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Chapter 10

The Foreign Exchange Regime and Resource Allocation

Any foreign exchange regime can have a substantial effect on the allocation of resources.[1] Protective tariffs encourage the movement of resources into import substitution industries rather than into export industries or into strictly domestic production. The exchange rate also influences the allocation of resources. When overvalued, it discourages investment both in export and in import-substituting industries and makes investment in domestic enterprise (i.e., nontradables) more attractive. In time, however, an overvalued currency leads to balance of payments pressure, which in turn prompts restrictions on imports. Controls on the use of foreign exchange, quantitative controls on imports and multiple exchange rates are some of the techniques available to government and all of them have substantial effects on investment incentives and the allocation of resources.

It is difficult to determine whether the changes in the structure of prices and incentives caused by the foreign exchange regime lead to more or less efficiency in resource allocation. Much of the literature on trade and development presumes that any substantial deviation of the exchange rate from a unified equilibrium rate, large deviations in effective tariffs, and all import controls cause resources to be allocated inefficiently. According to this view, world prices of tradable commodities reflect the true opportunity costs of producing them. Thus tariffs, controls, and multiple exchange rates, which distort world market prices, lead to inefficiencies.

There are many reasons to question this view. The protection of infant industry, the need to raise revenues from tariffs, and the ability to achieve social and political goals through manipulation of the price mechanism argue

in favor of some divergence between world market and domestic prices. World market prices, however, provide a standard by which the effects of the foreign exchange regime on resource allocation can be appraised. Large divergences from world market prices suggest the possibility, when other justifications are lacking, that allocation of resources is inefficient.

STANDARD MEASUREMENT TECHNIQUES

A simple measure of the divergence between world market and domestic prices is the legal tariff. If foreign supply is perfectly elastic, and if imports are free from quantitative controls, and if domestic demand for a protected commodity is great enough to sustain imports despite the extra cost, then the legal tariff is both equal to and the cause of the divergence between world market and domestic prices. In Korea, however, the legal tariff is seldom a good measure of this discrepancy. First, quite a number of commodities are exempt from duties, particularly intermediates imported for use in the production of exports. Many capital goods are exempted from legal tariffs as well. Second, a number of tariffs are virtually prohibitive, so that many commodities are not imported. Domestic production is sufficient to satisfy local demand at or below the world market price plus tariff. In these two cases, the legal tariff overstates the actual degree of protection. Third, many imports are subject to controls. The domestic price of such commodities can be higher than the world market price plus tariff if the demand at that price exceeds the amount of imports the quota allows.

For our study of protection in Korea it was thus necessary to compare world market and domestic prices directly. The divergence between the two can be expressed as a percentage of the world price:

$$t_n = \frac{pd - pw}{pw} \tag{10–1}$$

where pd is the domestic price of a commodity and pw is the world market price.[2] We call t_n the rate of nominal protection or nominal tariff rate to distinguish it from the legal tariff rate.[3]

Neither legal nor nominal tariff rates provide clear indications of how tariffs or quantitative restrictions divert resources. A much better measure is the rate of effective protection, because it takes into account the intermediates required for production along with primary factors. Effective rates of protection measure protection in relation to the returns to primary factors engaged in separate processing activities. When intermediate inputs are traded, protective measures influence resource allocation according to their effect on

factor returns in various processing activities. For example, if the value added in automobile assembly is only 10 percent of the total value of the car, and if imported automobile parts are free of duties and QRs, while the tariff on the final product is 100 percent, then the effective incentive to assemble automobiles is exceedingly high. For the effective rate of protection would be not 100 percent but 100/(.10) or 1000 percent.

The general formula for the effective rate of protection, t_{ej}, for activity j is: [4]

$$t_{ej} = \frac{p_{dj} - \Sigma_i a_{ij} p_{di}}{p_{wj} - \Sigma_i a_{ij} p_{wi}} - 1, \tag{10–2}$$

or

$$t_{ej} = \frac{p_{wj}(1 + t_{nj}) - \Sigma_i a_{ij} p_{wi}\ (1 + t_{ni})}{p_{wj} - \Sigma_i a_{ij} p_{wi}} - 1 \tag{10–3}$$

$$= \frac{t_{nj} p_{wj} - \Sigma_i a_{ij} t_{ni}\ p_{wi}}{p_{wj} - \Sigma_i a_{ij} p_{wi}}$$

where p_{dj} is domestic price of commodity j, p_{wj} is its world market price, a_{ij} is the input-output coefficient giving the input of commodity i per unit of output of commodity j, and t_{ni} is the nominal protection rate for commodity i. The effective rate of protection is the percentage difference between domestic value added—the numerator of the first term on the right-hand side of (10–2) —and value added in world market prices—the denominator of the first term on the right-hand side of (10–2). Equation (10–3) shows that the effective rate of protection may also be expressed in terms of rates of nominal protection on commodity j and the rates of protection on all the inputs into commodity j. For example, if the rate of nominal protection on all inputs is zero (i.e., $t_{ni} = 0$ for all i), then the effective rate of protection is merely the tariff rate divided by value added at world market prices. The higher the rate of protection on inputs i relative to the rate of protection on output j, the lower the rate of effective protection.

This formula assumes that all intermediate inputs are tradable, so that protection affects only factor rewards in the specific processing activity. When the existence of nontradable intermediate inputs is admitted, it becomes somewhat unclear whether protection affects only the factor rewards in the primary processing activity or those in the domestic industries producing nontradables as well. Two conventions have grown up to compute effective protection where there are nontradable inputs. Under the Balassa convention, protected value added includes only that in the specific processing activity (see Balassa and Associates [1971]). Corden (1971) proposed an alternative formulation that takes into account the indirectly generated value added in those domestic in-

dustries which supply nontradable commodities. His argument is that protection affects the factor rewards in the domestic nontradable sectors as well. Thus one should measure the effective incentive to domestic resources in both the final processing stage and in those industries which supply nontradable inputs. The Corden measure of effective protection is the percentage deviation between the value in domestic prices and that in world market prices of the value added generated directly in the production of commodity j and indirectly in the production of nontradable inputs into commodity j. One must invert that part of the input-output matrix referring to nontradable goods to perform the Corden calculation.[5]

The interpretation of effective incentives as we have measured them is not straightforward, for it is not clear whether a high incentive rate is indicative of a high level of incentives (i.e., high excess profits) for factors to move into a particular activity, or a high degree of inefficiency (i.e., wasteful use of all resources used) in the production of a commodity, or a combination of both. High tariffs and other forms of protection may encourage some small efficient producers to expand beyond an efficient scale. Excess profits of the marginal producers may be eliminated, but inframarginal producers may be reaping profits in the form of producers' surplus. If domestic demand is limited, however, the excess profits may remain for all producers. On the other hand, the protected industries may be high-cost industries at all levels of output so that no excess profits are made by any producers. Similarly, low or negative effective incentive rates may indicate factor rewards below their opportunity costs or a high degree of efficiency. "High" and "low" in this context are to be understood in relative terms rather than as absolute magnitudes.

Furthermore, effective protection rates may not even indicate the direction in which resources will tend to flow in response to incentives. If this is generally true, the interpretation of effective protection becomes even more difficult.[6]

EXTENSIONS AND VARIATIONS USED IN MEASURING PROTECTION

An important refinement made here is the notion of effective subsidy in contrast to effective protection. Subsidies in the form of income tax exemptions, accelerated depreciation, and special low interest rates to finance specific activities are not included in the usual measures of effective protection, even though such subsidies may provide particular sectors with substantial incentives. Therefore, we have calculated rates of effective subsidy as well as rates of effective protection. Subsidies affecting direct tax and interest liabilities do not change value-added at world market prices; they do, however, affect the

composition of value-added and profits after taxes. These subsidies are incorporated into a measure of effective subsidy in the following way:

The total direct tax liabilities of all firms were reapportioned to each sector on the basis of its share in the total tax base; i.e., we assumed that each firm would have paid the average tax rate on its net income under a neutral tax policy. The difference between the reapportioned tax liability and a sector's actual tax liability is the estimated tax subsidy. The subsidy could, therefore, be negative as well as positive, depending upon whether the sector actually paid a higher or lower tax rate than the average; the algebraic sum of all estimated tax subsidies is zero.

Interest subsidies were determined in analogous fashion. To compute the interest that would be paid under a neutral credit policy, we assumed that all sectors paid the same average interest rate on outstanding loans, that rate being determined as the ratio of total interest payments by all sectors to total loans outstanding. The interest subsidy to a sector is thus the difference between total interest payments at the average interest rate and the actual interest payments of a sector. The algebraic sum of all interest subsidies is zero.

Total direct tax and interest subsidies were added to value added in domestic prices.[7] This adjusted value added is divided by value added at world market prices, and the ratio (minus one) is the effective subsidy rate. Since the sum of all subsidies is zero, the weighted average of all effective subsidy rates is equal to the weighted average of all effective protection rates, where the weights are world market price value added.

Another important extension in this study is to calculate two separate rates of protection or subsidy, one applying to domestic sales, the other to export sales. Prices to the producer of both outputs and inputs are quite different for production for export. Specifically, exports particularly benefited from the following types of preferential treatment in addition to direct tax and interest subsidies:

(1) export production was completely exempt from indirect taxes on both inputs and output;
(2) imports of both intermediate and capital goods for export production were tariff exempt;
(3) exports received an additional subsidy for inputs in the form of a wastage allowance; [8]
(4) a number of export sectors paid subsidized rates for railroad transport and electricity.

All of these factors changed the prices paid for inputs used to produce exports and were taken into account in calculating the effective incentive rates for exports. In addition, exports were frequently priced below the domestic market price. One reason for this difference might be that exported commodities

were of lower quality than those consumed domestically. But a more likely explanation is that monopolies or cartels among producers, sustained by import quotas and tariffs, enforced discriminatory pricing. Finally, most tax and interest subsidies apply to production for export but not to production for domestic sale. All of the export incentives described in chapters 3 and 6 that were in effect in 1968 were incorporated in our estimates, except for import prepayment deposits and the implicit export-import link subsidy. Both of these measures were quantitatively unimportant in 1968. We should also note that special incentives to emergent import-substituting activities were taken into account as well.

In total, a number of distinct measures of effective protection and subsidy rates were calculated for Korea for 1968. Effective protection and subsidy rates were calculated by both the Balassa (see Balassa and Associates [1971]) and Corden methods. In both cases, depreciation is deducted from value added. Estimates of effective incentives were obtained separately for export and domestic sales.

THE DATA BASE

Our estimates are based on 1968 domestic and world-market prices, 1968 trade and output flows, and input-output coefficients from a 1966 input-output table. A synthetic input-output table for 1968 derived from the 1966 table is available. However, we believe that the double-deflation and trend extrapolation method used to estimate the 1968 coefficients yields unreliable estimates. We prefer to use the 1966 coefficients in the belief that they are better estimates of the 1968 coefficients than those of the extrapolated 1968 table.

The 1966 table contains 299 producing sectors. The table was aggregated to 160 sectors, of which 150 are tradable-goods-producing sectors. Effective rates of protection and subsidy were calculated for these 150 sectors separately.

The 150 tradable goods sectors were further aggregated in two different ways: (1) by eleven industrial groups, and (2) by four trade categories, namely export industries, import-competing industries, industries that export and are also import-competing, and industries that are neither export oriented nor import-competing (the latter industries called non-import-competing industries). Details of these industrial classifications appear in Table 6–6 and the accompanying text.

Data on world market prices and domestic prices were obtained by means of a survey.[9] A list of commodity groups for which price comparisons were to be made was prepared from the Bank of Korea's 1966 input-output data tabulated at the level of 2,000 commodity groups (comparable input-output information for 1968 was not available). Of the 2,000 groups, price

observations were obtained for selected commodities in 365 of them, which in total accounted for 70.8 percent of aggregate commodity domestic sales and 78.2 percent of commodity exports in 1966. The principal criterion for selecting a commodity group for inclusion in the survey was that it had a relatively large share in sectoral output. Priority was further given to non-import-competing commodity groups, to products subject to quantitative restrictions, and to export commodities.

The major sources of domestic price information were individual producers, producers' associations such as the Korea Chamber of Commerce, and various government agencies including the Ministry of Finance, the Economic Planning Board, the Bank of Korea, and the Korea Development Bank. Export and import prices for those commodities actually exported or imported were obtained from domestic records of the transactions. Export prices were not estimated for other commodities. For commodities not actually imported in 1968, import prices were estimated from Korea's export price (if relevant) or, in a majority of the cases, from wholesale prices (exclusive of indirect taxes) in Japan and, less frequently, in the United States. A single price comparison was obtained for a majority of the commodity groups; however, in a number of cases, comparative price information for several commodities within a commodity group was collected.

All world market prices are stated c.i.f., this being the appropriate basis for determining protection of sales on the domestic market. Domestic prices are ex-factory f.o.b. net of indirect taxes.

Other data required to compute effective rates of protection and subsidy included rebates on overhead charges (electricity and rail transport), indirect tax rates and exemptions, legal tariff rates and exemptions on imported inputs, wastage allowance rates, direct tax credits and reductions, and interest rates actually paid. These data were collected from published sources where possible and through the cooperation of various Korean government agencies. Tariff rates include those intended to soak up excess profits on imports subject to quantitative restrictions. Estimates of wastage allowance subsidies, which could not be obtained directly from government, were pieced together from other sources.

NOMINAL RATES OF PROTECTION AND QUANTITATIVE RESTRICTIONS

The 1968 price data gathered from the survey for the most part followed the pattern expected. In some cases the price data on domestic and foreign sales exhibited peculiar characteristics. Differences in quality between domestic and foreign products explained some of these peculiarities, and errors that

usually accompany this kind of price data may have accounted for others. In cases where domestic and foreign price comparisons indicated that these factors seemed to be involved, adjustments were made in the data where appropriate. The information used to make the adjustments included (1) the relationship between the price difference as shown by the survey and the legal and actual tariff rates; (2) the relative importance of exports and imports within the commodity group; (3) the type of import control imposed on the commodity.

Domestic prices of imported products generally exceeded world prices. Where they did not, the lower domestic price usually reflected poorer quality. There were some exceptions, however. Negative nominal protection for all petroleum products, the most notable example, is explained by government controls. All crude petroleum is imported and refined domestically in a regulated industry. Local petroleum prices provide substantial subsidies to domestic consumers.

As mentioned above, among goods for which both export and import prices were available, export prices tended to be lower than import prices. This can be explained by quality differences or market imperfections.

Goods primarily for export exhibited three different patterns. First, the export price of primary products tended to be higher than the domestic price. Because this is not possible in perfectly competitive markets, except where government controls on exports appear to cause differential pricing, we assumed that in most cases the difference stemmed from the inferior quality or packaging of the domestic product. Ginseng (a medicinal root) and dried seaweed, however, are special cases, because exports of both are controlled by the government. The only commodity for which we could find evidence of an export tax was ginseng, where the nominal rate of protection on both domestic and export sales was negative. A government monopoly buys up the entire ginseng crop at harvest and sells it at home and abroad for a much higher price than what it pays the farmer. The export price of dried seaweed is higher because almost all of it goes to Japan; the price is negotiated by the Korean and Japanese governments. In contrast to its involvement in the ginseng trade, the government acts only as a sales agent in the export of seaweed.

In the second pattern exhibited by export commodities, export prices tended to be the same as domestic prices. Exports conforming to this pattern included both primary and manufactured products.

The third pattern, which mostly applied to manufactured products, showed the domestic price substantially higher than the export price. This might be explained in a number of ways. Many of these commodities, particularly textiles, earn large tariff duty remissions and tax breaks for export sales. But when they are sold locally, they are subject to these duties and taxes. Consequently, export and domestic prices are bound to differ. In some cases,

however, pricing may have been noncompetitive and discriminatory. Negotiations between the government and exporters' associations set export quotas firm by firm and the size of export subsidies. By acting through manufacturers' associations in the domestic market, the exporters may have been able to form a cartel for the restriction of sales.

Nominal protection estimates gauge the relative importance of quantitative restrictions in 1968. Since nominal protection seldom exceeded the legal tariff, it is tempting to conclude that QRs added little to the protection provided by the tariff structure. However, to make this conclusion valid, it is necessary to separate the regular tariff from the special tariff which in many instances was used to mop up the scarcity premiums resulting from the QRs. Recall that the legal tariff rate was composed of two elements: the regular rate which was legislated and the special rate which was administered.

Special tariffs were imposed on 123 commodity groups (out of a total of 365) within the sample; these accounted for 13.7 percent of total domestic sales within the sample.

The weighted-average special tariff on the 116 manufacturers subject to it was 9.8 percent compared with a legal tariff rate of 83.9 percent.[10] Thus the special tariff played a relatively modest role in the protection system, at least for manufactures.

Among primary products, the weighted-average special tariff rate on the seven commodities subject to it was 207.1 percent. This result, however, was dominated by red pepper for which the special tariff was 217 percent. Without red pepper the weighted average of the special tariff for primary products was 80.2 percent compared with a legal tariff rate of 81.1 percent. Thus QRs had more effect on primary products than on manufactures.

Final judgment on the importance of QRs rests on a comparison of nominal protection with the *regular* tariff rate (i.e., excluding the special tariffs). The following estimates are weighted averages over all commodities for which nominal protection exceeded the *regular* tariff rate:

Trade Category	Number of Commodity Groups	Nominal Protection Rate	Regular Tariff Rate
X	5	64.9%	56.5%
NIC	46	66.2	26.9
IC	22	41.5	18.0
XIC	4	98.6	38.7
All	77	62.6	26.6

Except for the commodity groups in the export category, QRs did afford some commodities significant additional protection. The major groups so

protected include barley and wheat, red pepper, chickens, worsted yarn, steel sheet and wire rod, wire and cable, cotton shirting, several chemical products including synthetic staple fiber, and several metal products including tools. These 77 commodity groups, however, accounted for only 11.4 percent of total domestic sales within the sample, so that in total effect, QRs were relatively unimportant, even though they were imposed on competitive imports in the markets for commodities representing 75.6 percent of all domestic sales in the sample. (That figure, however, represents a biased estimate of the imposition of QRs relative to total domestic sales, for a commodity group's inclusion in our sample was based, in part, on the imposition of QRs.)

AVERAGE PROTECTION

The average levels of incentives for agriculture, mining, and manufacturing are summarized in tables 10–1 and 10–2. The averages of legal and nominal protection are weighted by domestic sales volumes in world market prices, while those for effective protection and subsidy are weighted by value-added in world market prices. The results are striking in a number of ways.[11]

First, nominal rates of protection are well below legal tariff rates, which indicates considerable tariff redundancy. Tariffs are particularly redundant in manufacturing, where the average legal rate of protection was 58.8 percent and the average nominal rate was 10.7 percent (Table 10–1), compared with agriculture and mining where the spread is much narrower. Tariff redundancy

TABLE 10–1

Average Incentive Rates by Major Industry Grouping, 1968

(percent)

	Agriculture	Mining	Total Primary	Manufacturing	Total
Average legal protection	36.0	9.6	34.1	58.8	49.4
Average nominal protection	16.6	6.9	15.9	10.7	12.6
Average effective protection					
Balassa	18.1	2.9	17.1	−0.9	9.9
Corden	17.5	2.5	16.4	−0.7	8.4
Average effective subsidy					
Balassa	22.1	4.7	20.9	−6.5	10.0
Corden	21.3	4.1	20.1	−4.7	8.5

SOURCE: All tables in Chapter 10 are drawn from Annex tables 2.A through 2.C, Westphal and Kim (1974).

TABLE 10–2

Average Incentive Rates in Manfacturing by Trade Category, 1968

(percent)

	Export Industries	Import-Competing Industries	Non-Import-Competing Industries	Export & Import-Competing Industries	Total
Average legal protection	53.7	55.4	64.1	46.3	58.8
Average nominal protection	5.2	31.6	5.0	23.1	10.7
Average effective protection					
Balassa	−10.7	91.7	−16.1	45.2	−0.9
Corden	−8.1	50.2	−12.4	28.7	−0.7
Average effective subsidy					
Balassa	−13.4	90.7	−23.7	37.9	−6.5
Corden	−10.2	49.6	−18.2	24.1	−4.7

NOTE: Trade categories are defined in Chapter 6.

within manufacturing was greatest in the export industries and the non-import-competing industries (Table 10–2). In the export and non-import-competing industries, the nominal tariff was only about one-tenth of the legal tariff; while in the import-competing sectors, the implicit tariff was more than 50 percent of the legal tariff. Given that quantitative restrictions played a relatively minor role, tariff redundancy was natural in industries where there were few imports.[12] The overall level of tariff redundancy in Korea is thus very high for three reasons: many tariffs, though relatively low in absolute magnitude, are prohibitive; exemptions and reductions of tariff levies are common; and because much of Korean industry is export oriented, even though protected by tariffs on the domestic market.

Second, agriculture is much more highly protected than mining or manufacturing. Average nominal protection is 16.6 percent for agriculture, 10.7 percent for manufacturing, and only 6.9 percent for mining. The difference in effective protection between major industries is even larger. By the Balassa measure, for example, the average rate of effective protection for agriculture is 18.1 percent, only 2.9 percent for mining, and a negative 0.9 percent for manufacturing. More protection for agriculture than for manufacturing is very unusual in other countries.

Third, the average level of protection and subsidy is quite low in Korea compared with other countries, because the exchange rate in 1968 was not greatly overvalued. The level of protection for manufacturing is especially low, a negative 6.5 percent according to the Balassa measure of effective subsidy. The average level of effective protection for all sectors is only about 10 percent.

The low level of protection for manufacturing is partly influenced by the inclusion of processed food and beverages and tobacco in the manufacturing sector (the line dividing processed food, in particular, from primary production is quite arbitrary, for much of the food processing is done in the primary sector). If these are excluded, the level of incentives to manufacturing increases. The average effective subsidy rate is no longer negative, but slightly positive (less than 1 percent). It nonetheless remains well below the average for the primary, processed food, and beverage and tobacco sectors taken together.

INCENTIVES TO DOMESTIC AND EXPORT SALES

Differential rates of effective protection for and subsidy to domestic sales compared with export sales are summarized in tables 10–3 and 10–4. Table 10–3 shows that in every industrial sector, except intermediate products I and transport equipment, effective *protection* for export sales is negative. The large positive effective protection for intermediate products I is due almost entirely to plywood, which receives substantial protection through the wastage allowance on imported roundwood. Wood is extremely scarce in Korea and imports are controlled. Plywood manufacturers are given generous wastage allowances for export production so that they have substantial excess wood which they can sell domestically or process into goods for domestic sale.

Table 10–4 also indicates a pattern of low and negative effective protection for exports. The rate of protection for the export sales of export industries (X) is slightly positive, while for all other industries it is negative. This difference, however, is again due to plywood. Exclude plywood and the average level of protection becomes negative.

The basic reason for the near zero or negative rates of protection for export sales is that exporters purchase tradable intermediate inputs at world market prices, just as they sell their products at world market prices. Imported inputs are automatically purchased at world market prices, since for exporters they are duty free. Inputs purchased domestically are not more expensive than comparable imports, otherwise they would have been imported. Thus exporters operate, so far as commodities are concerned, at world market prices. For nontradable, domestically produced inputs, however, *nominal*

TABLE 10–3

Effective Protection for and Subsidy to Export and Domestic Sales by Industry Group, 1968

(percent)

Industry[a]	Balassa Measure			Corden Measure		
	Export	Domestic	Average	Export	Domestic	Average
Effective Protection						
Agriculture, forestry, and fishing	−16.1	18.5	18.1	−15.3	17.9	17.5
Processed food	−2.7	−18.2	−17.0	−2.2	−14.2	−13.3
Beverages and tobacco	−1.9	−19.3	−18.6	−1.7	−15.5	−15.0
Mining and energy	−1.0	4.0	2.9	−0.9	3.5	2.5
Construction materials	−5.2	−11.5	−11.3	−3.9	−8.8	−8.6
Intermediate products I	31.0	−25.5	−19.5	18.6	−18.8	−14.0
Intermediate products II	−0.2	26.1	24.2	−0.2	17.4	16.1
Nondurable consumer goods	−1.9	−10.5	−8.5	−1.4	−8.0	−6.5
Consumer durables	−4.7	64.4	51.0	−3.0	39.8	31.8
Machinery	−12.7	44.2	42.9	−4.6	29.5	28.0
Transport equipment	53.1	163.5	163.9	−13.1	83.2	82.7
Effective Subsidy						
Agriculture, forestry, and fishing	−9.9	22.5	22.1	−9.4	21.7	21.3
Processed food	2.3	−25.2	−23.0	1.8	−19.6	−18.0
Beverages and tobacco	14.5	−25.8	−24.2	12.6	−20.8	−19.5
Mining and energy	3.0	5.1	4.7	2.7	4.5	4.1
Construction materials	5.9	−16.9	−15.9	4.4	−12.9	−12.1
Intermediate products I	43.4	−29.7	−21.9	26.0	−21.9	−15.7
Intermediate products II	17.5	19.6	19.5	11.6	13.1	13.0
Nondurable consumer goods	5.4	−20.6	−14.7	4.1	−15.7	−11.2
Consumer durables	2.4	38.2	31.3	1.5	23.6	19.5
Machinery	5.2	31.5	30.9	1.9	21.0	20.2
Transport equipment	−22.8	158.7	159.1	−5.6	80.8	80.3

a. Industrial groups are defined in Chapter 6.

protection is positive. This makes the *effective* protection for the *output* for export of some industries slightly negative.[13] For other industries, effective protection is slightly positive because wastage allowance subsidies and utility rebates outweigh nominal protection for nontradable inputs. Most wastage allowance subsidies, about one-half of the total, go to plywood manufacture.

TABLE 10–4

Effective Protection for and Subsidy to Export and Domestic Sales in Manufacturing by Trade Category, 1968

(percent)

Trade Category[a]	Balassa Measure			Corden Measure		
	Export	Domestic	Average	Export	Domestic	Average
Effective Protection						
Export industries (X)	4.6	−18.0	−10.7	3.4	−14.0	−8.1
Import-competing industries (IC)	−8.6	93.1	91.7	−3.9	51.1	50.2
Non-import-competing industries (NIC)	−0.8	−16.4	−16.1	−0.7	−12.6	−12.4
Export and import competing industries (XIC)	−2.1	72.8	45.2	−1.4	46.1	28.7
All manufacturing industries	3.1	−1.4	−0.9	2.2	−1.1	−0.7
Effective Subsidy						
Export industries (X)	13.5	−26.2	−13.4	9.8	−20.4	−10.2
Import-competing industries (IC)	35.3	91.4	90.7	15.8	50.2	49.6
Non-import-competing industries (NIC)	6.1	−24.3	−23.7	5.0	−18.7	−18.2
Export and import-competing industries (XIC)	8.7	55.0	37.9	5.6	34.8	24.1
All manufacturing industries	12.4	−8.9	−6.5	8.9	−6.5	−4.7

a. Trade categories are defined in Chapter 6.

Thus except for plywood and some minor exports, effective protection for export sales tends to be close to zero or negative.

In striking contrast, effective subsidy to exports is positive among all industries except agriculture and transport equipment (see Table 10–3). When industries are grouped by trade category (see Table 10–4), the rates of subsidy for their export sales are positive in all categories. This clearly demonstrates the overwhelming importance of tax and credit preferences for exports in the total system of export incentives.[14] Just as tax and interest preferences raised effective incentives to export sales, they lowered them to domestic sales except in agriculture where virtually no direct taxes were levied. Tax rates were also below average in mining and energy. The average level of effective

subsidy to all manufactured export sales is 12.4 percent, and to domestic sales, −8.9 percent. A bias in favor of export sales is rarely encountered in the incentive systems of developing countries, and this makes the Korean case all the more unusual. This bias is even greater than the 12.4 percent subsidy to exports, since the effective incentives to domestic sales were negative.

The rank correlation coefficient between *effective protection* and *effective subsidies* (Balassa measure) on sales to the export market is only .15, which is barely significant at the .05 level. Thus the major explicit incentives to export activity not only came from credit and direct tax preferences, but these policies also had a powerful influence on the inter-industrial structure of export incentives. The rank correlation between these measures on sales to the domestic market, however, is .95. The major incentive policy addressed to production for the domestic market was the structure of nominal protection rates, and therefore estimates of effective protection are reasonably good predictors of the net effect of all policy instruments operating within the protected domestic market. There is virtually no correlation between effective subsidies to export sales and to domestic sales; there is thus no stable overall relationship between the incentives offered a sector for its domestic sales and those for its exports.[15]

In the industrial sectors classified as export and import-competing (XIC), and in the import-competing sector (IC), the incentive was much higher to domestic sales than to exports, while in the export (X) and non-import-competing (NIC) sectors the reverse was true. The explanation for this marked difference appears to be the way in which newer export commodities are often promoted through linking highly profitable domestic sales to satisfactory export performance by individual producers. High levels of protection for the domestic market should thus be interpreted as an incentive to export various goods, for example certain kinds of textile products, fertilizers, and electrical products. Most of these products appear in the former two classifications.

Relative incentives are somewhat different in the primary product industries, where incentives are lower for export sales in general than for domestic sales. The average effective subsidy rate for exports of primary products was −2.7 percent and for domestic sales it was 21.6 percent. The bias against exports is particularly marked in agriculture. However, the effective subsidy rate for exports in nearly all the export mining sectors was positive and for domestic sales it was negative.

VARIABILITY IN RATES OF PROTECTION

Table 10–5 displays frequency distributions for various measures of incentives at the 150-sector level. The degree of dispersion increases as the measure

of protection includes more of the incentive policies. That is, legal tariff rates have the least dispersion, nominal protection rates have more, effective protection rates even more, and effective subsidies the most dispersion.

Rates of effective protection are subject to some extreme values, ranging from −18404.7 percent to +1929.1 percent.[16] The extremes occur in those sectors that have a near zero value-added in world market prices. Errors of measurement and aggregation can easily lead to extreme values when value added is near zero. To remove the effects of the extreme values, all sectors having a protection or subsidy rate greater than 500 percent on either the Balassa or Corden measure were eliminated from the sample and a coefficient of variation (unweighted) was calculated for the reduced sample. The coefficient of variation for the Balassa effective protection rate dropped from 36.7 to 3.2, but the relative ranking of the various measures of variability remained the same except that between the Corden and Balassa measures of protection. Over the entire set of sectors, the Corden rates vary less than the Balassa rates, largely because the Corden measure defines value added in world market prices more inclusively. As a result, there is less tendency toward extreme values, since value added in world prices is greater in absolute value. The variability in export protection was much less than for domestic protection or subsidy. For the reduced sample, export variability was still less but not significantly so.

Effective protection and subsidy rates are more variable than legal and nominal protection rates because the value-added denominator of the former is substantially smaller than the value-of-output denominator of the latter and not because of an escalation of nominal rates at higher processing stages. Average nominal protection for inputs is larger than nominal protection for output in most industrial groups. The only one of the eleven groups in which there was any marked escalation of protection was transport equipment. At the 150-sector level, there were numerous instances of both positive and reverse escalation of nominal protection, though reverse escalation predominated.[17]

Table 10–6 lists the 20 (of the 150) sectors that had the highest rates of effective protection for domestic sales. For the most part, these high rates of protection arose because of low value-added at world market prices, i.e., high nominal protection of the output and low nominal protection of the inputs. In some cases, the high rates of protection can be traced to a single commodity group within the sector and do not characterize the sector as a whole. For example, the high rate for vegetables reflects a high rate of protection for just one vegetable, red peppers, but this vegetable nevertheless accounts for a large portion of the average Korean food budget.

Most of the highly protected sectors are import-competing or both export and import-competing industries. In nine cases, value added in exports at the prices received and paid by the producer (i.e., domestic prices) is negative

TABLE 10–5

Frequency Distributions of Incentives Measures in 150-Sector Sample

Value in Percent: Greater Than or Equal to	Less Than	Legal Tariff	Nominal Protection	Effective Protection: Balassa Export	Balassa Domestic	Balassa Average[a]	Effective Protection: Corden Average[a]	Effective Subsidy: Balassa Export	Balassa Domestic	Balassa Average[a]	Effective Subsidy: Corden Average[a]
−∞	−100			1	6	6	1	2	7	6	1
1000	∞				3	3	2		3	3	2
500	1000				5	4	1	1	4	5	
200	500	1			5	5	3	2	6	5	5
150	200				3	4	4		4	4	4
100	150	12	2		8	8	8	1	6	5	9
90	100	9	2		2		2	6	1	2	1
80	90	10	1		1	2	4	1	3	1	2
70	80	10	3	1	1	1	2	1	3	4	1
60	70	9	1		4	5	5	2	3	3	3
50	60	12	8		4	3	2	1	1	1	4
40	50	16	8		2	2		2	4	5	4
30	40	13	7	1	4	4	5	2	2	2	2
20	30	21	19	2	6	4	7	12	5	5	7
10	20	6	25	2	11	13	14	16	10	11	14
1	10	18	31	16	13	15	19	41	16	17	20
−1	1	13	39	17	1	2	3	13	1	3	3
−10	−1			87	21	23	29	26	9	13	21

−1	1	13	39	17	1	2	3	13	1	3	3
−10	−1			87	21	23	29	26	9	13	21
−20	−10		1	13	20	19	24	13	21	20	23
−30	−20		1	2	14	15	6	4	16	16	15
−40	−30		1	2	5	4	5	1	11	11	4
−50	−40		1	4	6	5	2	2	6	4	2
−60	−50				3	1			3	1	1
−70	−60			1	1	2	2		3	2	2
−80	−70							1	1	1	
−90	−80										
−100	−90			1	1				1		
Over entire sample											
Simple average		49.2	18.1	−3.5	−66.1	−31.1	23.7	10.5	−115.4	−29.6	21.8
Coefficient of variation[b]		.8	1.4	5.2	23.2	36.7	13.3	9.1	13.9	37.5	13.4
Over reduced sample[c]											
Simple average		48.0	13.1	−3.5	20.8	20.2	10.3	11.4	14.1	15.9	7.7
Coefficient of variation[b]		.8	1.4	3.2	3.3	3.2	3.7	3.5	4.7	4.0	5.1

a. These columns refer to weighted average effective incentives where weights are value added at world prices in domestic sales and export sales.

b. Coefficient of variation, standard deviation divided by the mean.

c. Excludes those sixteen sectors for which one or more measures of effective incentives exceeds 500 percent or for which value added in world market prices is negative.

TABLE 10–6

Sectors Having High Effective Protection for Domestic Sales, 1968

(percent)

Sector	Negative Value Added	Effective Subsidy Rate	Effective Protection Rate	World Price Value-Added Coefficient	Nominal[a] Input Protection	Nominal Protection on Output
Vegetables		150.4	139.7	.59	19.6	91.0
Raw salt		113.9	133.1	.59	28.8	90.3
Worsted and woolen yarns	b	333.8	383.2	.08	31.0	60.4
Cotton fabrics		176.2	169.5	.11	11.1	27.9
Silk fabrics		233.8	260.6	.19	17.5	64.3
Synthetic dyes	c	141.4	136.7	.20	32.1	53.3
Paint and printing ink		145.9	144.8	.27	39.3	67.8
Steel sheet and bars	c	131.9	138.7	.12	13.0	28.6
Steel pipes	d	−3186.6	−3417.7	−.02	34.6	110.6
Galvanized and plated steel	c	160.7	127.0	.15	27.8	42.6
Insulated wire and cable	e	1463.1	1654.8	.03	29.8	76.3
Measuring instruments		114.9	120.6	.37	26.7	61.1

Insulated wire and cable	e	1463.1	1654.8	.03	29.8	76.3
Measuring instruments		114.9	120.6	.37	26.7	61.1
Photographic materials	f	1228.9	1274.6	.06	22.8	100.4
Household electronic equipment		68.5	114.0	.38	46.0	72.1
Electric appliances	f	449.0	558.9	.15	35.8	113.5
Watches and clocks		152.0	160.2	.29	36.1	71.7
Machinery components		114.6	127.2	.33	30.2	62.0
Transformers		195.8	225.2	.26	38.3	87.6
Railroad equipment	f	204.8	202.4	.09	39.7	55.1
Motor vehicles	f	241.8	247.7	.23	44.0	90.0

NOTE: All protection and subsidy rates pertain to sales on the domestic market and are based on the Corden convention.

a. Nominal input protection = $\frac{\Sigma_i t_{ni} a_{ij}}{\Sigma_i a_{ij}}$ in the notation used in equations (10–2) and (10–3).

b. Value added negative for exports at world market prices, Balassa measure only.

c. Value added negative for exports at both world market and domestic prices, Balassa measure only.

d. Value added negative for all sales in world market prices and export sales in domestic prices, both Balassa and Corden measures.

e. Value added negative for all sales in world market prices with Balassa measure, for export sales only with Corden measure, and export sales in domestic prices.

f. Value added negative for all sales in world market prices and export sales in domestic prices, Balassa measure only.

under the Balassa convention. The implication in these cases, to which we return below, is that exports are sold at a loss. In five cases, total value added is negative in world market prices. We doubt the inference that production in these sectors was absolutely inefficient. Rather, in these sectors world-price value added is very small and slight errors of measurement or aggregation can result in a negative magnitude. Nominal protection rates were estimated from a sample of commodities that was too small to cover the whole range produced in any one of the 150 sectors. Input-output coefficients are aggregates for the whole sector and do not necessarily apply to the specific commodities whose prices were measured.

Exports may in fact be sold at a loss by private producers if export of a particular commodity raises profits on domestic sales, or if, in the more extreme case, exporting makes it possible to gain access to the profitable domestic market. For example, credit availability, import licenses for inputs, and favorable tax treatment were dependent, through government policies, on export performance. In such cases, the true subsidy to exports includes at least a part of the profits realized on the domestic market, for these profits could not be fully realized under the Korean system except by exporting. We have not tried to incorporate this phenomenon in our measure of effective incentives to export sales, though it does show up in the average incentives to the sector's total sales. Of the nine commodities with negative value added for exports in domestic prices, all were well protected in the domestic market. All except photographic materials were import-competing products with exports less than 4.0 percent of output. Photographic materials exports were 20.6 percent of output, but were also import competing.

EFFECTIVE INCENTIVES AND RESOURCE ALLOCATION

If high levels of effective incentives reflect high profit rates, then investment should flow toward those sectors with high effective incentives. This would show up either in rapid import substitution or rapid growth of exports for goods with high levels of effective incentives. On the other hand, if there is no correlation between effective incentives and growth of the ratio of imports to total supply or exports to total production, then effective incentives are more likely to reflect relative inefficiency. Table 10–7 lists rank correlation coefficients between various measures of effective incentives and resource allocation.

Neither the share of exports in total output nor growth contributions of exports are significantly related to effective *protection.* However, export trade shares and growth contributions are significantly and positively related to effective rates of *subsidy*. This result is striking, for it demonstrates the importance of tax and credit preferences among the various export subsidies, and

TABLE 10–7
Rank Correlation Coefficients between Effective Incentives and Resource Allocation

	Share of Exports in Output 1968	Growth Contribution of Exports 1960–68
Exports		
Effective protection to exports		
Balassa	−.16	−.15
Corden	−.13	−.06
Effective subsidy to exports		
Balassa	.29	.26
Corden	.28	.32

	Share of Imports in Total Supply 1968	Growth Contribution of Import Substitution[a] 1960–68
Imports		
Effective protection to domestic sales		
Balassa	.32	−.14
Corden	.32	−.15
Effective subsidy to domestic sales		
Balassa	.40	−.14
Corden	.39	−.15

NOTE: The correlations were obtained at the 117-sector level where time series data on resource allocation are available. Correlation coefficients of greater than .16, .20, and .27 (in absolute value) are significant at the .10, .05, and .01 levels under a two-tailed test.

a. These are the contributions of import substitution to total growth of the sector. See Chapter 6 for an explanation.

suggests that export incentives had a positive influence on the expansion of exports.

Imports prompt the opposite conclusion. Since the correlation between the share of imports in total supply and effective incentives is significant and positive, it suggests that import substitution had progressed the *least* in those sectors where the level of effective incentives to domestic sales was high. The correlations between effective incentives to domestic sales and growth contri-

butions are not significant, though they are negative, which is what we would expect if import substitution had progressed the least in sectors where incentives were large. Thus, effective subsidies to domestic sales seem to indicate relative inefficiencies while effective subsidies to exports seem to indicate profit incentives.

Tables 10–8 and 10–9 present data at the 117-sector level for the major exporting and import-substituting sectors. The exporting sectors within manufacturing are those that contributed more than 1 percent to the growth of manufactured exports between 1960 and 1968. The exporting sectors within the primary group are those that contributed the most to the growth of primary exports. Import-substituting sectors have been identified only within manufacturing and are those that contributed more than 1 percent of the total import substitution contribution to manufacturing ouput growth. Because of rising import shares in other sectors, the import-substituting sectors accounted for well over three times the total import substitution that took place within manufacturing. Some sectors are classified as both major export and major import-substituting, and they are designated in the tables.

The pattern discerned in the correlation analysis does not hold uniformly for the major export and import-substituting sectors; nonetheless some regularity is discernible. Most of the exporting sectors received positive effective subsidies to exports; several received subsidies that were higher than average. The effective subsidy to exports exceeded the subsidy to domestic sales in 13 of the 19 manufacturing sectors (compare the export subsidy rate with the average in Table 10–8). In the other 6 sectors, however, subsidies were biased in favor of domestic sales. Given that exports were sometimes subsidized by linking sales and various preferences in the profitable domestic market to export performance, the export effective subsidy rate in these cases probably seriously understates the incentives to export activity.

Our analysis does not prove that resource allocation was affected by policy or that it was relatively efficient; it merely demonstrates that the available information is reasonably consistent with these contentions. Incentives policies are only one of many forces that determine changes in economic structure. It is therefore somewhat surprising to find any correlation at all in the hypothesized direction. However, we cannot reject the counter-hypotheses that these correlations merely reflect errors of measurement or are meaningless because our data do not really measure what needs to be measured.

FACTOR INTENSITY OF TRADE

It is difficult to assemble evidence about the efficiency of Korea's rapid growth that is conclusive. The preceding analysis demonstrates that the level and dis-

persion of incentives was relatively modest, but it does not prove that resource allocation was efficient. Here we investigate the question of efficiency by using an additional partial measure: the relative factor intensity of Korea's exports and imports. Apart from considerations of natural resource and labor skill endowments, Korea's comparative advantage, at least within manufacturing, should lie in exporting products that are labor intensive and in importing goods that are capital intensive.

Our analysis of the factor intensity of Korea's trade follows the pioneering work of Leontief (1954). Using labor and capital input coefficients at the 117-sector level for 1968, we have calculated the direct as well as the total factor input requirements associated with Korea's exports and imports.[18] Total labor and capital requirements include both direct and indirect labor and capital requirements by sector per unit of production, export, or import. The indirect factor requirements are determined by inverting the input-output table for 1966 at the 117-sector level.

Imports can be treated in two different ways. First, all imports can be classified by one of the 117 sectors and capital and labor requirements calculated as if the imports were produced using the Korean sectoral coefficients. Second, clearly noncompeting imports, i.e., imports not produced in Korea, can be excluded and remaining imports classified by sector.[19] The results reported here include noncompeting imports, except for a few primary products not found in Korea, in the bundle of imports that is considered to be replaced. This procedure facilitates comparisons over time, since the imports considered to be noncompetitive in the compilation of the tables changed from year to year.

In the calculation of the total factor input coefficients, the matrix of intermediate input coefficients includes the requirements for those inputs that were actually imported. Certainly it does not make sense to calculate the factor requirements to replace some imports without also assuming that intermediate imports would also be replaced.[20] If total factor input coefficients for imports and exports are to be consistent, the same input-output matrix must be used in both cases. This does mean, however, that calculation of the total factor input coefficients relating to exports assumes that *all* intermediate input requirements would be produced domestically. Given that some imports of intermediate inputs were related to export production, our calculations overstate the "actual" total factor employments associated with export activity.[21]

For those years for which detailed input-output statistics are available, Table 10–10 exhibits the average direct and total capital and labor ratios for exports and imports of primary and manufactured products separately as well as for total imports and exports (including services and social overhead). For purposes of comparison, the comparable input coefficients for domestic production are also shown.

TABLE 10–8

Effective Incentives to Major Export Sectors, 1968

(percent)

Sector	Share in Total: Export Growth 1960–68	Share in Total: Output Growth 1960–68	Share of Exports in Output: 1960	Share of Exports in Output: 1968	Export Growth Contribution[a]	Effective Subsidy Rate[b]: Export	Effective Subsidy Rate[b]: Average
Primary sectors—Total	2.7	26.4	3.7	2.5	1.2	−2.7	20.9
of which:							
Metallic ores	1.7	.3	67.4	70.5	78.0	2.8	−.1
Nonmetallic minerals	1.0	.9	23.8	15.9	13.6	2.8	−4.2
Industrial crops	1.0	1.7	4.8	6.1	6.8	−39.3	3.5
Fishing	.9	2.7	11.0	6.3	3.7	11.9	1.8
Total for sectors listed	4.6	5.6					
Manufacturing sectors—Total	97.3	73.6	2.6	11.4	15.1	12.4	−6.5
of which:							
Silk yarn	4.4	.6	48.4	83.7	90.1	−5.2	−7.4
Knit products	13.0	1.9	.0	57.8	78.7	3.1	9.8
Misc. metal products	1.4	.2	.8	25.7	74.3	8.4	−1.8
Other fabrics	5.1	.8	.0	36.2	72.8	20.0	1.1
Other manufactured products	8.9	1.5	13.0	59.0	69.0	[illegible]	[illegible]

Misc. metal products	1.4	.2	.8	25.7	74.3	8.4	−1.8
Other fabrics	5.1	.8	.0	36.2	72.8	20.0	1.1
Other manufactured products[c]	8.9	1.5	13.0	59.0	69.0	3.8	21.8
Lumber and plywood[c]	19.3	3.8	.7	42.6	57.6	94.7	−6.6
Processed seafoods	5.1	1.4	17.4	33.6	42.0	−.7	−57.2
Worsted and woolen fabrics	1.1	.3	.2	10.6	39.7	−9.0	−2.3
Apparel and accessories[c]	11.3	3.3	1.1	29.7	39.4	7.9	−24.7
Electronics	3.4	1.0	3.9	37.5	37.6	.3	62.8
Rubber products	3.7	1.2	5.5	22.5	34.0	.6	−44.6
Misc. textile products[c]	2.0	.7	8.5	24.8	32.0	1.8	24.8
Rope and fishing nets[c]	1.3	.5	6.6	22.7	25.9	21.1	−11.8
Slaughtering, meat and dairy products	2.1	1.1	.5	10.0	22.2	28.2	−8.3
Cotton fabrics	2.1	1.1	9.2	15.7	21.7	350.4	298.4
Electric equipment[c]	1.2	.7	6.4	19.9	20.8	22.9	155.5
Cement[c]	1.4	1.7	1.2	8.2	9.2	7.1	−13.4
Processed tobacco[c]	2.3	4.5	.1	4.5	5.9	18.5	−38.8
Petroleum products[c]	1.9	6.1	.0	3.7	3.7	2.1	−69.8
Total for sectors listed	91.0	32.4					

a. Sectors appear in order of the contribution of exports to their growth; see Chapter 6 for an explanation.
b. According to the Balassa convention.
c. Both a major export and a major import-substituting sector because of aggregation.

TABLE 10–9

Effective Incentives to Major Import-Substituting Sectors, 1968

Sector	Share of Sector in: Import Substitution in Manufacturing[a] 1960–68	Share of Sector in: Growth of Manufactured Output 1960–68	Share of Imports in Total Supply 1960	Share of Imports in Total Supply 1968	Import Substitution Contribution[a]	Effective Subsidy Rate[b] Domestic	Effective Subsidy Rate[b] Average
Manufacturing sectors	100.0	100.0	22.4	25.3	3.2	−8.9	−6.5
Fertilizers	58.3	2.4	96.5	41.7	76.3	46.5	47.0
Petroleum products	133.1	8.2	100.0	6.0	51.5	−73.1	−69.8
Sewing machines	3.2	.3	59.4	31.7	41.0	4.9	4.2
Misc. electrical equipment	8.1	.7	58.0	7.2	34.9	−822.6	−802.9
Hemp and flax yarns	1.3	.1	47.5	.6	32.9	181.0	179.1
Electrical products	5.2	.5	64.9	13.4	31.6	82.6	78.4
Drugs	18.5	2.0	36.9	14.3	28.8	−36.4	−36.3
Steel ingots	11.0	1.3	28.8	7.4	26.5	−29.1	−29.1
Paper and paperboard	9.7	1.2	34.5	9.1	25.0	4.2	4.2
Basic inorganic chemicals	3.1	.5	51.3	42.1	21.8	32.8	32.3
Cosmetics and toothpaste	2.8	.4	60.0	1.8	21.8	3.0	3.0
Cast and forged steel	4.2	.6	26.0	4.0	20.5	−17.3	−17.2
Other manufactured products[c]	12.4	2.0	78.3	21.4	19.7	47.4	21.8

Basic inorganic chemicals	3.1	.5	51.3	42.1	21.8	32.0	[illegible]
Cosmetics and toothpaste	2.8	.4	60.0	1.8	21.8	3.0	3.0
Cast and forged steel	4.2	.6	26.0	4.0	20.5	−17.3	−17.2
Other manufactured products[c]	12.4	2.0	78.3	21.4	19.7	47.4	21.8
Refined sugar	7.4	1.4	38.6	19.9	17.0	−50.6	−49.3
Electrical equipment[c]	4.3	.9	82.5	61.4	15.7	160.8	155.5
Cement[c]	8.6	2.3	9.8	3.8	11.6	−15.1	−13.4
Grain milling	8.6	2.5	5.9	6.0	11.2	−13.3	−13.3
Steel sheet and bars	6.8	2.1	48.3	48.7	10.3	1451.6	1592.8
Rope and fishing nets[c]	2.2	.7	12.7	6.4	9.3	−20.2	−11.8
Glass products	1.6	.7	29.0	10.9	6.6	−16.4	−15.9
Misc. textile products[c]	2.0	1.0	11.7	2.9	6.4	31.7	24.8
Apparel and accessories[c]	8.3	4.5	9.0	1.2	5.9	−37.5	−24.7
Other paper products	2.1	1.2	14.3	5.5	5.6	−10.7	−10.4
Other clay and stone products	1.2	.7	11.7	3.2	5.5	−21.8	−21.2
Processed tobacco[c]	5.7	6.1	7.3	.1	3.0	−42.4	−38.8
Coal products	1.3	1.9	1.3	.0	2.2	45.4	45.4
Lumber and plywood[c]	1.7	5.2	2.6	.4	1.0	−46.6	−6.6
Total	332.7	51.4					

a. Sectors appear in order of the contribution of import substitution to their growth; see Chapter 6 for an explanation.
b. According to the Balassa convention.
c. Both a major export and a major import-substituting sector because of aggregation.

TABLE 10–10
Factor Intensity of Trade

	Labor (thousand man-years per billion won of output measured in 1965 constant domestic prices)		Capital[a] (ratio of capital to output)		Labor-Capital Ratios (thousand man-years per billion won of capital in world prices)			
	1960	1968	1960	1968	1960	1963	1966	1968
Direct factor requirements								
Primary products								
Domestic output	10.86	10.74	.65	.63	16.60	17.20	17.08	17.16
Exports	7.54	6.27	.92	1.10	8.19	6.89	6.15	5.69
Imports	11.06	11.28	.67	.73	16.58	15.91	16.13	15.48
Manufactured products								
Domestic output	1.63	1.53	.55	.58	2.97	2.89	2.67	2.64
Exports	1.87	1.89	.69	.53	2.72	3.02	3.24	3.55
Imports	1.29	1.54	.62	.66	2.09	1.93	1.98	2.33
Total factor requirements								
Primary products								
Exports	9.84	8.29	1.49	1.73	6.55	5.75	5.13	4.81
Imports	12.99	13.06	1.08	1.16	11.99	11.50	11.90	11.30
Manufactured products								
Exports	7.89	7.91	2.11	1.83	3.74	3.71	4.09	4.29
Imports	5.06	5.56	1.84	2.03	2.77	2.40	2.40	2.74

a. Capital includes inventories and is measured in world prices; output is measured in constant 1965 domestic prices.

a. Capital includes inventories and is measured in world prices; output is measured in constant 1965 domestic prices.

In every observation year, manufactured exports had higher direct and total labor-capital ratios than did manufactured imports. On the other hand, primary exports were more capital intensive than primary imports. A large share of Korea's primary exports are capital-intensive minerals, whereas minerals are only a small share of primary imports. Primary imports include a large share of labor-intensive agricultural products.

Even though there was a steady fall in the direct labor intensity of manufacturing production, the composition of Korea's manufactured exports shifted from 1960 to 1968 so as to increase the direct labor-capital ratio in manufactured exports by approximately 30 percent. Korea's manufactured exports were less labor intensive than average manufacturing in 1960, but far more labor intensive by 1968. The direct labor intensity of manufactured imports was less than that of manufacturing production throughout the period. The total labor-capital ratio for Korea's manufactured imports declined slightly between 1960 and 1968. Thus, at the same time that Korea's manufactured exports were becoming more labor intensive, her manufactured imports were tending to become a bit more capital intensive. The result was that in 1960, the total labor-capital ratio in manufactured exports was 35 percent higher than that in manufactured imports; by 1968, the ratio was more than 56 percent higher.

The total labor intensity of exports was greater than the direct labor intensity. That is, intermediate products produced for export industries have been even more labor intensive than the direct production of the exports themselves.

VALUATION OF OUTPUT AND GROWTH RATES AT WORLD MARKET AND DOMESTIC PRICES

In order to use the input-output tables of 1955, 1960, 1963, 1966, and 1968 for calculating contributions to growth, they were deflated to both constant 1965 domestic market prices and world market prices. At constant world prices, the compound annual growth rates between 1955 and 1968 for primary, manufactured, and total commodity output were 5.5, 14.0, and 9.8 percent. These growth rates are almost identical with those obtained when constant domestic prices are used as aggregation weights. This result is noteworthy: similar comparisons in other countries have shown that the growth rate in constant domestic prices often exceeds the rate of growth in constant world market prices.[22] Growth rates are usually much higher when constant domestic prices are used because it is usually the highly protected sectors, i.e., those with high domestic prices relative to world market prices, that are

the fastest growing. In Korea, rates of protection were not very high and the relatively more protected sectors did not grow very much more rapidly than the less protected. That growth rates are nearly identical and very high, whether measured in domestic or international prices, suggests that Korea's growth has been relatively efficient if world market prices are taken to reflect true opportunity costs and domestic prices represent real marginal utilities.[25]

Our figures also show one other respect in which the Korean economy stands out: revaluation in world prices generally raises the contribution of the primary sectors to total growth because these sectors are usually less protected than manufacturing. In Korea, however, primary activity has received more protection than manufacturing (both nominal and effective), so that revaluation increases (if only slightly) the relative contribution of manufacturing. The contribution of the primary sectors to the growth of total commodity output between 1955 and 1960 was 26.3 percent in constant domestic prices and 25.0 percent in constant world prices.

CONCLUSIONS

Effective protection or subsidy rates may indicate either excess profits or gross inefficiency. If rates are low, however, they leave little room for much of either. The low average incentive rates and the relatively small dispersion in South Korea are presumptive evidence that Korean development has been efficient.

This hypothesis is buttressed by other data. Domestic prices and international prices differ so little that the growth rate of the economy remains very high when measured by constant world prices instead of by domestic prices. Thus Korea's growth cannot be regarded as spurious in the sense that growth was dominated by the inefficient production of overpriced goods.

The emphasis in South Korea has been on the expansion of labor-intensive manufactured exports. Of course, if all considerations of natural resource bias, labor skills, infant industries, and risk and uncertainty are taken into account, it may have been more advantageous for South Korea to take a much different path. Nevertheless, the presumption is strong that a poor country like South Korea has a comparative advantage in labor-intensive expansion. Thus all the evidence taken together suggests that South Korea has followed the path of efficiency.

NOTES

1. This chapter summarizes a more extensive report on our investigations published in Westphal and Kim (1974). That report discusses both methodology and results in far greater detail.

2. The world market price is expressed in terms of domestic currency at the prevailing exchange rate. Note that this formula implies that nominal protection is equivalent, from a resource allocation point of view, to an actual tariff rate, were it to be imposed at the same level. As Bhagwati (1965) has shown, this is not always true where markets are imperfect. In fact, when domestic production or quotas are monopolized, the nominal rate tends to be greater than the equivalent tariff. Thus our nominal protection rates may be overestimates of the protective effects of QRs in an equivalent tariff sense. See also Shibata (1968) and Bhagwati (1968).

3. As used here, legal and nominal tariffs correspond to the explicit and implicit tariffs defined in Appendix A.

4. This formula assumes all intermediate inputs are tradables.

5. Ray (1973) analyzes three different ways of measuring protection: (1) the Corden method, (2) what Ray calls the Balassa method but is actually a method used only in earlier writings of Balassa (e.g., see Balassa 1965), and (3) what Ray calls the Scott measure but is actually the measure used in more recent writings by Balassa. See Balassa and Associates (1971). Ray shows that the Scott (i.e., late Balassa) method has limited significance for resource allocation and that the Corden measure has even somewhat more significance. In this study we use these two methods only.

An alernative to both the Balassa and Corden measures of effective protection is a measure called the domestic resource cost (DRC) of foreign exchange, which is either earned through exports or saved through domestic production. This measure, developed independently by Bruno (1972) and Krueger (1972) attempts to calculate the real domestic resource cost of value added domestically for any particular product. It requires the calculation of shadow prices of domestic inputs, an exercise which we have not attempted here.

6. See Bhagwati and Srinivasan (1973), Bruno (1973), and Ramaswami and Srinivasan (1970).

7. The adjusted value added so measured is an estimate of what value added in the sector would have been if there were no tax and credit preferences and net factor returns were unaltered from their actual value under the incentives policies.

8. For a definition of the wastage allowance, see Chapter 4.

9. The survey was jointly financed by USAID, Korea Mission, and the Economic Planning Board, Republic of Korea, to whom we are grateful. Westphal and Kim (1974), Annex Table 1, presents the full results of the price comparison survey after necessary adjustments by the authors.

10. Figures were averaged by using domestic sales flows in world market prices as weights.

11. For comparisons with other countries, see Balassa and Associates (1971).

12. Theoretically one would expect tariff redundancy only in products for which there were no imports at all. Empirically, however, "products" are aggregations of several product lines and prices and tariffs are averages of the aggregates.

13. Positive nominal protection on nontradables is due to protection on inputs to their production and to indirect taxes levied on their sale, even to exporters.

14. Total export subsidies in 1968 amounted to 8.4 percent of the total value of commodity exports. This figure excludes tariff and indirect tax exemptions, as these are not subsidies in relation to prices at world market values. Direct tax subsidies were 1.1 percent of total commodity exports while interest subsidies were 4.5 percent.

15. These statements hold equally whether one uses the Balassa or Corden measures of effective incentives. The rank correlations between Balassa and Corden estimates in every particular case are very high, always well above .95.

16. Negative rates of effective protection and subsidy less than −100.0 in algebraic

value occur where value added in world market prices is negative, i.e., where the world value of inputs exceeds that of the output. They thus indicate absolute inefficiency, assuming there are no errors of measurement. See Guisinger (1969).

17. Legal tariff rates, in fact, exhibit a pattern of positive escalation; that is, tariffs rise with the stage of processing. Nominal protection rates, which are the relevant measures, do not exhibit positive escalation except in some cases.

18. For estimates of the sectoral labor coefficients, we have relied upon the labor input coefficient estimates provided along with the Bank of Korea's 1966 input-output table (Bank of Korea, *Economic Statistics Yearbook, 1969*, p. 383, Labor Coefficients Based on Workers). These data are given at the 43-sector level only; we have assumed that the same labor input coefficient pertains to all of the sectors at the 117 level that comprise a single sector at the 43-sector level. For estimates of the capital-output ratios we have relied upon Kee Chun Han's (1968) exhaustive retabulation of the 1968 National Wealth Survey. By virtue of the estimation method, the capital-output ratios for the manufacturing sectors give marginal rather than average input coefficients. Nonetheless, for estimates of average capital-output ratios in 1968, they are considered superior to the average ratios obtained from the National Wealth Survey. We experimented with several other sets of capital-output ratio estimates; the basic conclusions are not sensitive to the set of estimates employed. Constant 1965 price input-output data on production, exports, and imports were used to calculate factor input requirements. The factor input coefficients were deflated to obtain the proper input coefficients per billion won of output in 1965 prices. The 1966 117-sector input-output matrix, deflated to 1965 prices, was used to obtain total factor input requirements. We have omitted real estate and ownership of dwellings, iron scrap, and other scrap from the calculation of input requirements.

19. Details on these and related methodological issues and computational results are available from the authors.

20. Estimates of input-output coefficients for noncompetitively imported intermediate inputs are not directly available from the original input-output tables. We applied a simple method of proportional estimation by row and column sums to estimate these coefficients.

21. Calculations of the factor intensity of exports based on the input-output table for domestically produced inputs are given in Hong (1973). His results concerning the relative factor intensities of exports and imports are consistent with ours.

22. See Little, Scitovsky, and Scott (1970), pp. 70–76 and Balassa and Associates (1971), pp. 32–34. These authors examine GDP growth rates rather than total commodity output growth rates and use effective protection measures for a single year to deflate value added to constant world market prices rather than nominal protection measures for a single year to deflate output; otherwise the calculations are quite similar.

23. See Bhagwati and Hansen (1973) for a discussion of the implications of measuring growth rates at domestic or international prices.