The Pattern of Korean Growth, 1963~1973: In International Perspective with Special Consideration of the Japanese Pattern

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I. Introduction

This paper analyzes the pattern of Korean growth in international perspective with special consideration of the Japanese pattern, using both input-output relationships and other statistical methods suggested in earlier studies in this field by Chenery and others. The pioneering study by Chenery-Shishido-Watanabe [4] on the pattern of Japanese growth combined input-output methods and other statistical analysis into a comprehensive comparative study of national growth patterns. However, the statistical method used in CSW(1) is based on Chenery [3] which Chenery and Taylor [6] have shown is out of date. CT substantially modifies and improves those statistical methods for the analysis of the growth pattern of industries presented in Chenery [3]. Recently Chenery and Syrquin [5] have presented a comprehensive method for the systematic analysis of the structural changes that normally accompany economic growth.

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(1) Chenery-Shishido-Watanabe, Chenery-Taylor, and Chenery-Syrquin, when referred to in this paper, are shortened to CSW, CT, and CS, respectively.

This study combines the methodologies of CSW,CT and CS to analyze growth patterns and structural change in Korea. It finds that the methodologies of CSW on the growth pattern of the economy, CT on the growth pattern of industry, and CS on the changing pattern of economic structures accompanying growth are complementary and provide more useful guidelines when applied(2) in combination than when used separately as in earlier studies. These methods are combined in the study of Korea as follows.

This paper first uses the CSW method of input-output analysis to analyze the growth pattern of the economy. The patterns of change in autonomous factors and their effects on sectoral growth are investigated through input-output relationships. Next it compares the actual growth pattern of Korean industries to average patterns on the basis of the CT method. Finally, this study analyzes briefly the patterns of change in the Korean economic structure and compares them to statistically typical patterns derived from the broad international experience presented in CS.(3)

The pattern of Korean growth analyzed in this study is compared directly with Japan's earlier growth experience. Korean development policy may gain valuable insight from a study of Japanese growth patterns in an earlier comparable period. Fortunately the CSW study provides excellent Japanese data for such a comparative study.

The period of analysis chosen for our study is 1963~1973 for Korea, the first years of Korea's rapid economic growth,(4) and 1914~1954 for Japan, the

(2) In the formulation of Korea's 15-Year Socioeconomic Development Plan (1977~1991) and other long-run plans, the methods suggested in these studies have been applied and found to be extremely useful.

(3) CS identifies average or typical patterns corresponding to a country's population size, level of income, capital inflow, shares of exports (primary, manufactured, and services) and trend variables. CT defines average patterns in terms of national attributes including per capita GNP, population, shares of primary and manufactured exports in GNP, and the share of gross fixed capital formation in GNP. Both CT and CS distinguish development patterns between large and small country groups.

"Average" or "typical" patterns in this study corresponds to "normal" patterns in CT and CS.

(4) The pattern of Korean growth has also been examined annually from 1953, the year the Korean War ended, to 1975. But the results are not reported in this study because the growth pattern in the 1963~1973 period appears most appropriate for our purposes.

period of rapid Japanese growth analyzed in CSW.[5] The Korean pattern of growth during 1963~1973 is similar in many respects to the Japanese pattern during 1914~1954. Both countries experienced remarkably rapid growth and were structurally transformed from underdeveloped to semi-industrialized countries.[6] Recently Song [12] has shown that the production structure of the Korean economy in 1970 was similar to that of Japan in the early 1950's. By 1973 a firm basis for rapid industrialization had been formed in Korea as in Japan by 1954.

Korea's recent rapid growth began with the First Five-Year Plan (1962~1966) in 1962. Korea's per capita GNP increased after two successive Five-Year Plans[7] from $160 in 1963 to $378 in 1973. Between 1963 and 1973 GNP grew at an average annual rate of 10 percent, exports by 29 percent and imports by 19 percent.[8] Korean growth during the 1963~1973 period was even faster than the Japanese growth between 1914~1954. When converted into 1973 constant U.S. dollars, Japanese per capita GNP was $197 in 1914 and $336 in 1954.[9]

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(5) In CSW the 1914~1954 period is divided further into two periods, namely, the 1914~1935 period of uninterrupted rapid growth and the 1935~1954 period characterized by the WWII interruption. The pattern of Japanese growth has also been examined for the 1914~1935 and 1935~1954 periods and also for the years 1965 and 1973. But for our purposes only results for the 1914~1954 period are reported.

By 1954 Japan had recovered economic normalcy and her output had regained its prewar peak. See Patrick and Rosovsky [11].

(6) Although CSW indicated that the Japan's economic structure reached the level of an advanced country as early as in 1954, it seems more reasonable to assume, like Patrick and Rosovsky, that Japan was still a semi-industrialized country in 1954. Patrick and Rosovsky [11, p. 11] feel that Japan in the early 1950's combined "a mixture of characteristics of less developed countries and of economically advanced countries."

It may be argued that the pattern of Japanese growth between 1894~1914 is similar in regards to export-oriented growth strategy to that of Korean growth between 1963~1973. I am grateful to J.G. Williamson for valuable suggestions in this regard.

(7) The First (1962~1966) and the Second (1967~1971) Five-Year Plans.

(8) At constant 1973 U.S. dollars computed on the basis of the 1962~1964, 1972~1974 average values.

(9) Per capita Japanese GNP is from CSW.

II. Basis of Analysis

1. The Input-Output Model

The basic I-O model and notation adopted for our study are as follows:[10]

$$X_i^t=\sum_j a_{ij}^t X_j^t=Y_i^t+E_i^t-M_i^t \tag{1}$$

where X_i, Y_i, E_i, and M_i denote total output, domestic final demand, and exports and imports for sector i in year t, respectively. a_{ij} is the input coefficient for commodity i used in sector j. $\sum_j a_{ij}X_j^t$ is total intermediate demand for commodity i.

The solution to (1) can be shown as

$$X_i^t=\sum_j r_{ij}^t(Y_j^t+E_j^t-M_j^t) \tag{2}$$

where r_{ij}^t is an element of the inverse Leontief matrix.

2. Input-Output Data and Sectoral Classification

The basic I-O tables for the Korean economy used in this study are from the 340-sector model for 1973 and the 117-sector model for 1963 constructed by the Bank of Korea. These tables are aggregated and reduced to 22 and also to 8 sectors[11] in order to achieve comparability with the I-O tables for Japan in 1914 and 1954 as reported in CSW. In the aggregation of Korean industries, the CSW classifications have been strictly followed. The 1963 Korean I-O table has been convertd into 1973 prices.[12]

3. Factors Influencing Comparative Study

The degree of comparability of growth patterns as analyzed by I-O analysis depends on several factors, including the level of aggregation, changes in rela-

(10) Our model differs from the Leontief formulation in treating imports, as in the CSW study, as exogenous.

(11) If the unallocated sector is included, the number of sectors becomes 23. The 23 sectors are: 1-agriculture, 2-coal and petroleum, 3-other mining, 4-food, 5-textiles, 6-wood, 7-pulp and paper, 8-printing and publishing, 9-rubber products, 10-chemicals, 11-coal and petroleum products, 12-non-metallic mineral products, 13-metal manufacturing, 14-machinery, 15-transport equipment, 16-miscellaneous manufacturing, 17-construction, 18-electricity and gas, 19-trade, 20-real estate, 21-transport and communications, 22-services, 23-unallocated. The 23 sectors are further aggregated and reduced to 8 sectors as shown in Tables 1 and 2.

(12) Sectoral price deflators used in this study are from the Bank of Korea [1].

tive input prices, and other statistical difficulties. In addition, as in other international comparisons, conceptual differences in accounts and methodological differences in gathering data and compiling I-O tables influence comparative study.

III. Patterns of Growth

Just as an economy is decomposable through input-output relationships into subsectors, analysis of the growth pattern of an economy is reducible to studies of growth patterns in individual industries. Analysis of growth patterns of industries within the I-O framework focuses on the changing patterns of sectoral growth determinants and their effects on industrial growth. Determinants of industrial growth include domestic final demand, exports and imports, and technological change. The effects of these autonomous factors on industrial growth are traceable through input-output relationships.

1. The Changing Patterns of Domestic Demand, Trade and Production

If all elements of final demand grew proportionately between two periods, the effects on sectoral output could be found by multiplying both sides of (2) by the growth factor, say, α. Because final demands do not expand proportionally, deviations between actual and proportionate growth are defined as follows:

$$\begin{aligned} dY_i &= Y_i^2 - \alpha Y_i^1, \\ dE_i &= E_i^2 - \alpha E_i^1, \\ dM_i &= M_i^2 - \alpha M_i^1, \\ dX_i &= X_i^2 - \alpha X_i^1. \end{aligned} \tag{3}$$

The proportionality factor α may be defined in various ways. For this study, as in CSW, α is defined as the ratio of total domestic demand,[13] namely, $\alpha = \sum Y_i^2 / \sum Y_i^1$ for time periods 1 and 2. As we are interested only in the difference between actual and proportional growth, growth determinants are ex-

(13) Note that α equals the GNP expansion ratio if trade is balanced.

pressed as deviations from proportional growth instead of as absolute values.[14]

Technological change represented by changes in input coefficients a_{ij}, is the fourth autonomous factor influencing sectoral growth. The basic I-O model (1), however, does not include technological change as an autonomous element in the final demand sector and hence must be modified. Changes in intermediate demand resulting from changes in input coefficients between two periods can be expressed as follows:[15]

$$dT_j=\alpha\sum_k(a_{jk}^1-a_{jk}^2)X_k^1. \tag{4}$$

dT_j is the difference in intermediate demand for sector j's output between periods 1 and 2 which results directly from technological change.

The effects on sectoral output of these four autonomous elements can be combined to explain a single sector's total deviation from proportional growth:

$$dX_i=\sum_j r_{ij}^2(dY_j+dE_j-dM_j-dT_j). \tag{5}$$

Thus, effects of deviations in autonomous elements from proportional expansion between periods 1 and 2 are:[16]

(i) the effects of dY: $\sum_j r_{ij}^2dY_j=dYX_i$,

(ii) the effects of dE: $\sum_j r_{ij}^2dE_j=dEX_i$,

(iii) the effects of dM: $-\sum_j r_{ij}^2dM_j=-dMX_i$,

(iv) the effects of dT: $-\sum_j r_{ij}^2dT_j=-dTX_i$.

dY, dE, dM, and dT and their effects on sectoral outputs, namely, dYX_i, dEX_i, $-dMX_i$, and $-dTX_i$ are computed as shown in Tables 1 and 2. For example, dYX_i is the part of that sector's deviation from proportional growth caused by dY.

The changing patterns of the four autonomous factors are shown in Table 1. Between 1963∼1973, domestic final demand changed most in terms of absolute

(14) Note that absolute values can readily be found from deviations and proportional elements.
(15) For derivation of dT_j and (5) see CSW, pp. 106-107.
(16) In order to allow comparison with the Japanese pattern, this paper uses the residual from (5), as in CSW, as a measure of $-dTX_i$.

deviations, and technology changed least. Domestic final demand for industrial products expanded more than proportionately, and that for primary products and services expanded less than proportionately. Exports and imports expanded more than proportionately for almost all primary and secondary industries. The more than proportionate expansion of imports of primary products reflects the severe resource limitations in the primary sector, whose slower growth could not match increasing domestic demand. Technological change between 1963~1973 is small for the economy as a whole, but significant in basic manufacturing industries and agriculture.

Positive deviations caused by rapid expansion of both domestic final demand and exports are substantially offset by the rapid growth of industrial product imports. The deviation in services is small and appears to be due largely to exports.

The Korean pattern is similar to the Japanese pattern with respect to the much slower growth of primary than of industrial production, the relative importance of deviations in domestic final demand (42 percent), and the rapid expansion of primary imports. But the Korean pattern is different from the Japanese with respect to technological change, the relative importance of trade, and the direction of imports. In the case of Japan, the relative importance of technological change is 40 percent,[17] much higher than the 12 percent Korean

(17) This is the CSW corrected result. The original CSW result is 42 percent. Some of the results in CSW for Japan appear to be inaccurate due to a methodological error. CSW apparently used the ratio of the 1914 and 1954 GNPs for α, the proportionality factor, which they defined in the text, however, as the ratio of total domestic demand between periods 1 and 2. The two ratios become equal only when trade is balanced. They apparently used the ratio of GNP figures (2.84), because Japanese trade was almost balanced in 1954. However, due to a trade imbalance in 1914 of about 5 percent of GNP, the ratios of total domestic demand and GNP for Japan between 1914 and 1954 are not equal. The actual vlaue of α becomes, when computed from equation (1), 2.67. The CSW corrected results are for domestic final demand 41 percent instead of 37 percent, for imports 13 percent instead of 16 percent, and for technological change, as indicated already, 40 percent instead of 42 percent.

The difference between the original CSW results and the CSW corrected results is slight and appears not to affect the CSW conclusions, except for a slight overestimation of the effect of technological change and a slight underestimation of the role of domestic final demand in Japan between 1914~1954.

I am grateful to Bert Keidel for valuable suggestions in this regard.

Table 1. Deviations from Proportional Expansion in Domestic Demand, Trade, and Technology
(Korea 1963~1973, Japan 1914~1954) (Billions of 1973 won and 1951 yen)

Sector[a]	Domestic Final Demand (dY)		Exports (dE)		Imports ($-dM$)		Technological Change ($-dT$)		Total	
	Korea	Japan[b]	Korea	Japan	Korea	Japan	Korea	Japan	Korea	Japan
I. Primary										
A. Agriculture	−921	−1,030	54	−58	−130	−194	−174	−720	−1,172	−2,002
B. Mining	−12	−15	−6	−36	−130	−145	−27	−212	−176	−408
II. Industry										
A. Food	248	−322	46	−27	−34	−45	82	66	342	−460
B. Textiles	−38	250	452	75	−73	49	−55	97	287	471
C. Basic industries	52	17	188	89	−250	304	221	507	211	917
D. Other industries	734	559	367	69	−400	12	75	164	776	804
III. Services	−157	132	193	−16	−5	7	2	477	33	632
Unallocated	95	30	87	−52	−19	7	−4	120	159	209
Absolute total	2,257	2,354	1,393	422	1,042	763	640	2,363	5,332	5,903
Relative weight(%)	(.42)	(.42)	(.26)	(.07)	(.20)	(.14)	(.12)	(.38)	(1.00)	(1.00)

Notes: (a) Sectors are aggregated as follows from 22 sectors. For the 22 sector classification see Table 3 and footnote (11).
IA Agriculture (1)
IB Mining (2, 3)
IIA Food (4)
IIB Textiles (5)
IIC Basic industries (7, 9, 10, 11, 12, 13)
IID Other industries (6, 8, 14, 15, 16, 17)
III Services (18, 19, 20, 21, 22)

(b) Figures for Japan are from CSW.

Table 2. Effects on Sectoral Production of Deviations in Domestic Demand, Trade, and Technology[a]

(Korea 1963~1973, Japan 1914~1954))

Sector	Domestic Final Demand(dYX)		Exports (dEX)		Imports ($-dMX$)		Technological Change($-dTX$)		Total		Production Indexes(X_i^2/X_i^1)	
	Korea	Japan[b]	Korea	Japan	Korea	Japan	Korea	Japan	Korea	Japan	Korea	Japan
I. Primary											1.69	1.62
A. Agriculture	−893	−1,036	279	−69	−203	280	−175	−561	−992	−1,946	1.67	1.47
B. Mining	59	69	72	5	−185	−94	31	15	−23	−183	2.19	2.78
II. Secondary											5.93	4.38
A. Food	260	−422	109	−33	−71	−27	96	122	394	−604	4.64	2.20
B. Textile	−43	432	718	29	−130	127	−83	338	463	926	4.86	5.03
C. Basic industries	663	354	928	238	−1,064	630	383	1,198	911	2,421	7.47	10.04
D. Other industries	986	627	547	80	−657	42	108	287	984	1,036	6.75	5.64
III. Services	27	249	541	−3	−247	99	102	787	423	1,138	3.22	3.78
Unallocated	180	33	201	−30	−107	55	30	283	304	401	5.13	4.23
Absolute total	3,111	3,222	3,396	487	2,664	1,354	1,008	3,591	10,178	8,654	3.57	3.00
Relative weight(%)	(.31)	(.37)	(.33)	(.06)	(.26)	(.16)	(.10)	(.42)	(1.00)	(1.00)		

Notes: (a) The effects of deviations computed for 22 sectors have been aggregated.
(b) Figures for Japan are from CSW.

figure.[18] The relative importance of trade in Japan is much smaller (exports 7 percent and imports 14 percent) than in Korea (exports 26 percent and imports 20 percent). Also, the much less than proportionate increase in imports in Japan reflects the Japanese policy of positive import substitution, while the more than proportionate increase in imports in Korea reflects the Korean policy of neither favoring nor discriminating against import substitution. The ratio of imports to total production in Korea increased from 10.5 to 18.4 percent.

Changes in sectoral production resulting from the changing patterns of autonomous factors are presented in Table 2. Because of different sectoral linkages,[19] differences between the two patterns emerged. The relative importance of autonomous factors has changed. The cause of the largest absolute change in Korea's sectoral production was exports (33 percent),[20] not domestic final demand (31 percent).[21] Exports played a very important role in the growth of almost all secondary and tertiary industries. The rapid growth of the manufacturing industries was also due, of course, to the rapid expansion of domestic final demand.

The Korean pattern is different from the Japanese pattern with respect to the relative importance of domestic and foreign demand. For Japanese growth,

(18) The CSW method of computing the effects of technological change appears to be very crude. It treats technological change as a residual, as shown by equation (5), and thus may not distinguish between errors of estimation and technological change.

However, our results showing the higher relative importance of technological change in Japan between 1914~1954 than in Korea between 1963~1973 appear to be reasonable. The results may reflect partly the fact that although Korea emphasized the importance of technology during the successive Five-Year Plans, the potential period of absorbing new technologies was relatively short. Japan had about 40 years to absorb new technologies while Korea had only about 10 years.

(19) For definitions and the method of computation of linkages (backward, forward, and total) and international comparisons, see Song [12].

(20) Krueger [8, p. VI-26] indicates that "about 4 percentage points of the growth rate were attributable to export growth." This implies that the relative contribution of exports to economic growth would amount to about 40 percent (assuming a GNP growth rate of 10 percent). Krueger's figure is higher than ours, but does not seem to be substantially different from it.

(21) According to CT [6, p. 409] "the development pattern of large countries is primarily determined by the growth of domestic demand since trade and resource differences are relatively unimportant." However, this doesn't seem to be applicable to the Korean case. For Korea's growth, export expansion played a more important role than the growth of domestic final demand.

domestic demand played a more important role than foreign demand. However, for Korea's growth the roles of both domestic and foreign demand were important, although exports played a slightly more important role than domestic demand. The two countries also show different patterns with respect to imports and technological change.

The differences in the growth patterns of Japan and Korea seem to have been substantially influenced by respective trade policies of the two countries. They were also influenced, of course, by world trade conditions, which were very different in the two periods.[22]

2. Pattern of Sectoral Growth

Total output in Korea increased 2.6 times between 1963~1973 as shown in Table 2. The rapid rise in total production consisted mainly of the rapid expansion of secondary production (4.9 times). If all 22 sectors are ranked according to their total growth (i.e., production index),[23] the 13 manufacturing industries grew at a much faster rate than the average growth rate for all industries. The growth of primary industries (0.7 times) was much slower than the growth of the secondary or service industries (2.2 times). The overall patterns of growth of the various sectors are similar in both Korea and Japan. However, the growth of manufacturing industries differs in the two countries.

In order to compare the growth patterns of manufacturing industries, the average output of each sector has been computed on the basis of the calculations and data presented by CT. CT used the following regression equation in

(22) For instance, import substitution in Japan between 1914~1954 is also due, to a large extent unfavorable world trade conditions such as increasing trade barriers, shrinking trade volume, and war. However, Korea's export-oriented growth in the 1960's coincided with expanding world trade and trade liberalization. I am grateful to Edwin S. Mills and Jeffrey G. Williamson for valuable discussions in this regard.

(23) The production indices between 1963~1973 for various sectors, namely X_i^{73}/X_i^{63} are, in descending order of magnitude, machinery and electrical equipment (13.5), petroleum and coal products (12.2), miscellaneous manufacturing (12.1), transport equipment (9.7), chemicals (7.8), nonmetallic mineral products (7.2), metal manufacturing (6.8), transport and communications (6.6), electricity (6.1), lumber and wood products (6.0), construction (5.4), paper and paper products (5.1), rubber products (5.0), textiles (4.9), food (4.6), trade (3.7), printing and publishing (3.6), other mining (2.9), services (2.4), agriculture (1.7), and coal mining (1.6).

computing the average output of each industry, utilizing data collected from about 50 countries.[24]

$$X=\alpha+\beta_1\ln Y+\beta_2(\ln Y)^2+\gamma\ln N+\delta_1\ln E_p+\delta_2\ln E_m$$

where X denotes sectoral value added per capita, Y per capita GNP, N population, E_p the share of primary exports in GNP, and E_m the share of manufactured exports in GNP, respectively. Actual values are compared in Table 3 with average world values that correspond to a nation of Korea's present population, level of income and share of exports in GNP.[25]

According to CT, manufacturing industries are classifiable according to the stage at which they make their main contribution to growth as early, middle, and late. Early industries are those producing foods, textiles and leather goods with income elasticities of demand of 1.0 or less and supplying demand in LDC's at an early stage of development. They increase their share little after an income level of $200.[26] The growth pattern of Korea's early industries conforms to the average pattern observed by CT. However, their share of industrial production is still very high. Korea's leather industry, however, is an exception and has increased its share even above the $200 level.

Middle industries produce rubber products, wood products, nonmetallic minerals, and petrochemicals. The finished products of these industries usually have income elasticities of 1.2–1.5, according to CT. Their share of GNP increases rapidly until income reaches about $400–$500, but relatively little thereafter. All middle industries, except wood products, in Korea are presently increasing their shares. The Korean pattern of middle industry growth conforms to the CT findings. Late industries are printing and publishing, basic metals, paper, and metal products, all of which have high income elasticities and grow faster

(24) CT also estimated this equation separately for groups of countries, namely, large countries, small industry-oriented countries, and small primary-oriented countries.
For estimation of the average outputs of the primary, secondary and service industries as shares of GNP and for additional explanatory variables, see CT [6, pp. 392-393].

(25) The average output of each industry has also been examined annually. But the results are not reported in this study because results for 1963 and 1973 appear most appropriate for our purposes.

(26) In 1960 constant U.S. dollars as indicated in CT [6].

Table 3. Comparison of Actual and Chenery-Taylor Average Outputs (Korea 1963 vs. 1973 and Japan 1914 vs. 1954)

(Value added per capita in 1973 U.S. dollars)

Sector	Korea(1973)			Korea(1963)			Japan(1954)			Japan(1914)		
	Actual	Average[a]	Ratio (1)/(2)	Actual	Average	Ratio (4)/(5)	Actual	Average	Ratio (1)/(2)	Actual	Average	Ratio (4)/(5)
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Manufacturing Industry												
4. [b] Food, beverage & tobacco	22.62[c]	14.19	1.59	6.48	7.47	0.87	26.73	11.20	2.39	11.26	6.89	1.64
5. Textiles & clothing	23.15	12.61	1.84	5.40	3.23	1.67	23.45	14.27	1.65	6.99	5.29	1.32
6. Wood & wood products	3.55	2.62	1.35	0.94	0.58	1.64	3.82	2.32	1.65	0.48	0.87	0.54
7. Pulp & paper	2.59	2.76	0.94	0.65	0.43	1.51	6.62	2.12	3.12	0.52	0.70	0.74
8. Printing & publishig	1.85	4.27	0.43	0.80	1.39	0.58	4.24	6.80	0.62	0.69	1.34	0.51
9. Rubber products	1.26	1.75	0.72	0.40	0.88	0.45	1.08	2.66	0.40	0.12	0.61	0.20
10-11. Chemicals, petroleum & coal products	16.99	14.07	1.21	1.83	2.88	0.64	14.43	13.36	1.08	2.45	4.47	0.55
12. Non-metallic mineral products	4.44	5.96	0.74	0.77	1.28	0.60	3.76	7.38	0.51	0.72	1.91	0.38
13. Metals	6.62	5.39	1.23	1.31	0.85	1.54	10.50	9.25	1.14	1.36	1.52	0.89
14-15. Metal Products	11.14	13.37	0.83	1.38	1.51	0.91	15.27	12.83	1.19	3.69	3.59	1.03
Total Output	94.20	76.99	1.22	19.97	20.50	0.97	109.91	82.19	1.34	28.28	27.19	1.04
Aggregate Sectors												
1-3. Primary	94.53	91.53	1.03	73.29	60.63	1.21	70.90	85.91	0.83	79.13	75.59	1.05
4-17. Industry	117.74	106.17	1.11	24.67	29.61	0.83	109.53	104.93	1.04	45.04	41.13	1.10
18-23. Services	165.86	165.99	1.00	62.34	70.06	0.89	155.20	144.65	1.07	73.22	80.67	0.91
Per Capita Income (=Total)	378.1			160.3			335.5			197.4		
Population (in millions)	32.91			26.99			88.20			52.58		

Notes: (a) Average outputs are derived from regression equations for "large" countries in CT.
(b) Indicates sectoral number in the 23 industry classification. See footnote (12).
(c) Indicates sectoral value added per capita.

than GNP up to the highest GNP levels. Their share accounts for as much as 80 percent of the industrial share above a $300 income level. The growth pattern of Korea's late industries also conforms to the pattern observed by CT.

At the aggregated level primary, secondary and tertiary production are all close to average in 1973. But in 1963 actual output in almost all sectors was significantly different from average output. The primary sector was still much larger and the secondary and tertiary sectors much less developed than would be expected in countries of Korea's characteristics and level of development.

The total manufacturing output in 1973 was higher than the average level because of the rapid growth in middle industries and the large share of early industries. Outputs of many late industries as well as some middle industries were below average in 1973.

Korea more closely approximates the average than Japan. Korea's industrialization has proceeded from early to middle to late industries, whereas Japanese industrialization went simultaneously from early to both middle and late industries.[27] This is reflected by the fact that the output of Japanese middle industries was below average, whereas that of many late industries was above average as early as 1954. Japan's manufacturing sector was larger than average as early as 1914. Japan's industrialization was led to a great extent by heavy and chemical industries, in contrast to the leading role played by light manufacturing industries in the case of Korea.

3. Growth and Structural Changes

The comparisons between actual and typical patterns of structural change presented in this section are based on calculations and data presented by CS. CS used the following regression equation[28] in computing the average value

(27) Until 1930 textiles and other light manufacturing industries spearheaded Japanese industrialization, but after 1930 heavy and chemical industries such as steel, machinery, chemicals, and electricity dominated industrial production. This was due largely to the military requirements of moving Japanese armies into Manchuria and China. By 1952 when the Japanese economy entered into an era of economic normalcy, the heavy industries were on the verge of resuming a leading role in industrialization.

(28) For a full description of it and its variants, see CS [5, pp. 16-17, 141-158, 159-168].

for each of the 27 development processes,[29] using data collected from about 100 countries from 1950 to 1970. That is,

$$X=\alpha+\beta_1\ln Y+\beta_2(\ln Y)^2+\gamma_1\ln N+\gamma_2(\ln N)^2+\sum\delta_j T_j+\varepsilon F$$

where X denotes the dependent variable (development process), Y GNP per capita, N population, F net resource inflow (imports minus exports) as a share of total GDP, and T_j the time period. Actual values are compared in Table 4 with statistically typical values that correspond to a nation of Korea's present population, level of income, and net resource inflow.

Many of the processes explaining structural changes in Korea were substantially different from the typical patterns statistically derived from broad international experience as shown in Table 4. This was especially so in the cases of exports, imports, capital inflow, and urbanization.

The present pattern of these structural changes resulted mainly from Korea's development strategy of expanding industrial production and exports. That is, as industrial production and exports expanded rapidly throughout the 1963~1973 period, so did imports.[30] This is indicated by the actual level of industrial exports and imports which exceeded substantially the statistically typical level in 1973. Between 1963~1973, the proportion of imports to total production increased from 10.5 to 18.4 percent. The rapid expansion of imports may reflect the Korean government's policy of neither favoring nor discriminating against import substitution at earlier stages of development.

(29) Structural changes that normally accompany economic growth may be classified in various ways. Here, they are classified, as in CS, into three basic processes: resource allocation, accumulation, and demographic and distributional processes. The three basic processes are further divided into the 10 sub-processes consisting of 27 variables. The actual and statistically typical levels of each of these processes are compared in Table 4.

Due mainly to the lack of reliable data, two out of 10 sub-processes, namely, income distribution and education, are excluded. Estimates for the structures of production have been computed on the basis of the CS method, but are not reported here because the results are mostly similar to those in Table 3. Thus, estimates for 7 (19 variables) out of the so-called CS 10 (27 variables) basic processes are presented in Table 4.

(30) The rapid rise in imports may also be due to technological improvement, a government policy of encouragement rather than discouragement of imports, and the population increase. The population increase reduced per capita arable land and thereby increased Korea's dependency on foreign foodstuffs.

Table 4. Comparison of Actual and Chenery-Syrquin Average Economic Structures[a]

Process	Korea				Japan			
	1963		1973		1914		1954	
	Actual	Average	Actual	Average	Actual	Average	Actual	Average
A. Resource Allocation Processes								
1. Structure of trade								
a. Exports	0.049[b]	0.137	0.318	0.163	0.163	0.115	0.102	0.086
b. Primary exports	0.015	0.104	0.031	0.093	0.017	0.082	0.002	0.062
c. Manufacture exports	0.016	0.030	0.231	0.050	0.087	0.027	0.069	0.034
d. Services exports	0.018	0.018	0.055	0.026	0.058	0.014	0.031	0.017
e. Imports	0.164	0.153	0.350	0.170	0.154	0.114	0.110	0.096
2. Structure of domestic demand								
a. Private consumption	0.831	0.788	0.677	0.689	0.746	0.746	0.662	0.676
b. Government consumption	0.113	0.131	0.097	0.124	0.072	0.109	0.110	0.111
c. Food consumption	0.485	0.417	0.358	0.302		0.382	0.347	0.334
B. Accumulation Processes								
1. Saving and investment								
a. Saving	0.071	0.075	0.228	0.185	0.180	0.158	0.228	0.179
b. Investment	0.186	0.190	0.260	0.216	0.171	0.149	0.236	0.188
c. Capital inflow	0.155	0.021	0.033	0.014	−0.009	0.003	0.008	0.016
2. Government revenue								
a. Government revenue	0.120	0.123	0.158	0.168		0.153	0.203	0.177
b. Tax revenue	0.089	0.125	0.131	0.168		0.140	0.172	0.159
C. Demographic and Distributional Processes								
1. Labor allocation								
a. Primary share	0.639	0.609	0.504	0.525	0.613	0.622	0.406	0.538
b. Industry share	0.105	0.136	0.193	0.201	0.187	0.133	0.290	0.188
c. Services share	0.256	0.271	0.303	0.296	0.200	0.262	0.304	0.296
2. Urbanization	0.323	0.275	0.472	0.418	0.181[c]	0.293	0.563[d]	0.397
3. Demographic transition								
a. Birth rate	0.370	0.396	0.240	0.342		0.406	0.201	0.354
b. Death rate	0.100	0.164	0.070	0.129		0.167	0.082	0.130

Notes: * Due to inclusion of estimates for the large country group, figures may not add up to 100 percent. Per capita GNP used in the computation is measured at factor cost in 1964 U.S. dollars. Per capita GNP for Korea in 1963 was $118.4 and in 1973 $245.6. For Japan it was $139.2 in 1914 and $236.6 in 1954, respectively.

(a) The CS method of computation for actual and normal economic structures has been strictly followed.

(b) Indicates ratios to GNP.

(c), (d) figures for 1920 and 1955, respectively.

Due to the low level of income, a poor domestic savings policy which has penalized saving, and the availability of a relatively large amount of foreign savings, the level of domestic savings was very low.[31] As a result, external resources were used to finance the increasing imports of both primary and secondary products. This is indicated by the level of actual capital inflows (0.033) which exceeded substantially the average level (0.014).

Changes in the production structure were caused and reinforced by the changes in domestic demand resulting from rising incomes and population. The shares of private consumption, government spending, and food consumption decreased rapidly during the period. However between 1963~1973, accumulation processes in Korea, including the shares of saving, investment and government revenue, increased significantly with rising income. In addition, all processes appear to have taken place earlier in the transition than would have been predicted by CS. As domestic saving started to increase rapidly, capital inflow decreased substantially, from about 16 percent to 3 percent of GNP.

As industrialization continued, population and labor in Korea moved rapidly from the rural-agricultural to the urban-modern sectors. This is indicated by the rise in the urbanization ratio from 0.323 to 0.472, by the decrease in the primary labor share from 0.639 to 0.504, and by the corresponding increase in the industrial labor share from 0.105 to 0.193 between 1963~1973. Urbanization in Korea has exceeded statistically typical levels since the late 1950's. This is as indicated by CS for a large country,[32] like Korea, adopting a development strategy of industrial specialization[33] and an industry-oriented trade policy.[34] As income has risen both birth and death rates in Korea have de-

(31) I am grateful to Jeffrey G. Williamson for valuable discussions and to the referees for helpful suggestions.

(32) The basis for classifying countries into large and small countries is population size. CS considers a population size of 15 million to be the dividing line, whereas Kuznets utilizes a figure of 10 million as a dividing line.

(33) CS classifies development patterns based on patterns of resource allocation into four categories: primary specialization, balanced production and trade, import substitution, and industrial specialization.

(34) According to CS, trade patterns are classified as primary-oriented, normal, and industry-

clined.

In comparison with the Japanese pattern, the overall pattern of Korean growth is similar in many respects. The two countries show different patterns, however, with respect to capital inflows (much higher in Korea than in Japan), government revenue (higher in Japan than in Korea), domestic saving (higher in Japan than in Korea), and industrial share of employment (higher in Japan than in Korea). Capital inflow was high in Korea because Korea received large amounts of foreign capital from the U.S. due to its special place in U.S. foreign and military policy. Low capital inflow in the case of Japan resulted from the Japanese policy of excluding foreign capital.

IV. Concluding Remarks

The results of this study show that the pattern of Korea's industrialization departs very substantially from the "typical pattern" derived from broad international experience. Nevertheless, Korea's industrialization has been very rapid and Korea's trade-oriented development strategy appears to have been successful.

The pattern of Korean growth also differs from the Japanese pattern in certain respects. For Korea's growth, export expansion has played, unlike in Japan, an even more important role than the growth of domestic final demand. Imports in Korea also expanded more than proportionately for almost all primary and secondary industries. But in the case of Japan, only primary and some secondary industries, such as food, experienced more than proportionate increases in imports. For many manufacturing industries in Japan the growth of

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oriented depending upon whether the value of the trade orientation index is high, normal or significantly negative. The value of Korea's trade orientation index was −0.55 in 1963 and −0.89 in 1973 or significantly less than zero. Thus, Korea's trade policy is classifiable as industry-oriented.

Krueger [8, p. VI-25] indicates that when "Korea adopted an export promotion strategy in 1960... the commitment of the government to the export strategy was so complete that virtually all policies were scrutinized and considered in light of their implications for the export drive."

imports was very slow. Korea and Japan also show different patterns with respect to domestic saving (much higher in Japan than in Korea) and capital inflows (much higher in Korea than in Japan). Another contrast is that in Japan both middle and late industries developed relatively early in the transition. However, Korea's industrialization proceeded gradually from early to middle and to late industries which are presently in the process of development.

However, the two countries show similar patterns with respect to the structure of production (low primary production and high industrial production), the structure of trade (low primary exports, high manufactured exports, and high dependency on foreign foodstuffs), the structure of domestic demand (low government consumption and high food consumption), the high level of investment, and a high urbanization ratio. In addition, Korea and Japan are similar in that exports of labor-intensive manufactured goods, especially textiles, played important roles at earlier stages of development.

The differences in the growth patterns of Korea and Japan may reflect different growth policies in the two countries. For instance, the less than proportionate expansion of manufactured imports in Japan reflects the Japanese policy of positive import substitution, whereas the more than proportionate expansion of manufactured imports in Korea reflects Korea's policy of neither favoring nor discriminating against import substitution. Korea did not put much emphasis on import substitution at earlier stages of development. The low capital inflow in Japan resulted from the Japanese policy of excluding foreign capital and the high capital inflow in Korea resulted from the availability of a relatively large amount of foreign capital (especially from the U.S.) and also from Korea's poor domestic savings policy which penalized saving. The trade patterns of the two countries were also influenced, of course, by world trade market conditions which were different in the two periods.

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