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Chapter 6

Exports and the Growth and Structure of the Economy

Very rapid growth of exports has been the outstanding feature of South Korea's economic performance over the 1960s and early '70s and has been a significant determinant of the growth and structure of the South Korean economy as a whole.

PATTERN OF EXPORT GROWTH

Table 6–1, which gives exports and export growth rates from 1953 until 1972, shows that rapid growth began in 1959 and averaged 38.5 percent between 1958 and 1972. Exports in 1973 reached $3.2 billion, almost a doubling over the previous year.

Table 6–1 demonstrates the relative unimportance of U.S. procurement for Viet Nam which only began in 1967. The growth rate of exports exclusive of exports to South Viet Nam was even more rapid than growth in total exports, except in 1967 and 1968. Nevertheless, exports, net of sales to Viet Nam, grew at rates of 28 and 42 percent, respectively in 1967 and 1968—a very creditable performance by any standard. In 1972, exports to Viet Nam accounted for less than 3 percent of the total.

As Table 6–2 shows, 78 percent of South Korean exports in 1961 were primary products—mainly tungsten, coal, dried laver (seaweed), and fish. By 1971, 86 percent were manufactured products and only 14 percent were primary products. Though total exports expanded more than 40 times between 1961 and 1972, manufactured exports expanded almost 170 times in those

TABLE 6–1
Export Growth, 1953 to 1973

Year	Total Exports ($ million)	Growth Rate (percent)	Year	Total Exports ($ million)	Growth Rate (percent)	Exports Net of Sales to Viet Nam ($ million)	Growth Rate (percent)
1953	40	—	1963	87	58	87	58
1954	24	−40	1964	119	37	119	37
1955	18	−25	1965	175	47	175	47
1956	25	39	1966	250	43	250	43
1957	19	−24	1967	335	34	320	28
1958	17	−11	1968	486	45	455	42
1959	20	18	1969	658	35	622	37
1960	33	65	1970	882	34	835	34
1961	41	24	1971	1,132	28	1,068	28
1962	55	34	1972	1,676	48	1,624	52
			1973	3,271	95	3,225	99

SOURCE: Bank of Korea, *Economic Statistics Yearbook*, various issues.

years, a rate of growth averaging more than 60 percent per annum. Admittedly, the growth started from a very small base, but it continued even after exports had reached a substantial percentage of GNP. From 1967—when exports were almost 9 percent of GNP—to 1972, the growth rate of total exports averaged 38.2 percent and manufactured exports 44.5 percent.

Table 6–3 lists the major manufactured exports of the period 1961–72. In 1961, they were plywood, cotton fabrics, and plates and sheets of iron and steel. The growth of exports of these products was rapid over the next decade and they remained important in 1972. Electrical machinery and apparatus, clothing, footwear, and wigs were not exported at all in 1961, but by 1972 they accounted for 39 percent of total exports and 45 percent of manufactured exports.

The largest market for Korean exports in the early 1960s was Japan, and from 1965 onwards the most important has been the United States (Table 6–4). Though of very little significance as an export market in the 1950s and very early '60s, the United States absorbed more than 50 percent of Korea's exports in 1968, but has become a somewhat less important customer in recent years. Since 1965, Japan has taken about one-quarter, and the remaining quarter has been split between other Asian countries and Europe. In 1973, exports to Japan were expected to increase substantially. The several revalua-

TABLE 6–2

Structure and Growth Rates of Exports, 1961 to 1973

Year	Total Export Transactions[a]		Primary Product Exports			Manufactured Exports		
	Amount ($ million)	Annual Growth Rate (percent)	Amount ($ million)	Percent of Total	Annual Growth Rate (percent)	Amount ($ million)	Percent of Total	Annual Growth Rate (percent)
1961	42.9	32.5	33.5	78.0	—	9.4	22.0	60.8
1962	56.7	32.2	41.4	73.0	23.6	15.3	27.0	62.2
1963	84.4	48.8	40.8	48.3	−1.4	43.6	51.7	184.8
1964	120.9	43.2	58.6	48.4	43.6	62.3	51.6	42.9
1965	180.5	49.3	68.1	37.7	16.2	112.4	62.3	80.3
1966	225.8	41.7	96.1	37.6	26.4	159.7	62.4	42.1
1967	358.6	40.2	107.4	29.9	11.8	251.2	70.1	55.4
1968	500.4	39.5	113.5	22.7	5.7	386.9	77.3	54.1
1969	702.8	40.4	147.7	21.0	30.1	555.1	79.0	43.4
1970	1,003.8	42.8	164.4	16.4	11.3	839.4	83.6	51.2
1971	1,352.0	34.7	189.1	14.0	15.0	1,162.9	86.0	38.5
1972	1,807.0	33.7	222.7	12.3	14.1	1,584.3	87.7	36.2
1973	3,254.2	80.2	381.0	11.8	71.1	2,872.8	88.2	81.3

SOURCE: Economic Planning Board, *Major Economic Indicators,* various issues.

a. These figures are based on records of settlements of export transactions kept by the Ministry of Commerce and Industry. They usually exceed other export figures cited in this volume (e.g., tables 2–7 and 6–1), which are determined on a customs clearance basis.

TABLE 6–3

Major Manufactured Exports, 1961 to 1973

(amounts in millions of dollars)

	Plywood		Cotton Fabrics, Woven		Plates & Sheets of Iron & Steel		Electrical Machinery & Apparatus		Clothing		Footwear		Wigs & Human Hair	
Year	Amount	Percent of Total Exports	Amount	Percent of Total Exports	Amount	Percent of Total Exports	Amount	Percent of Total Exports	Amount	Percent of Total Exports	Amount	Percent of Total Exports	Amount	Percent of Total Exports
1961	1.2	2.8	0.9	2.1	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1962	2.3	4.1	1.8	3.2	0.5	0.0	0.1	0.2	1.1	2.0	0.2	0.4	0.0	0.0
1963	6.3	7.5	4.3	5.1	8.3	9.8	0.9	1.1	4.6	5.5	0.7	0.8	0.0	0.0
1964	11.4	9.4	11.1	9.2	2.1	1.7	1.6	1.3	6.6	5.5	0.9	0.7	0.2	0.2
1965	18.0	10.0	10.5	5.8	10.2	5.7	3.3	1.8	20.7	11.5	4.2	2.3	2.3	1.3
1966	29.9	11.7	10.1	3.9	7.1	2.8	8.3	3.2	33.4	13.1	5.5	2.2	12.0	4.7
1967	36.4	10.2	12.6	3.5	0.9	0.3	9.3	2.6	59.2	16.5	8.1	2.3	22.7	6.3
1968	65.6	13.1	13.3	2.7	0.8	0.2	21.8	4.4	112.2	22.4	11.0	2.2	35.1	7.0
1969	79.2	11.3	18.6	2.6	3.6	0.5	42.3	6.0	160.8	22.9	10.5	1.5	60.2	8.6
1970	91.4	9.1	26.4	2.6	7.6	0.8	48.5	4.8	213.6	21.3	17.3	1.7	100.9	10.1
1971	124.3	9.2	31.0	2.3	20.1	1.5	74.3	5.5	304.3	22.5	37.4	2.8	69.9	5.2
1972	153.6	8.5	34.8	1.9	68.1	3.8	137.4	7.6	442.2	24.5	55.4	3.1	73.8	4.1
1973	270.8	8.3	56.5	1.7	129.3	4.0	345.3	10.6	749.9	23.0	106.4	3.3	81.5	2.5

SOURCE: Economic Planning Board, *Major Economic Indicators,* various issues.

TABLE 6–4
Exports by Country, 1960 to 1973
(percent of total exports)

	United States	Japan	Other Asia	Europe	Rest of World
1960	6.7	63.4	11.6	14.1	4.3
1961	9.4	50.2	23.3	8.4	8.6
1962	21.8	42.8	22.3	11.5	1.5
1963	28.0	28.6	33.3	9.1	1.0
1964	29.7	31.9	23.3	13.1	2.0
1965	35.2	25.1	23.9	12.2	3.6
1966	38.3	26.5	15.4	13.6	6.2
1967	42.9	26.5	13.9	10.4	6.4
1968	51.7	21.9	11.5	8.0	7.0
1969	50.1	21.4	13.0	8.9	6.5
1970	47.3	28.0	9.8	9.1	5.7
1971	49.8	24.5	10.4	8.2	7.0
1972	46.7	25.1	11.3	10.1	6.7
1973	31.7	38.5	10.3	11.8	7.8

SOURCE: *Economic and Statistics Yearbook, 1973*, pp. 184–185; *1970*, pp. 296–297; *1966*, p. 264; *1962*, p. 220.

tions of the yen vis-à-vis the dollar and the gradual devaluation of the won with respect to the dollar from December 1970 to June 1972 left the won in a very favorable position with respect to the yen in 1973. This has stimulated exports from Korea to Japan.

NET FOREIGN EXCHANGE CONTENT OF EXPORTS

Many of South Korea's exports have a particularly high import content—for example, cotton, woolen, and synthetic textiles; plywood; wigs; steel; and electronics. Some require more natural-resource-based raw materials than can be produced locally, except at very high cost, such as iron ore, cotton, wool, leather, round wood for plywood, and human hair (in sufficient quantities). Others require industrial raw materials that are not produced locally in adequate amounts despite attempts to produce import substitutes for petrochemicals; synthetic yarns, plastics, and sophisticated electronic components. Though the import content of silk textiles, fertilizers, cement, tiles, and a range of primary products is low, for most exports it is high.

It is difficult to determine the total import content (direct and indirect) of South Korea's exports. The Ministry of Finance publishes figures only on the direct import content of exports, including imports for bonded processing and an estimate of other private imports used directly in exports.[1] Import content is estimated for the years 1967 to 1973 as follows:

1967	1968	1969	1970	1971	1972	1973
40.0%	43.7%	43.9%	44.3%	46.3%	36.8%	42.3%

The Korea Productivity Center (1970) produced estimates of 32.2 percent and 41.7 percent for 1967 and 1969 for the direct import content, based on a survey of 45 commodities accounting for 85.4 percent of total exports. The Korea Trade Research Center of Seoul National University (1969) produced estimates of both the direct and indirect import content using the 1966 input-output matrix. They also computed an implicit "charge" for imported capital inputs. For 1966, they estimated the direct and indirect import content at 40.0 percent and for 1968 at 44.4 percent.

All observers apparently agree that the import content of Korea's exports increased during the late 1960s, despite the incentives given after 1965 to domestic suppliers of exporting firms, but did seem to fall off in the early '70s.

South Korean exports are import intensive largely because of the particular products in question rather than because of the processes used to produce them. Since manufactures tend to be more import intensive than primary products, and the former are more important relative to the latter, the import content of South Korea's exports is high. Another factor in the high import content of exports is the greater import intensity of manufactured exports relative to all manufactures. In the table below, we contrast the results from the 1970 input-output estimates of the direct import intensity of total production with the Korea Productivity Center results for direct import intensity in 1969:[2]

	1970 Input-Output Estimates of Direct Import Intensity of General Production (percent)	Korean Productivity Center Estimates of Direct Import Intensity for Exports in 1969 (percent)
Primary products	1.2	1.1
Food, beverages, and tobacco	10.9	0.2
Other manufacturing	25.0	53.8
All commodities	14.2	41.7

We see that exports are more import intensive than general production, but that the differences are far smaller when corrected for the type of products exported or produced. In fact, for primary products and processed foods, exports are less import intensive than general production.

Although the import intensity of Korean exports is higher than for production in general, it is not appropriate to characterize South Korean exports as resulting largely from bonded processing. Value added domestically is quite substantial. The degree of import content and its tendency to increase in the 1960s does take some of the bloom off of Korea's spectacular export performance. Yet even if allowance were made for this fact by adjusting South Korean exports and their growth downward, the performance would still be remarkable by any standard of international comparison.

RANGE OF EXPORT INCENTIVES

As we have mentioned before, the number and variety of export incentives used in South Korea is striking (Table 3–3). Although some of them predate the mid-1950s, most incentive programs have been introduced and gradually intensified since the end of the Korean War. Their net effect has been an effective exchange rate for exports that has exceeded that for imports.

Another means of encouraging exports is implicit in the government's method of administering the various export subsidies and targets. Rather than dealing with each individual exporter, the government has worked through exporters' associations composed of all the exporters in a particular industry. For example, wastage allowances, import entitlements, preferential loans, and export targets were often allocated to an association, which in turn devised methods of parceling the incentives and targets among its members. These associations, moreover, have tended to serve as informal cartels for allocating domestic sales and this arrangement has enabled firms to charge somewhat higher prices in local markets. In some instances these higher prices reflect the absence of tariff and internal tax exemptions and for some commodities (e.g. wigs), there is almost no domestic market. Nevertheless, the presumption remains that for a limited range of commodities there is an element of monopoly in domestic pricing. For these commodities, price discrimination between domestic and foreign sales potentially subsidizes exports. This problem is discussed in more detail in Chapter 10.

EXPORT SENSITIVITY TO SUBSIDIES AND EXCHANGE RATES

The value of a number of subsidies to exports was calculated as part of the determination of the purchasing-power-parity effective exchange rates on exports and imports (tables 5–8 and 5–9). In Table 6–5, the purchasing-power-parity effective exchange rate on exports is divided into three components: (1) that due to the official exchange rate, (2) that due to premia resulting from the multiple exchange rate system, and (3) that due to a number of export subsidies. Subsidies include direct subsidies, tax rebates, utility rate rebates, and the value of subsidized credit for exports. In Table 6–5, the three components of the effective exchange rate are deflated separately, while only the aggregate series is deflated in Table 5–8, line H.

These data can be used to estimate the sensitivity of exports to exchange rates and export subsidies. Statistically, there are a number of problems, the

TABLE 6–5

Effective Exchange Rate on Exports, Purchasing-Power-Parity Basis, 1955 to 1970

(won per dollar)

Year	Official Exchange Rate	Premia Due to Multiple Exchange Rates	Export Subsidies per Dollar of Exports	Effective Exchange Rate on Exports
1955	99.7	159.9	0.0	259.6
1956	132.1	139.8	0.0	271.9
1957	118.1	139.1	0.0	257.2
1958	121.8	155.9	3.0	280.7
1959	119.7	202.8	3.1	325.6
1960	135.4	181.7	2.6	319.7
1961	244.8	28.0	16.4	289.2
1962	226.6	0.0	37.5	264.1
1963	189.3	58.0	28.4	275.7
1964	232.2	43.0	29.6	304.8
1965	265.4	0.0	39.2	304.6
1966	256.3	0.0	48.7	305.0
1967	243.1	0.0	56.0	299.1
1968	233.3	0.0	65.5	298.8
1969	234.5	0.0	61.2	295.7
1970	240.2	0.0	67.0	307.2

SOURCE: Same as Table 5–8.

main difficulty being that from 1955 to 1970 the effective exchange rate for exports remained remarkably steady. This was particularly true after 1964. Although the effective official exchange rate has varied dramatically from year to year, subsidies and export premia have also changed in such a way as to keep the effective exchange rate for exports relatively constant. Another factor affecting our estimate is that exports after the Korean War were very small for a country of South Korea's size and GNP per capita. Much of South Korea's export growth in the late 1950s and early '60s was a matter of catching up after the devastation of two major wars in little more than a decade. Since the extraordinarily rapid rate of growth indicates that exporting was extremely profitable at prevailing exchange rates, it is plausible to hypothesize that South Korean exports were constrained more by the capacity to produce goods than by the relative profitability of producing for export instead of for domestic markets.

The sensitivity of exports can be tested by using exports of manufactured goods (*XGM*) as the dependent variable, and nonagricultural output (*YNA*), the official exchange rate on a purchasing-power-parity basis (*ORD*), and all other export incentives (i.e., a combination of multiple exchange rate premia and subsidies denoted by *SUBX*) as explanatory variables. If the whole period 1955 to 1970 is included, the results are very poor. From 1957 to 1970, we obtain the following result:

$$XGM = -241.4847 + 0.3323YNA + 0.2629ORD + 0.1471SUBX \quad (6\text{–}1)$$
$$\qquad\qquad (-3.92) \quad (11.29) \qquad\quad (1.70) \qquad\quad (1.27)$$

Estimation Technique: Cochrane-Orcutt Iterative Technique

$R^2 = 0.9900$

$d = 1.3742$

$\rho = 0.8701$

The coefficient of *YNA* is highly significant, which indicates that general capacity in nonagriculture is the most significant factor explaining exports. That is, the general capacity of the economy to produce is probably an important determinant of exports. The elasticity of manufactured exports with respect to changes in the exchange rate (*ORD*) is 2.14 and with respect to export subsidies is 0.95. The coefficients of the official exchange rate *ORD* and the subsidy level for exports *SUBX*, however, are not significant.

This result can be greatly modified, however, if the time span is changed from 1957–70 to 1963–70. The coefficient of *ORD* becomes 1.713 and the *t* ratio is over 13.8; the coefficient of *SUBX* becomes 1.305 with a *t* ratio of 10.9.[3] With such a short period, however, the degrees of freedom are limited.

The exchange rate variable, *ORD*, and the subsidy variable, *SUBX*, are almost constant and show fairly limited variation from 1963 to 1970, making the results still more suspect. Finally, the implied elasticities for the exchange rate and subsidy variables from 1963 to 1970 are enormous, equal to 6.16 for *ORD* and 4.69 for *SUBX*. Any period beginning before 1963, however, gives insignificant results for the coefficients of *ORD* and *SUBX*.[4]

It seems reasonable to infer that the responsiveness of exports changed sharply after 1963, but the period is too short for accurate estimation of parameters. We may infer that before 1963 sensitivity to exchange rate policy was lacking because exports, particularly manufactures, were insignificant and because the system of multiple exchange rates then in use was very inefficient. After 1963, both government officials and private entrepreneurs were more export oriented. Multiple exchange rates gave way to a system that relied more heavily on high official exchange rates combined with export subsidies, particularly in the form of tax and tariff relief (Table 6–5). Exports became very much more sensitive to exchange rate policies and despite rapid inflation, the rate on exports was maintained at a high level after the reforms of 1964 by a combination of official devaluations and growing export subsidies.

Another factor that may have fostered the increased responsiveness of exports after 1963 was the reduced risk of exporting once the exchange rate for exports was stabilized after 1964. As the predictability of export earnings increased, it became more reasonable for individual entrepreneurs to concentrate on exports.

MEASURING STRUCTURAL CHANGE

In the remainder of this chapter, we shall discuss the use of input-output data and national accounts to evaluate the role of exports in the growth of the Korean economy, particularly in relation to the other sources of output growth, namely domestic demand expansion and import substitution. Our analysis extends from 1955 to 1968. We could not extend it beyond 1968 because at the time the research was done, 1968 was the last year for which an input-output table was available.

The analysis of structural change in South Korea is based on a series of five input-output tables. That for 1955 was prepared especially for this study and gives information at a 29-sector level of detail.[5] Those for the remaining observation years—1960, 1963, 1966, and 1968—provide the information in a 117-sector breakdown.[6] Because of this difference, it is not possible to present the same information for all five observation years.

The input-output tables distinguish between competing and noncompeting imports. The former are defined as items that are also produced domestically;

the latter as items not produced in Korea in the year for which the table was compiled. By virtue of this definition, the list of items classed as noncompeting changes from table to table. Failure to adjust the statistics year by year to a common list of noncompeting imports would lead to a severe understatement of the degree of import substitution practiced, for much of it has come through introducing the production of formerly noncompeting imports (e.g., petroleum products). We have adjusted the data so that virtually all imports are treated as competing. The original data with explanatory documentation are available from the authors. The tables provided here are confined to aggregated data and present most of this data in terms of shares and/or compositions within total figures; this mode of presentation seems of greater relevance to the general reader than the presentation of the raw statistics.

A study of structural change is most meaningfully conducted in terms of real, i.e., constant price, magnitudes: thus it was necessary to deflate the current price input-output statistics into constant price figures. A procedure often followed in other studies of this type is to deflate all magnitudes for a given observation year by the same index, say the GDP deflator. While this procedure does suffice to insure that, on average, changes over time are not misstated because of price level changes, it fails to take account of relative price changes. In our deflation procedure, output deflators at the 117-sector level were used to estimate inter-sectoral relative price changes, while independent time series on the general wholesale price level, the wholesale price level of imported commodities, the price level of exports, and the exchange rates on imports and exports were used to determine aggregate price level changes for imports, exports, and domestic sales. The resulting figures at constant domestic market prices incorporate, insofar as possible given the limitations of the price indexes, changes over time both in the average price level and in the structure of relative prices. These constant price statistics were further deflated by the nominal protection rates estimated for 1968 to yield a set of input-output statistics at constant world market prices.[7] Deflation to constant world market prices was carried out for commodities only; there are no estimates here of magnitudes for nontradables measured in some equivalent of constant world market prices.

For our basic indicators of structural change, we split the growth of production of a sector over time into three categories: domestic demand expansion (*DE*), export expansion (*EE*), and import substitution (*IS*). There are a number of ways to accomplish such a decomposition, depending upon whether one examines first differences or deviations from proportional growth and upon how one relates imports to other elements in the system.[8] Here we shall report on one set of estimates that uses a particular mode of decomposition. Though we have experimented with a variety of methods, they all lead to the same general conclusions reported here.[9]

The decomposition begins with the fundamental supply-demand balance equation of input-output analysis:

$$X_{j,t} = W_{j,t} + C_{j,t} + Z_{j,t} + E_{j,t} - M_{j,t} \tag{6–2}$$

where $X_{j,t}$ = gross output in sector j in period t;

$W_{j,t}$ = intermediate demand for the output of sector j in period t;

$C_{j,t}$ = private plus government consumption demand for the output of sector j in period t;

$Z_{j,t}$ = investment demand (including net stock accumulation) for the output of sector j in period t;

$E_{j,t}$ = export demand for the output of sector j in period t; and

$M_{j,t}$ = imports of items classified in sector j in period t.

We shall define import substitution as a change in the ratio of imports to *domestic* demand. Let $m_{j,t}$ be defined as $M_{j,t}/D_{j,t}$, where

$$D_{j,t} = W_{j,t} + C_{j,t} + Z_{j,t} \tag{6–3}$$

is total domestic demand for the output of sector j in period t. Letting $t = S$ denote the first period, from (6–2) and (6–3), we may write

$$X_{j,S} = (1 - m_{j,S})\, D_{j,S} + E_{j,S}. \tag{6–4}$$

For the second period (T), from (6–2) and (6–3) we may write:

$$X_{j,T} = D_{j,T} + E_{j,T} - M_{j,T}. \tag{6–5}$$

If we add $m_{j,S} \cdot D_{j,T}$ and subtract the same quantity on the right hand side of (6–5), we have

$$X_{j,T} = (1 - m_{j,S}) \cdot D_{j,T} + E_{j,T} + m_{j,S} \cdot D_{j,T} - M_{j,T}. \tag{6–6}$$

Subtracting (6–4) from (6–6) yields

$$(X_{j,T} - X_{j,S}) = (1 - m_{j,S}) \cdot (D_{j,T} - D_{j,S}) + (E_{j,T} - E_{j,S}) + (m_{j,S} - m_{j,T}) \cdot D_{j,T} \tag{6–7}$$

or

$$\Delta X_j = (1 - m_{j,S}) \cdot \Delta D_j + \Delta E_j - \Delta m_j \cdot D_{j,T} \tag{6–8}$$

where Δ is the difference operator and

$(1 - m_{j,S}) \cdot \Delta D_j$ = contribution of domestic demand expansion (DE);

ΔE_j = contribution of export expansion (EE);

$-\Delta m_j \cdot D_{j,T}$ = contribution of import substitution (IS).

Equation (6–8) gives the breakdown of growth into that due to expansion of domestic demand, that due to export expansion, and that due to import substitution. The contribution of domestic demand is the domestic demand coefficient $(1 - m_{j,S})$ times the change in domestic demand (ΔD_j) for the sector j. The contribution of exports is merely the increase in exports, and the contribution of import substitution is minus the change in the import coefficient (Δm) times domestic demand $(D_{j,T})$ in period T for sector j.

We shall use equation (6–8) to decompose the change in output into its component parts. It is important to recognize, however, that any decomposition is essentially a descriptive device and involves some arbitrary choices. For example, the choice of the first period as the base for defining the import ratio is wholly arbitrary. Use of the second period's import ratio—an equally arbitrary choice—as the reference point would give

$$\Delta X_j = (1 - m_{j,T}) \cdot \Delta D_j + \Delta E_j - \Delta m_j \cdot D_{j,S}. \qquad (6\text{–}9)$$

If the import ratio declined over time, then both measures of import substitution would be positive, but that based on the first period's import ratio would be greater if domestic demand has grown (i.e., $-\Delta m_j \cdot D_{j,T} > -\Delta m_j \cdot D_{j,S}$). Conversely, the contribution of domestic demand to growth will be smaller when the first period is taken as the base. The bias in either case results from using values for two discrete points in time, which means that we face an index number problem.[10]

There are several ways to circumvent this problem, a number of which were tried. The approach reported here is the use of "chained" measures. Rather than apply the decomposition simply to the data for 1955 and 1968, we have separately decomposed the change in output over each interval for which we have input-output data; the estimates for each interval are then summed to give the growth contribution estimates between 1955 and 1968. The same method was applied to decompose changes in output between 1960 and 1968.

As well as being sensitive to the index number problem, measures of import substitution are also sensitive to the level of aggregation employed. Estimates based on highly aggregated data reflect both changes in the conditions of supply within individual subsectors producing uniquely defined products and changes in the pattern of domestic demand. For example, there may be no import substitution in the sense defined above when one sums the estimates for individual sectors, and yet the ratio of aggregate imports to total domestic demand may have changed because of shifts in the composition of demand. In our study of trade policy, we are primarily interested in the import substitution stemming from changes in the conditions confronting suppliers. We have therefore estimated the growth contributions at the 117-sector level. The aggregate estimates presented below are thus aggregates of the growth

contributions for individual sectors rather than growth contributions calculated from data aggregated over the sectors. While this removes the effect of changes in the composition of demand among the 117 sectors, the effects of demand shifts within individual sectors remain in the estimates.

The measures defined above give the direct contributions of import substitution and export expansion to the growth of a sector's output. However, part of the growth of *intermediate* demand for a sector's output may also be attributable to import substitution or to export expansion, albeit in other sectors which require the output of the particular sector as intermediate input. The total, direct plus indirect, effect of import substitution and export expansion can be calculated through the use of the inverse input-output matrix. Below we shall estimate both the direct and the total growth contributions. Only the former are relevant to assessing how producers within *individual* sectors have responded to incentives policies. The latter are, however, relevant to measuring the contributions of import substitution and export expansion to the economy's growth.

CONTRIBUTIONS TO SOUTH KOREA'S ECONOMIC GROWTH

Estimates of contributions to growth based on constant world prices are presented in Table 6–6. For the period 1955 to 1968 all sectors are grouped in five broad aggregates. These appear in Part 1 of the table. For the period 1960 to 1968 the tradable goods sectors were grouped according to the eleven categories shown in Part 2. The two intermediate product categories shown there indicate different stages of processing, I being at a lower stage than II.[11] The first two industries listed are primary and the remaining nine are manufacturing industries.

Tradable goods were also grouped according to the four trade categories shown in Part 3. This classification includes:

(X) Export industries (exports greater than 10 percent of total production);
(IC) Import-competing industries (imports greater than 10 percent of total domestic supply);
(XIC) Export and import-competing industries (exports greater than 10 percent of total production and imports greater than 10 percent of total domestic supply); and
(NIC) Non-import-competing industries (all other sectors).

The figures in Table 6–6 are the absolute growth contributions divided by the respective changes in output; thus they state the proportion of the change in output that is attributable to each cause.

TABLE 6–6

Direct and Indirect Contributions to Economic Growth

(percent of total growth of sector)

	Domestic Demand Expansion		Export Expansion		Import Substitution	
	Direct	Total	Direct	Total	Direct	Total
Part 1. 1955–68: Broad Sectors						
1. Primary	109.2	94.7	4.0	19.4	−13.2	−14.2
2. Manufacturing	80.0	72.5	13.7	22.0	6.3	5.5
3. Social overhead	91.4	86.7	8.8	12.3	−0.2	0.9
4. Services	96.4	86.7	5.0	14.9	−1.4	−1.6
5. Other	81.5	70.9	35.9	46.4	−17.4	−17.3
Total	89.0	80.3	11.2	20.2	−0.3	−0.6
Part 2. 1960–68: Industrial Groups						
1. Agriculture, forestry, and fishing	108.1	94.9	−0.1	15.9	−7.9	−10.8
2. Mining and energy	88.1	70.6	15.9	28.2	−3.9	1.2
Primary	106.5	92.9	1.2	16.9	−7.6	−9.8
3. Processed food	90.4	87.8	7.8	11.7	1.8	0.5
4. Beverages and tobacco	93.8	88.9	4.0	9.9	2.2	1.1
5. Construction materials	86.4	84.8	5.6	7.4	8.0	7.8
6. Intermediate products I	68.2	54.0	17.0	32.3	14.8	13.6
7. Intermediate products II	84.6	72.1	10.4	25.6	5.0	2.4
8. Nondurable consumer goods	57.1	53.0	36.2	40.2	6.8	6.8
9. Durable consumer goods	81.2	78.1	23.2	27.2	−4.4	−5.3
10. Machinery	141.1	139.5	8.0	12.2	−49.0	−51.8
11. Transport equipment	141.7	144.6	0.2	4.2	−41.9	−48.8
Manufacturing	81.7	74.0	15.1	24.3	3.2	1.7
Part 3. 1960–68: Trade Categories						
1. Export goods (X)	45.4	37.9	52.7	60.4	1.9	1.8
2. Import-competing goods (IC)	109.3	97.5	0.5	16.1	−9.8	−13.6
3. Non-import-competing goods (NIC)	93.5	85.3	1.4	10.9	5.1	3.9
4. Export and import-competing goods (XIC)	90.7	76.7	47.2	61.8	−37.9	−38.5
All commodities	88.2	79.0	11.4	22.4	0.3	−1.4

NOTE: All results are aggregated from 117-sector input-output data, except for 1955–60 which is from 29-sector data. Totals may not reconcile because of rounding. Figures for 1955 to 1968 are based on constant domestic market price data, and all other figures are based on constant world market prices.

The most striking result of this analysis is the predominance of export expansion over import substitution. From 1955 to 1968, 20.2 percent of total growth was attributable directly and indirectly to export expansion, while −0.6 percent was due to import substitution. Thus, on balance, there was negative import substitution but substantial export expansion. Naturally, expansion of domestic demand was the most important factor, accounting for more than 80 percent of total growth. From 1960 to 1968, export expansion was relatively even more important, and accounted for 22.4 percent of growth compared with −1.4 percent for import substitution.

Another striking conclusion to be drawn from Table 6–6 is that export expansion generated considerable domestic backward linkages while import substitution did not. The average contribution of export expansion for either the 1955–68 or 1960–68 period almost doubles when indirect effects are taken into account. That is, growth of exports generates substantial demand for domestically produced intermediate goods.

It is of interest to compare the relative importance of time periods with respect to export expansion and import substitution. The following figures show the *total* contribution of each to the growth of aggregate commodity output for each subinterval:

	1955–60	1960–63	1963–66	1966–68
Export expansion	12.9%	6.3%	31.4%	21.3%
Import substitution	10.2	−6.9	8.9	−6.6

Export expansion contributed more to the growth of commodity output in each subperiod than did import substitution. The combined contribution of export expansion and import substitution was greatest from 1963 to 1966, the same period in which the major policy reforms were carried out and rapid growth began. Growth of primary exports and import substitution in manufacturing had characterized the earlier period but after 1960 manufactures dominated the growth of exports and there was less import substitution than there had been in the late 1950s.

The figures below show the *direct* contributions of export expansion and import substitution to the growth of *manufactured* output alone:

	1955–60	1960–63	1963–66	1966–68
Export expansion	5.1%	6.2%	29.4%	13.0%
Import substitution	24.2	0.9	14.4	−0.1

The late 1950s is seen to have been a period of major import substitution in manufacturing when exports played a relatively minor role in Korea's indus-

trialization. Export growth is again seen to have made its major relative contribution from 1963 to 1966. Both these and the preceding figures for import substitution clearly reflect the effect of the high capital inflow that financed large imports of capital goods in the late 1960s.

We turn now to the estimates of direct contribution by individual industries, an analysis that can only cover 1960 to 1968. Table 6–7 shows the share of direct trade effects (i.e., export expansion plus import substitution) in the output change of each of the eleven industrial groups listed in Part 2 of Table 6–6.

The importance of trade effects was greatest for intermediate products and consumer goods (groups 6, 7, 8, and 9). Along with agriculture and processed food (groups 1 and 3) these industries were also the major sources of the growth of total domestic demand and output. Because of rapid growth of investment, import substitution (a rise of import shares) in investment goods production (groups 10 and 11) was negative. Thus the growth of the investment goods industries was almost wholly due to domestic demand. Exports contributed more than import substitution to the growth of *every* group (except group 5, construction materials). It is also remarkable that for every group 1963–66 stands out as having been the period when exports contributed most.

While import substitution played a relatively modest role in each industry's growth over the eight years, it did predominate in some industries during shorter intervals. Furthermore, the relatively low share of import substitution from 1960 to 1968 in the aggregate for manufacturing need not imply that it was unimportant to the 92 individual sectors. Nonetheless, in only 12 out of the 80 manufacturing sectors was import substitution responsible for more than 20 percent of the sector's growth. Sectoral import shares actually increased, leading to negative import substitution, in 39 of the manufacturing sectors and in 8 of the 12 primary sectors. Export expansion, on the other hand, was the source of more than 20 percent of the growth of 20 manufacturing sectors. The contribution of domestic demand expansion was more than 80 percent of the individual sector's growth in well over half of the manufacturing sectors (53 out of 80); thus the importance of domestic demand growth observed in the aggregate carries through for the individual sectors as well.

COMPARISONS WITH "NORMAL" DEVELOPMENT PATTERNS

The contributions of the respective sources to Korea's growth may be compared with a set of norms developed by Chenery (1969). Chenery used a somewhat different, though similar, set of measurements, which will now be

TABLE 6–7

Direct Trade Effects by Industry, 1960 to 1968

Group[b]	Trade Effect	Absolute[a] Value of: Export Expansion	Absolute[a] Value of: Import Substitution	Period of Highest Contribution to Sector's Own Growth: Export Expansion Period	Export Expansion Share	Import Substitution Period	Import Substitution Share
1	−8.0%	−0.3	−16.7	1963–66	2.8%	1963–66	17.0%
2	9.6	7.3	1.7	1963–66	37.1	1966–68	2.9
3	6.2	2.2	1.2	1963–66	11.4	1960–63	26.4
4	12.0	2.9	−0.7	1963–66	24.1	1963–66	12.4
5	13.6	1.4	2.1	1963–66	10.9	1963–66	20.1
6	31.8	27.7	24.1	1963–66	23.2	1963–66	49.8
7	15.4	13.3	6.3	1963–66	23.9	1966–68	7.1
8	43.0	39.3	7.3	1963–66	96.0	1960–63	27.9
9	18.8	3.8	−0.7	1963–66	27.0	1960–63	50.4
10	−41.0	1.5	−9.1	1963–66	47.4	1963–66	−16.9
11	−41.7	0.1	−12.5	1963–66	1.8	1966–68	−11.8

a. In billions of won at constant 1965 world prices.
b. These industrial groups are described in Table 6–6.

developed. Let $m'_{j,t} = M_{j,t}/(D_{j,t} + E_{j,t})$; that is, define import substitution in relation to the change in the ratio of imports to total demand including the sector's exports. Then for the first period, we may write:

$$X_{j,S} = (1 - m'_{j,S}) \cdot D_{j,S} + (1 - m'_{j,S}) \cdot E_{j,S}. \tag{6–10}$$

For the second period, we write

$$X_{j,T} = (1 - m'_{j,S}) \cdot D_{j,T} + (1 - m'_{j,S}) \cdot E_{j,T} + m'_{j,S} \cdot (D_{j,T} + E_{j,T}) - M_{j,T}. \tag{6–11}$$

Chenery classifies growth by sector in terms of the deviation of its growth from that of overall income. Let λ be the ratio of total income in the second period to that in the first. Then multiply the first period's equation by λ and subtract from the second period's equation:

$$\delta X_{j,T} = \underbrace{(1 - m'_{j,S}) \cdot \delta D_{j,T}}_{\substack{\text{Domestic} \\ \text{demand} \\ \text{contribution}}} + \underbrace{(1 - m'_{j,S}) \cdot \delta E_{j,T}}_{\text{Export contribution}} + \underbrace{(m'_{j,S} - m'_{j,T}) \cdot (D_{j,T} + E_{j,T})}_{\substack{\text{Import} \\ \text{substitution} \\ \text{contribution}}} \tag{6–12}$$

where δ is the "deviation" operator such that $\delta Y_T = Y_T - \lambda Y_S$ for any variable Y.

The figures shown below give the total, i.e., direct plus indirect, contribution of each source to the deviation from proportional growth of industrial output (as defined by Chenery) from 1955 to 1968, using the Chenery measure just developed. The norms are derived from cross-country and time series data for developing countries and they correspond to the growth of per capita income from \$100 to \$200.

	Domestic Demand Expansion	Export Expansion	Import Substitution
All country norm	50%	18%	32%
Large country norm	55	24	21
Korea (1960–68)	60	38	2

The industrialization of a "normal" country is considerably less dependent upon export expansion and considerably more dependent upon import substitution.

Another instructive comparison is that of structural changes in aggregate magnitudes for the South Korean economy with those observed in other countries at roughly the same level of per capita income. The most recent comparative study of changes in economic structure is that of Chenery (1970 a, b), where pooled cross-section and time series data are used to estimate regressions from which structural "norms" may be inferred.[12] In Chenery's classification, "industry" equals manufacturing plus construction plus other in our

TABLE 6–8

Observed Structure in South Korea and Structural Norms for Less Developed Countries

Observed Structural Shares

	1955	1960	1966	1968	1972
1. Per capita GNP	$79	$86	$113	$133	$179
2. Capital inflow ratio to GDP	7.7%	8.5%	9.0%	11.8%	4.9%
3. Share of investment in GDP	12.0	10.9	21.9	27.1	20.8
4. Share of exports in GDP	1.7	3.4	10.5	13.3	21.0
5. Share of manufacturing exports in GDP	0.4	1.2	7.5	9.3	17.8
6. Imports as percent of GDP	10.0	12.7	20.4	26.5	26.1
7. Primary share of GDP	48.0	42.2	40.1	33.2	32.0
8. Industry share of GDP	13.0	15.6	21.6	24.1	26.0
9. Utilities share of GDP	3.5	5.3	6.1	7.7	7.5
10. Services share of GDP	35.5	36.9	32.2	35.0	34.5

Structural Norms According to Chenery Equations

	Actual Capital Inflow		Zero Capital Inflow	
Large Countries				
1. Per capita GNP	$79	$179	$79	$179
2. Share of investment in GDP	14.4%	20.2%	12.8%	19.2%
3. Share of exports in GDP	9.8	10.8	16.0	14.8
4. Share of manufacturing exports in GDP	1.4	2.9	0.5	2.3
5. Imports as percent of GDP	17.6	15.8	16.1	14.8
6. Primary share of GDP	52.8	33.5	55.4	35.3
7. Industry share of GDP	14.4	24.9	11.7	23.1
8. Utilities share of GDP	5.2	7.1	5.6	7.4
9. Services share of GDP	27.6	34.5	27.3	34.2

TABLE 6–8 (concluded)

Large Manufacturing Countries

	Actual Capital Inflow		Zero Capital Inflow	
1. Per capita GNP	$79	$179	$79	$179
2. Share of investment in GDP	10.3%	23.1%	12.2%	24.3%
3. Share of exports in GDP	8.1	10.9	9.9	12.0
4. Imports as percent of GDP	15.8	15.8	9.9	12.0
5. Primary share of GDP	51.7	33.5	51.1	33.1
6. Industry share of GDP	17.0	24.4	19.2	25.8
7. Utilities share of GDP	2.9	8.2	3.4	8.5
8. Services share of GDP	28.4	33.9	26.3	32.6

SOURCES (Observed Structural Shares):

Line 1. For 1955 through 1968, GNP in 1965 prices from Bank of Korea, *National Income Statistics Yearbook,* 1971; divided by midyear population estimates from Bank of Korea, *Economic Statistics Yearbook,* 1971, to get per capita GNP in 1965 won. An exchange rate of 278.7 won per dollar was used, equal to the legal exchange rate times our estimate of average nominal protection in 1965. The estimate for 1972 was derived from that for 1968, the ratio of 1972 GNP to 1968 GNP (both in 1970 prices), and the ratio of midyear population in 1972 to that in 1968. The sources for the latter were respectively the August, 1973 *Monthly Economic Statistics* published by the Bank of Korea and the *Economic Statistics Yearbook* for 1973.

Lines 2–4, 6. Bank of Korea, *Monthly Economic Statistics,* August, 1973, Table 91 (at current market prices). The capital inflow ratio equals imports minus exports divided by GNP plus imports minus exports.

Line 5. For 1955 through 1968, current price input-output data. For 1972, derived from trade statistics.

Lines 7–10. Bank of Korea, *Economic Statistics Yearbook, 1973,* Table 144 (Industrial Origin of GDP at Current Factor Cost).

classification, and "utilities" equals social overhead less construction. The data given in Table 6–8 for South Korea are consistent with his definitions; they are taken from the current price national income accounts.

The figures shown in Table 6–8 for structural norms at per capita incomes of $79 (corresponding to 1955) and $179 (corresponding to 1972) require some explanation. They have been estimated from the Chenery regressions in which the explanatory variables include: the log of per capita income and its value squared, the log of population and its value squared, the ratio of the foreign capital inflow to total domestic resources, and three dummy variables corresponding to three different time periods.[13] We have provided two sets of estimates. One is based on the Korean values of per capita income, population, and the observed capital inflow ratio. The other set was similarly obtained from the regressions except that the capital inflow ratio was fixed at

zero. The difference between these sets of figures indicates the effects on the structural norms of foreign capital inflows at the rates observed in Korea. Both sets of estimates are derived using the appropriate values for the dummy variables based on the year from which the data were taken. With its population of 32.4 million in 1972, Korea falls in Chenery's large country (LC) and large manufacturing country (LMC) samples; thus estimates from the regressions over both samples are given. To summarize, the figures pertain to the "typical" structure of an economy of Korea's (then) per capita income and size, either based on the observed capital inflow rate or a zero capital inflow rate.

In Table 6–8, we see that Korea's structure in 1955 differed substantially from both the LC and LMC norms. This is understandable given the disruption caused by the Korean War. The most striking irregularity in Korea's structure in 1955 is the very low share of exports in Gross Domestic Product (GDP). The share of imports was also very low. Industrial production was below the norm and services output was exceptionally large as a share of GDP.

By 1972, Korea's exports as a percent of GDP were nearly double the norm for a country of her size, per capita income, and dependence on foreign capital. The ratio of imports to GDP was also unusually high, while the industry share was somewhat above the norm. Because 1972 was, in relative terms, a recession year, the investment rate in that year was nearly normal. However, from 1969 to 1971 it averaged 28.4 percent, well above the norm. Part of the reason for the exceptionally high 1972 export ratio relative to the norm is that Korea is being compared with other countries equally dependent on capital imports. However, even if we compute the norm by assuming that the trade deficit were zero, Korea's export ratio is still much higher than usual.

CONCLUSIONS

From these comparisons with the norm, it appears that (1) the share of primary production was probably lower than normal during the 1960s; that (2) the pace of industrialization was more rapid than in other countries; that (3) the growth of exports, especially of manufactures, was unusually fast; and that (4) the growth of investment was very large and far too quick to be attributed merely to high capital inflows. Exports were not retarded by capital inflows as much as the regressions that determine the norms might suggest; nor can the rapidity of their growth be explained away as simply the result of "catching up to the norm."

The foregoing discussion of exports has been largely descriptive. The rapid growth of exports, the ensuing alteration in the structure of the economy, and the responsiveness of exports to incentives are no proof of efficiency.

Likewise, the growing import content of South Korea's exports is no conclusive indication of inefficiency—it may merely demonstrate that Korea's comparative advantage lies in exporting commodities that happen to be import intensive. There is no reason to believe that more backward integration in exports would be any more efficient than a further expansion of existing types of exports or a venture into new export lines.

Efficiency in exports in particular and in trade and foreign exchange policy in general will be discussed in Chapter 10.

NOTES

1. See Ministry of Finance, *Foreign Trade of Korea,* various issues.

2. The 1970 input-output figures are given in Bank of Korea, *Economic Statistics Yearbook, 1973,* p. 359. The Korean Productivity Center data comes from p. 29 of Korean Productivity Center (1970).

3. The full equation, obtained by the Cochrane-Orcutt technique is:

$$XGM = -651.5 + 0.3357YNA + 1.713ORD + 1.305SUBX$$
$$(-17.0)\ (61.7) \qquad (13.8) \qquad (10.9)$$

($R^2 = 0.9997$ and Durbin-Watson $= 2.3205$). If ordinary least-squares are used, the coefficients of *ORD* and *SUBX* become significant whenever the period is 1964–70. Before 1964, however, the data do not reveal any significant relationship.

4. Nak Kwan Kim has used quarterly data on exchange rates, export subsidies, relative prices in Korea and abroad, and demand in major export markets in an attempt to estimate export equations for specific commodities from 1965 to 1970. For electrical machinery, knitted outergarments, plywood, and wigs, exchange rate or export subsidy variables are significant and explanatory with high elasticities. For woven cotton fabrics, neither exchange rate nor subsidy variables are important, but exports of these products are controlled by quota. See Kim (1972).

5. The compilation of the 1955 input-output table was conducted under the supervision of Sae Min Oh, Chief, Input-Output Research Section, Bank of Korea, and was financed by grants from the University Committee on Research in the Humanities and Social Sciences and the Council on International and Regional Studies, Princeton University.

6. These were published in 1970 in mimeograph by the Bank of Korea in its *Korean Input-Output Tables for 1960, 1963, 1966 and 1968.*

7. An Annex describing the deflation procedure in detail is available from the authors on request. This Annex also explains how a number of independent statistical series (e.g., national income accounts, various price indexes, the index of manufacturing output) can be systematically "filtered" through a time series of input-output statistics to check the consistency of a large body of economic data for a particular country. Having performed this analysis, we have great confidence in our input-output estimates at constant prices at the 29-sector and higher levels of aggregation. The Annex also discusses the projection back in time of an index of nominal protection based on the 1968 nominal protection rates and observed changes in domestic prices relative to export and import prices.

8. Chenery (1960, 1962) was the first to employ this type of analysis. Our decomposition is closer to that employed by Lewis and Soligo (1965), however. They define

import substitution in relation to total demand, including exports. Their definition is appropriate if the level of aggregation is such that there is considerable reexport activity within broadly defined sectors. Since we are working with highly disaggregated data, the "reexport" specification is incorrect.

9. Details are available from the authors on request.

10. See Fane (1971).

11. These categories were employed in Balassa and Associates (1971).

12. Chenery has subsequently revised the regressions presented in the papers cited; the latest set of regressions, communicated privately to the authors, have been used here to estimate normal structural shares.

13. Total domestic resources are equal to GNP plus imports minus exports.