods covered and in the method of calculating indicators, it is interesting that the two produced opposite results using similar import ratio indicators.

A. *Selection of Explanatory Variables*

The simplest definition of total factor productivity is the output per unit of combined labor and capital input (refer to Nadiri [13]); and, if economies of scale can be disregarded, the rate of change in total factor productivity is the residual not accounted for by a change in input. This residual is normally understood as a change in technology in the wider sense, including production technology, knowledge, and labor expertise; but the effect of changes in such given economic conditions as trends in business conditions, extent of competition in the market, and the trade environment are also reflected in individual industries. This study focuses on the effect of import policies on changes in total factor productivity, and incorporates the following as explanatory variables based on the available data.

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[6] For example, see Kim [7], Han [3], and Korea Institute for Industrial Economics and Trade, and Korea Trade Association [10].

[7] This research presumes that the higher the ratio of imports to output, the more advanced import liberalization is; but generally such a relationship does not exist. Rather, it should be interpreted as a definition in this research for the term "import liberalization."

TABLE V

LIST OF VARIABLES

Variable	Year	Source
Total factor productivity	every year (1970–88)	Kim and Hong [8]*
Output (constant price)	1970, 75, 80, 85	Bank of Korea [1]
Capital stock (constant price)	1970, 75, 80, 85	Kim and Hong [8]*
Number of employees	1970, 75, 80, 85	Bank of Korea [1]
Effective rate of protection	1970, 75, 80, 85	Bank of Korea [1]
Nominal rate of protection	1975, 80, 85	Hong [5]*
Overall index of liberalization	1970, 75, 80, 85	Kim [7]*
Tariff rate	1970, 75, 80, 85	Kim [7]*
Import-output ratio (current price)	1970, 75, 80, 85	Bank of Korea [1]
Export-output ratio (current price)	1970, 75, 80, 85	Bank of Korea [1]
Three-firm sales concentration ratio	1974, 77, 83, 87	data compiled by KDI
Herfindahl index	1974, 77, 83, 87	data compiled by KDI

* Aggregated to twenty-six sectors by being averaged with weight of current outputs.

First, because this paper concentrates on the effects of import liberalization, many import liberalization indicators are used. They include the effective rate of protection (ERP), nominal protection rate, average tariff rate, comprehensive liberalization rate (which is the average of the tariff rate and the ratio of importable items), ratio of imports to output, and penetration of imports into domestic markets. Next, to examine the effect of export competitiveness and domestic market competitiveness on total factor productivity, we used the ratio of exports to output as a yardstick of export orientation, the ratio of the sum of exports and imports to output as a measure of market openness, and the three-firm sales concentration ratio (CR3), or the Herfindahl index, as the alternative variable for degree of competitiveness in the domestic market.

Since it is possible that the effect of scale economies is included in total factor productivity data from the assumption of a linearly homogeneous function when calculating TFP data, we used the rate of increase of real output as an explanatory variable to verify economies of scale, and at the same time, we used capital equipment ratio data to ascertain differences in productivity according to whether the capital-intensive method or labor-intensive method of production is employed. Table V lists the sources of the data used in this analysis.

B. *Summary of Data*

1. *Total factor productivity*

In this research we have given priority to data accuracy, so it was decided to use the total factor productivity index estimated in Kim and Hong [8].[8] While

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[8] In addition to Kim and Hong [8] used in this paper, two more studies on the preparation of recent total factor productivity indicators for each manufacturing industry in Korea have come out: Moon et al. [12] and Pyo et al. [15]. Among these three studies, Kim

TABLE VI

AVERAGE ANNUAL RATE OF INCREASE IN THE TFP INDEX

(%)

Code	Industry	1970–88	1970–75	1975–80	1980–85	1985–88
311–12	Food	1.19	2.06	1.25	0.18	1.30
313	Beverage	0.92	6.24	−1.95	−2.19	2.38
314	Tobacco	3.10	5.28	4.23	−1.34	5.24
321	Textiles	1.41	4.22	0.68	0.23	0.02
322	Wearing apparel	1.22	1.28	1.18	0.24	2.83
323–24	Leather and fur, footwear	1.01	3.45	−1.31	0.82	1.20
331–32	Woods, furniture	1.38	2.27	1.32	0.25	1.92
341	Paper and paper products	1.46	1.54	1.65	1.78	0.48
342	Printing and publishing	2.24	1.08	2.59	2.25	3.63
351	Industrial chemicals	2.81	8.85	1.27	−0.35	0.97
352	Other chemical products	2.22	4.70	2.06	0.02	2.12
353	Petroleum refineries	0.08	1.15	−1.96	0.10	1.72
354	Petroleum and coal products	−0.06	−1.30	−0.07	0.79	0.65
355	Rubber products	1.62	3.98	1.10	−0.10	1.52
356	Other plastic products	0.96	−1.65	2.17	1.83	1.93
361	Pottery, china, and earthenwares	2.35	2.79	2.53	1.70	2.43
362	Glass and glass products	2.17	2.13	1.89	2.59	1.98
369	Other nonmetallic mineral	0.83	3.33	−0.09	−1.53	2.22
371	Iron and steel	0.73	1.97	0.29	0.14	0.42
372	Nonferrous metal	1.58	1.24	3.08	0.61	1.31
381	Fabricated metal products	1.96	2.42	3.62	0.81	0.38
382	Machinery	4.48	4.69	3.81	5.33	3.83
383	Electrical and electronic machinery	2.54	4.13	2.07	2.16	1.34
384	Transport equipment	2.40	3.88	2.93	1.44	0.72
385	Medical and other equipment	3.78	5.96	2.99	2.48	3.69
390	Other manufacturing	2.27	1.83	3.38	1.12	3.07
3	Manufacturing	1.51	3.28	0.95	0.52	1.22

Source: [8].

basically following the method presented in Denison [2], Kim and Hong adopted an estimation method premised on a translog production function for the input-output coefficient. Table VI shows the average annual increase of the total factor productivity index in each period. During the observed period, total factor productivity for the manufacturing industry as a whole increased by an annual average

and Hong [8] is the only one to use output data based on the input-output table. Since this research relies on the input-output table for data for such explanatory variables as effective protection rate, output, and labor input, the total factor productivity indicators in Kim and Hong [8] were considered the most suitable. The statistical relationship with the total factor productivity indicators of the other two studies was very weak. Incidentally, these two studies used value added from national income statistics (gross domestic product) as output data.

Fig. 3 Change in the Rates of TFP Increase
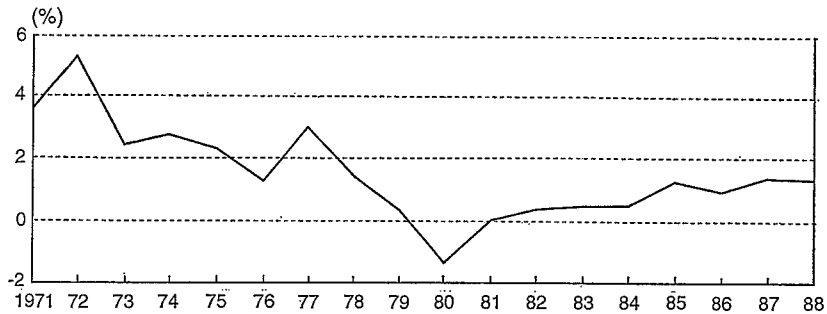
Source: [8].

of 1.5 per cent. The rate of increase was highest in machinery, medical and other equipment, and tobacco. It was lowest in petroleum refineries, petroleum and coal products, and iron and steel. Here we shall not discuss these differences in detail; however, one can say that it does stand to reason that the increase is high in the machinery industry because technological progress seems to be quite rapid, and low in the process industry because large-scale plant and equipment are necessary.

By period, the overall rate of increase is highest at 3.3 per cent for 1970–75, after which it dropped to around the 1 per cent level. The reason for this is the negative growth in total factor productivity around 1980, when Korea experienced a serious economic slump, as shown in the graph at Figure 3. The rate of increase since then has remained at a much lower level than before the drop, indicating, we believe, that the Korean economy has changed structurally. In other words, it has become much more difficult for Korea to achieve growth simply by increasing input, as it was able to do during the high growth period up to the mid-1970s. It is now necessary to strive for more advanced technology and greater efficiency.

2. *Import liberalization indicators*

If we compare the total factor productivity trend in Figure 3 and the protection rate indicator trend in Table IV, we generally observe an inverse pattern, although the time periods are slightly different. However, it would be somewhat hasty to conclude that import liberalization raises total factor productivity, for it can also be said that the drop in total factor productivity expedited import liberalization.[9] Before such a pattern can be verified, we would have to increase the sample and compare figures among different countries.

Table VII shows trends in the effective protection rate for various industries, and tells us that the protection structure does not display any consistent charac-

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[9] As discussed in the previous section, if we consider the process of policy-making, the latter would seem the more appropriate cause and effect relationship. However, the rate of increase of total factor productivity after 1983 showed signs of recovery, so there is a high possibility that the effect of import liberalization was positive.

TABLE VII

EFFECTIVE RATE OF PROTECTION BY INDUSTRY

(%)

Code	Industry	Effective Rate of Protection				Annual Average Increase Rate of ERP		
		1970	1975	1980	1985	1970-75	1975-80	1980-85
311-12	Food	14.97	52.94	46.95	64.77	38.0	-6.0	17.8
313	Beverage	-7.57	5.30	21.58	29.47	12.9	16.3	7.9
314	Tobacco	-25.80	49.17	14.49	63.13	75.0	-34.7	48.6
321	Textiles	2.41	1.30	25.54	40.95	-1.1	24.2	15.4
322	Wearing apparel	-34.90	-1.80	70.12	-14.58	33.1	71.9	-84.7
323-24	Leather and fur, footwear	8.24	-1.63	15.94	33.27	-9.9	17.6	17.3
331-32	Woods, furniture	19.68	33.45	44.34	26.07	13.8	10.9	-18.3
341	Paper and paper products	45.08	25.76	66.02	36.77	-19.3	40.3	-29.2
342	Printing and publishing	-11.51	-10.14	-21.96	-9.06	1.4	-11.8	12.9
351	Industrial chemicals	19.25	6.11	26.27	25.68	-13.1	20.2	-0.6
352	Other chemical products	63.90	72.27	46.18	28.83	8.4	-26.1	-17.4
353	Petroleum refineries	11.50	15.63	24.77	6.22	4.1	9.1	-18.6
354	Petroleum and coal products	-65.08	-0.58	5.41	11.58	64.5	6.0	6.2
355	Rubber products	14.75	6.03	88.77	39.79	-8.7	82.7	-49.0
356	Other plastic products	-10.74	18.79	32.30	24.19	29.5	13.5	-8.1
361	Pottery, china, and earthenwares	-10.39	52.94	39.69	10.56	63.3	-13.3	-29.1
362	Glass and glass products	53.07	41.18	20.84	34.21	-11.9	-20.3	13.4
369	Other nonmetallic mineral	30.07	39.62	56.43	10.32	9.6	16.8	-46.1

TABLE VII (Continued)

Code	Industry	Effective Rate of Protection				Annual Average Increase Rate of ERP		
		1970	1975	1980	1985	1970–75	1975–80	1980–85
371	Iron and steel	51.29	39.90	13.20	12.54	−11.4	−26.7	−0.7
372	Nonferrous metal	56.31	11.34	33.68	30.81	−45.0	22.3	−2.9
381	Fabricated metal products	104.71	36.05	68.94	17.70	−68.7	32.9	−51.2
382	Machinery	0.26	19.67	13.48	8.32	19.4	−6.2	−5.2
383	Electrical and electronic machinery	23.62	18.11	12.66	16.52	−5.5	−5.4	3.9
384	Transport equipment	10.97	6.86	48.79	6.54	−4.1	41.9	−42.2
385	Medical and other equipment	32.59	18.27	21.33	12.61	−14.3	3.1	−8.7
390	Other manufacturing	61.68	11.36	23.47	26.96	−50.3	12.1	3.5
3	Manufacturing	19.25	20.85	33.19	26.24	1.6	12.3	−7.0

Source: [1].

Fig. 4. Annual Rate of Increase in Output, Capital, Labor, and
Capital Intensity in the Manufacturing Sector
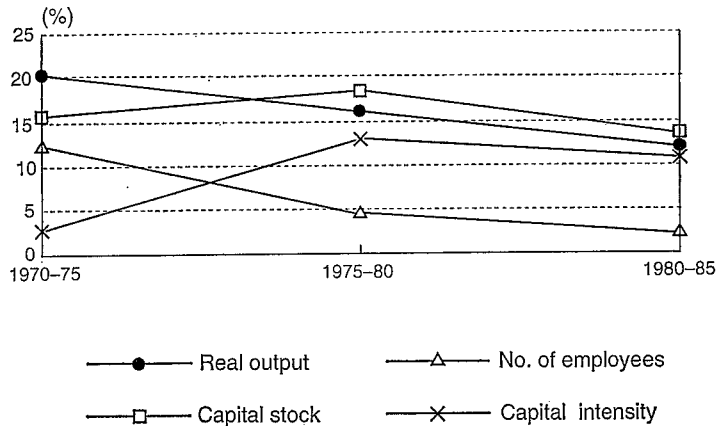
Source: See Table V.

teristics. There is little simple correlation between the effective protection rates
in successive years, and the rank correlation coefficient is extremely low. However,
changes in the effective protection rate show a negative correlation, and the
correlation coefficient between the periods 1975–80 and 1980–85 in particular
is very high at −0.69, supporting the view that the direction of Korea's protection
policies has shifted significantly since around 1980. The correlation between the
effective protection rate and capital intensity is also extremely low at all points,
enabling us to say that Korea's protection structure is not characterized along
the lines of capital- or labor-intensive industries, at least at twenty-six industrial
division level we studied. Industries that generally show a consistent rise in the
effective protection rate are food, beverage, textiles, and petroleum and coal
products, while those showing a decreasing trend are iron and steel, medical and
other equipment, and other chemical products. We were unable to observe any
common characteristics among these industries as well. Such a lack of consistency
in the protection structure reflects the fact that government policies stressed
commodities, not industires, considered important at the time, and were not aimed
at protecting specific industries. From this it can be interpreted that protection
policies were similar to export-related policies insofar as the assistance they
provided was not limited to specific industries.

3. *Others*
   Figure 4 shows the annual average rate of increase in constant output at 1980
prices, capital stock, and the number of employees in the manufacturing industry.
The annual rate of increase for output in the manufacturing industry was highest
in the early 1970s, but dropped steadily in subsequent years. This decline is not,
however, as severe as the fall in the rate of increase of total factor productivity
after 1975, as shown in Table VI. Similar to the rate of increase in output, the

Fig. 5.   Ratio of Exports and Imports to Output
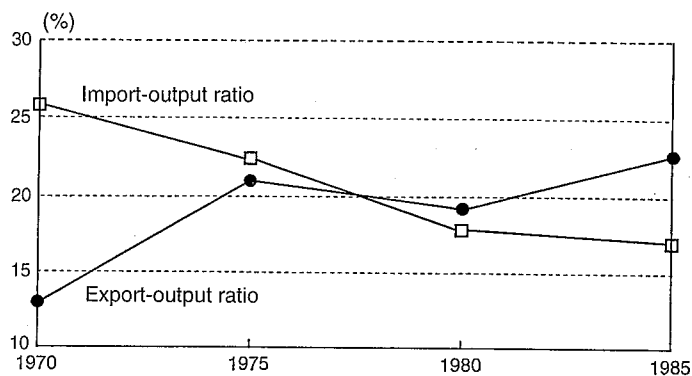
Source: See Table V.

rate of increase of labor input dropped steadily; but, in contrast, the rate of increase of capital stock rose in the latter half of the 1970s. As a result of these trends, the rate of increase of the capital equipment ratio rose sharply in the latter half of the 1970s, and maintained quite a high rate of increase during the 1980s as well.

   Next, looking at changes in the ratio of imports and exports to output in the manufacturing industry shown in Figure 5, we can see that, except for a slight drop around 1980 due to an unusual slowdown in exports, the export ratio was generally on an upward trend, although the rate of increase gradually fell after the latter half of the 1970s. The import ratio shows a constantly downward trend. Therefore, we cannot expect accurate results when, for example, we measure the economic effect of import liberalization in time series using the simple import ratio as an alternative variable for liberalization.

   Finally, if we look at the changes in the concentration indicator for industry in Figure 6, the three-firm sales concentration ratio and the Herfindahl index show similar trends: i.e., both rose until around 1983, then dropped sharply in 1987. The reason for this is that in line with its import liberalization policy in the 1980s, the Korean government strengthened antimonopoly policies from around 1985. In this respect, as well, the effect of the degree of concentration indicator on productivity is worthy of note.
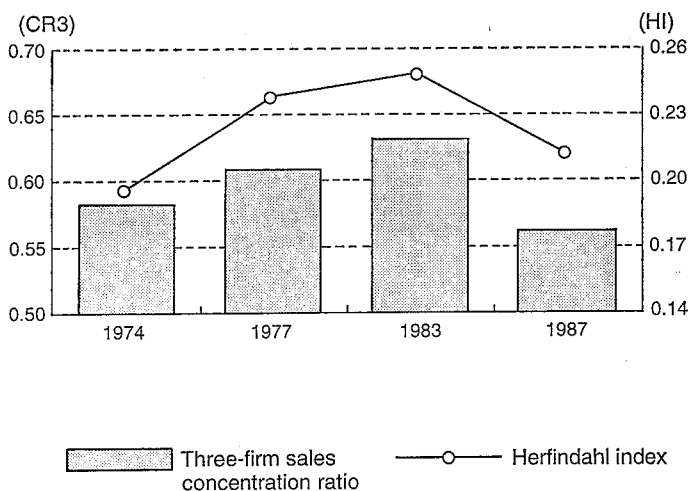
C.   Regression Results

   The following equation has been prepared to explain the rate of change in total factor productivity.

$$\hat{A} = g(\hat{X}, \, k, \, ex, \, imp, \, cr),$$

$\hat{A}$ = rate of change in total factor productivity,

$\hat{X}$ = rate of change in real output,

Fig. 6. Change in the Concentration Index

Source: See Table V.
Note: Weighted averages by current output from the
concentration index by industry.

k = capital equipment ratio,
ex = ratio of exports to output,
imp = indicators of degree of protection (the effective protection rate and its rate of change, the comprehensive liberalization rate, the tariff rate, the ratio of imports to output, and the degree of import penetration into domestic markets), and
cr = three-firm sales concentration ratio, or the Herfindahl index.

The results of a multiple regression analysis of the twenty-six manufacturing sectors are shown at Tables VIII and IX. We have omitted protection indicators other than the effective protection rate and its rate of change, because we were unable to obtain any statistically significant results. The results are consistent with the explanation in the previous section, which stated that in Korea's case, only the effective protection rate is indicative of the true protection structure. We also tried the degree of market openness, which is the ratio of the sum of exports and imports to output, and the ratio of net exports (= exports − imports) to output as explanatory variables; but, similarly, they did not show any significant results.

1. *The effective protection rate*
   First, we shall outline the relationship between total factor productivity and the protection rate. The level of effective protection rate at the early stages was statistically significant only in the 1980s, with a minus sign. In the 1970s and

TABLE VIII

SUMMARY OF REGRESSION ANALYSIS RESULTS

	1970-75		1975-80		1980-85		1970-80		1975-85		1980-88		1970-85		1975-88		1970-88	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Change of real output	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕
Capital intensity (initial period)	+	−	⊖	⊖	−	−	⊖	⊖	⊖	⊖	+	+	⊖	⊖	⊖	⊖	⊖	⊖
Change of capital intensity	⊖	⊖	−	(−)	⊖	−	⊖	⊖	⊖	⊖	⊖	⊖	(−)	(−)	⊖	(−)	⊖	⊖
Export-output ratio	⊖	⊖	−	−	+	−	−	−	−	+	+	+	−	−	−	−	−	−
ERP (initial period)	+		−		⊖		+		−		⊖	+	+		−		−	−
Change of ERP		−		−		−		−		⊖		+	+	⊕		+	⊕	⊕
Concentration ratio (CR3)	+	+	⊕	⊕	−	−	⊕	⊕	(+)	(+)	(−)	(−)	⊕	⊕	(+)	(+)	⊕	⊕

Notes: 1. ○ is significant at 95 per cent level. ( ) is significant at 90 per cent level. Others are not significant at 90 per cent level.
2. In the concentration ratio, a dummy variable was used, which takes 1 if three-firm sales concentration ratio is greater than 0.73, and 0 otherwise.

TABLE IX

TFP CHANGE: RESULTS OF REGRESSION ANALYSIS

	Constant	$\hat{X}$	k (1)	k (2)	ex	imp (1)	imp (2)	cr	$\bar{R}^2$
1970–75:									
(1)	1.319 (14.485)	0.052 (2.881)	0.000 (0.005)	−0.181 (−4.223)	−0.399 (−2.209)	0.021 (0.375)		0.010 (0.137)	0.462
(2)	1.320 (14.371)	0.054 (2.957)	−0.000 (−0.015)	−0.182 (−4.160)	−0.403 (−2.195)		−0.000 (−0.260)	0.011 (0.163)	0.460
1975–80:									
(1)	1.030 (14.580)	0.069 (4.244)	−0.002 (−3.465)	−0.055 (−1.713)	−0.006 (−0.093)	0.007 (0.122)		0.150 (3.214)	0.594
(2)	1.033 (15.641)	0.076 (4.785)	−0.002 (−3.745)	−0.063 (−2.027)	−0.023 (−0.367)		−0.001 (−1.176)	0.159 (3.526)	0.621
1980–85:									
(1)	0.954 (17.920)	0.118 (6.592)	−0.000 (−0.077)	−0.063 (−2.984)	0.038 (0.749)	−0.093 (−2.262)		−0.032 (−1.281)	0.710
(2)	0.930 (14.655)	0.124 (6.048)	−0.000 (−0.121)	−0.065 (−2.722)	−0.015 (−0.278)		−0.004 (−0.301)	−0.022 (−0.778)	0.633
1970–80:									
(1)	1.316 (13.953)	0.018 (2.603)	−0.004 (−2.389)	−0.057 (−2.133)	−0.220 (−1.028)	0.109 (0.894)		0.240 (2.158)	0.416
(2)	1.351 (13.283)	0.017 (2.419)	−0.005 (−2.404)	−0.058 (−2.148)	−0.211 (−0.963)		−0.060 (−0.700)	0.237 (2.115)	0.407
1975–85:									
(1)	1.151 (16.533)	0.045 (7.543)	−0.002 (−3.166)	−0.057 (−3.436)	−0.030 (−0.356)	−0.133 (−1.488)		0.177 (1.981)	0.752
(2)	1.281 (12.863)	0.042 (7.192)	−0.002 (−3.188)	−0.056 (−3.635)	0.086 (0.876)		−0.164 (−2.208)	0.114 (2.046)	0.780

TABLE IX (Continued)

	Constant	$\hat{X}$	k (1)	k (2)	ex	imp (1)	imp (2)	cr	$\bar{R}^2$
1980–88:									
(1)	1.061 (13.654)	0.125 (4.613)	0.000 (0.146)	−0.083 (−2.636)	0.038 (0.506)	−0.156 (−2.554)		−0.073 (−1.746)	0.597
(2)	1.015 (12.266)	0.137 (4.622)	0.000 (0.525)	−0.096 (−2.704)	0.028 (0.315)		0.086 (1.381)	−0.084 (−1.796)	0.509
1970–85:									
(1)	1.330 (13.999)	0.012 (5.834)	−0.005 (−3.496)	−0.039 (−2.060)	−0.179 (−0.975)	0.064 (0.476)		0.304 (3.333)	0.672
(2)	1.324 (16.751)	0.010 (5.257)	−0.005 (−4.208)	−0.033 (−2.024)	−0.142 (−0.898)		0.009 (2.677)	0.327 (4.164)	0.759
1975–88:									
(1)	1.241 (11.930)	0.048 (5.350)	−0.003 (−2.840)	−0.051 (−2.127)	−0.084 (−0.649)	−0.230 (−1.448)		0.181 (2.055)	0.624
(2)	1.173 (12.113)	0.050 (5.263)	−0.002 (−2.439)	−0.054 (−2.040)	−0.080 (−0.582)		0.001 (0.335)	0.162 (1.764)	0.585
1970–88:									
(1)	1.434 (10.562)	0.013 (4.707)	−0.005 (−2.773)	−0.039 (−1.472)	−0.239 (−0.925)	−0.019 (−0.086)		0.352 (2.701)	0.549
(2)	1.410 (12.300)	0.011 (3.978)	−0.005 (−3.216)	−0.033 (−1.369)	−0.204 (−0.882)		0.011 (2.173)	0.385 (3.276)	0.638

Notes: 1. Parentheses under each coefficient contain the t-statistic. Degree of freedom is nineteen for each equation.
2. (1) for k and imp is the level at the initial period, and (2) is the rate of change for the period.
3. X=change of real output, k=capital intensity, ex=export-output ratio, imp=ERP, and cr=concentration ratio.

for extended periods including the 1970s, the effective protection rate was not statistically significant. However, it tended to show a plus in the 1970s and a minus for an extended period that included the 1980s. That is to say, it was not until the 1980s that changes in import policies prompting changes in the effective protection rate began to have any substantial effect on changes in total factor productivity; before then the effect was negligible. As explained in the previous section, this result is in accord with the fact that the Korean government began to give serious consideration to raising the efficiency of domestic industries through import liberalization in the early 1980s. The results show a plus before the 1980s, and it can also be considered that rather than being harmful, protection was useful in raising productivity. During this period the policy-making authorities did not believe that import liberalization would have any beneficial effect on domestic industry; so while advocating liberalization at international forums, the government was actually strengthening protection and raising the effective protection rate.

Next, changes in the effective protection rate were statistically significant in only a small number of cases. As can be seen in Table IV, since the largest changes in the effective protection rate were recorded in the period 1975–80, we can say that the greatest effects of changes in the protection rate appeared in the period 1975–80 or the period 1975–85. These periods show a minus sign, and the period 1975–85 is statistically significant, so it may be interpreted that the promotion of import liberalization had a positive effect on productivity. On the other hand, if we look at the case of a longer period of more than fifteen years, the results show a plus sign and are statistically significant. However, as we have already explained, considering the fact that the structure of the effective protection rate in each industry was not stable, it is difficult to conclude that changes in the protection rate taken over the long term reflect actual changes in the protection structure.

2. Others

As for changes in real output and capital intensity, generally speaking, there were significant results, and the directions of signs are consistent. While an increase in real output is linked to an increase in total factor productivity (a relationship known as "Verdoorn's law"), this result is thought to be caused by economies of scale or the learning effect. Such economies of scale figure quite prominently in Korea's case as well. On the other hand, the signs for capital intensity are minuses, and the more capital-intensive the production method, the lower the increase in total factor productivity. Similarly, the signs for changes in capital intensity are all minuses, so the more capital-intensive the production method becomes, the lower the increase in total factor productivity. This result implies that there remains much room for improvement of labor productivity in developing countries.

The export ratio was not significant except for the early half of the 1970s. Since this was a period in which the rise in exports was historically most prominent, the minus sign for the export ratio was an unexpected result. This result can perhaps be attributed to the fact that during this period the increase in the capital

equipment ratio was greater than during other periods. During this period the government promoted import substitution policies which emphasized the heavy and chemical industries (see Sin [16]), and there is a high possibility that a higher increase in exports in those industries than in labor-intensive industries resulted in such a minus sign. The sign for the export ratio coefficient did not become a plus until the 1980s, when the export ratio reached its highest levels. In any event, we can only say that there is a very weak relationship between export ratio and total factor productivity.

As for market concentration, a stronger relationship with total factor productivity is evident than with imports and exports. There are many statistically significant cases, showing pluses in the 1970s and minuses in the 1980s. That is to say, before the 1980s the higher the market concentration of the industry, the higher its increase in total factor productivity; however, the 1980s show the opposite trend. This indicates that in the Korean economy of the 1980s, the policy of fostering and supporting the giant corporations to pursue simple economies of scale was becoming much less significant. Thus, the timing of the government's introduction of genuine antimonopoly policies with a view to improving the efficiency of domestic markets from around the mid-1980s was indeed effective. However, the concept of concentration is, by nature, only for a single commodity market, so we must note that, as in the case of this analysis, the aggregate indicators for each major industry category may not necessarily be suitable as reference indicators at the time of antimonopoly policy implementation.

CONCLUSION

The process of Korea's import liberalization may be broadly classified into pre- and post-1983 era. Although government policies before 1983 generally took an import liberalization stance, it can be said that those policies were, if anything, a mere pretense that gave ultimate consideration to minimizing the impact of liberalization on the domestic economy. The government's promotion of genuine import liberalization began only after 1983.

From our cross-section analysis of each industry, we discovered that, especially from the 1980s, industries with a low protection rate at the initial stages experienced a large increase in total factor productivity.[10] We observed a trend by which in the 1970s the higher the rate of protection at the initial stages, the higher the increase in total factor productivity; however, the figures were not statistically significant, and the strength of the effect was only minimal. This can be interpreted as supporting the argument that the government promoted real liberalization policies only from 1983. We also saw a trend by which the more advanced the industry in import liberalization, the higher its total factor productivity rate of increase. And if we combine this with the effect of the protection rate at the initial stage, we think that we have confirmed the fact that import

[10] There exist many studies on trade policy and productivity. Almost all cases except some broad cross-country comparisons fail to prove the positive links between trade policy and productivity growth. Refer to Havrylyshyn [4].

liberalization (removal of import protection) has a beneficial effect on total factor productivity. However, one point which must be noted here is that such a conclusion may not necessarily be the case, for it is possible that the cause and effect relationship between liberalization and productivity is quite the opposite. That is to say, as we have mentioned several times already, the Korean government's import liberalization policies before 1983 followed the line of liberalizing imports in industries that were judged to be internationally competitive, so there is a possibility that the protection rate in industries with a high rate of productivity increase was already low. To come to a more accurate conclusion, we must now analyze the cause and effect relationship, focusing on a time-series analysis in particular. To this end, we look forward to further progress in research that will assemble data for the period after full-scale import liberalization has been implemented.

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