Industrial Policy in the Republic of Korea: An Assessment Using Cost-Benefit Methods.

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To my beloved family and my sweetheart

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Abstract.

The identification of the appropriate role for government is a crucial element in the formulation of economic policy for developing countries. During the 1940s and 1950s the balance of opinion rested firmly in favour of substantial intervention, but over the 1960s and 1970s the balance shifted in what Little describes as the "neoclassical resurgence".

In the important debate between the proponents of free markets and the supporters of government intervention, South Korea has been a major battle ground. The neoclassical view, which is currently enjoying some prominance, is that the Korean economic miracle happened because government intervention was in some sense 'neutral' and so something approximating free markets was allowed to prevail.

In this thesis, we argue that policy incentives in Korea were not 'self-neutralising' and were contributory to Korean economic growth and development. First, we show that government intervention during the 1960s and 1970s was greater and more distortionary that some participants in the "neoclassical resurgence" might allow. Second, we show that government intervention was 'well-directed' in the sense that policy incentives were provided to those sectors with the greatest potential for economic development.

One way in which we assess industrial policy involves the use of shadow prices and the concept of social profitability. If shadow prices are defined as the social opportunity cost of goods, then a change in the allocation of resources can only be socially beneficial if profits calculated using shadow prices are positive. We capture an emphasis on growth through a social welfare function with appropriate weights on certain incomes. We also assess whether the promotion of heavy and chemical industries was justified on infant industry grounds using productivity-related tests and revealed comparative advantage.

Lastly, the method based on shadow prices and social profitability is adapted to study the current policy problem of trade imbalances with the US and Japan. We show that the imbalances are mainly by-products of export-led growth and that some 'selectivity' in the policies of export restraints vis-à-vis the US and localisation vis-à-vis Japan may be necessary to minimise the social cost of reducing the trade imbalances.

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Chapter One.

Introduction.

The identification of the appropriate role for government is a crucial element in the formulation of economic policy for developing countries. During the 1940s and 1950s the balance of opinion rested firmly in favour of substantial intervention, particularly in the investment process. A major component of the interventionist regime was a trade policy based on protection and import substitution. India provides an important example of this combination of planning and protection. The balance of opinion shifted over the 1960s and 1970s in what Little (1982) describes as the "neoclassical resurgence". Arguments for this shift were based, in part, on the rapid growth of certain countries which followed more laissez-faire policies; the outstanding growth performance of the so-called 'four dragons' -- Hong Kong, Singapore, South Korea and Taiwan -- was particularly influential.

A central argument which is offered in favour of state intervention is that markets in developing countries do not function well. The meaning of this statement can be clarified by considering the propositions of classical welfare economics. Under certain assumptions -- notably the existence of all markets, perfect competition and the absence of externalities -- a competitive equilibrium is Pareto efficient. Further, any given Pareto efficient allocation may be achieved as a market equilibrium. This second result requires in addition convexity of production and preferences (i.e. diminishing marginal rates of substitution in production and consumption) and the availability of non-distortionary lump-sum taxes and transfers. When all these assumptions are satisfied, the first-best outcome may be achieved via the market mechanism, with optimal distribution of income being organised through the lump-sum taxes and transfers. The interventionist argument is that these assumptions are unrealistic, particularly for developing countries. The market fails, it

is suggested, in substantial and important ways, particularly concerning investment and the state should therefore act to correct for these market failures to ensure second-best outcomes.

However, the experience of the planned economies during the 1950s and 1960s has brought to light many possible difficulties with government intervention and 'market failure' is now contrasted with 'government failure'. Government planning, for example, may be more rigid and inflexible than private decisionmaking, if it involves complex bureaucratic processes. Government controls may indeed hinder private sector initiative. Perhaps most importantly, it may be difficult for the government to replicate the system of discipline and incentive in the market which promotes the efficient allocation of resources (see Stern, 1989, for a summary of market and nonmarket failures). Several influential studies during the 1970s and 1980s, emphasising the rapid growth of apparently laissez-faire countries, have fortified the neoclassical position (see Bhagwati, 1978, and Krueger, 1978 and 1983).

An interesting aspect of this debate has been the association of planning with import substitution and laissez-faire with export promotion (or outward-orientation). This is unfortunate; import substitution is logically distinct from planning, as is export promotion from laissez-faire. We should not, therefore, reject or approve both intervention and import substitution in the same breath.

The main purpose of this thesis is to show that government intervention can have an important role to play in the growth of a developing economy. This will be illustrated using the example of South Korea, a country which has followed an export-led growth strategy since 1962. We do not address the issue of 'import substitution versus export promotion'. Rather, our intention is to show that government intervention may have played a significant part in the rapid growth of the Korean economy, within the context of the export promotion strategy. Of course, we hope that some

valuable lessons may be drawn from our study for other developing countries.

The Korean example may be particularly important, because it has become a focal point of the debate between the proponents of free markets and the supporters of intervention. Indeed, its importance has been magnified because the other three 'dragons', being small island economies, have often been dismissed as 'special cases'.

This study consists of three parts: in part one, we review industrial policy in Korea since the start of the 'big push' in 1962. The term 'industrial policy' is used in a wide sense, to include other policies relevant for economic development such as trade policy. Industrial policy in Korea may conveniently be divided into three main phases, although they overlap to some extent: export promotion (1962-1973), heavy and chemical industry drive (1973-1979), and liberalisation (1979-). For each phase, we will consider in some detail the types of policy tools used and how effective they have been in determining the allocation of resources. We will show that there has been <u>significant</u> government intervention throughout the 1960s and 1970s, greater and more distortionary than some participants in the 'neoclassical resurgence' might allow (Bhagwati, 1978, Krueger, 1978, 1983, and Lal and Rajapatirana, 1987).

In part two, we consider the impact of industrial policy on economic growth. We will show that industrial policy in Korea has been 'well-directed' in the sense that incentives were extended to those sectors with great potential for (socially profitable) growth. Considerable attention will be paid to Korean infant industries here.

One way in which we will assess the impact of policy on growth involves the use of shadow prices and the concept of social profitability. If shadow prices are defined as the social opportunity costs of goods, then a change in the allocation of resources can only be socially beneficial if profits calculated using shadow prices are greater than zero. We may

capture an emphasis on growth through a social welfare function with appropriate weights on certain incomes. If we define shadow prices according to this particular social welfare function, the test of social profitability embodies the emphasis on growth. Of course, this method allows us to assess policy when other objectives such as income equality are included.

Economy-wide shadow prices are estimated for 1975 and 1983. These years were chosen because they represent convenient landmarks on the Korean development path. By the mid 1970s, the promotion of exports in light manufactures had reached a peak and the heavy and chemical industry drive became the focus of attention. By 1983, this drive was essentially over and market liberalisation became the policy theme. The estimation is based on the Little/Mirrlees (1974) guidelines, using world prices wherever possible.

A consistent set of shadow prices provides a valuable policy tool, both at the level of the particular project and for general policymaking. We hope, therefore, that our shadow prices will be important and useful in their own right.

The heavy and chemical industry drive is also be assessed on infant industry grounds using other methods. Krueger and Tuncer (1983) suggest that, if the protected industries are genuinely those where learning-by-doing, economies of scale and the like are of particular importance, then these 'infants' should exhibit faster productivity growth than other less-protected industries. Alternatively, they should display faster productivity growth than their established counterparts abroad. Using these tests, together with Balassa's revealed comparative advantage, we show that the promotion of heavy and chemical industries may have been justified on infant industry grounds, in particular vis-à-vis the machinery industry.

Over the 1980s, the government's view on state intervention has

undergone a drastic change: the market is to have a much greater role in the allocation of resources. This change largely reflects the growing perception, both in the government and in the private sector, that the Korean economy is becoming too complex for extensive intervention. We also consider the merits of this policy change.

In part three, we turn to the current policy issue of trade management. In recent years, Korean policymakers have been attempting to 'manage' bilateral trade balances with the US and Japan. Concerned with its growing overall trade deficit, the US has threatened to reduce access to its market unless Korea takes steps to control its trade surplus with the US. As this huge market is essential for continued growth of the Korean economy, some action was deemed to be necessary. The large trade deficit with Japan, on the other hand, is the manifestation of a dependence on certain Japanese products. Partly due to strategic and political reasons, a reduction of this deficit has become a policy priority. We consider the origins of these imbalances in some detail and suggest how they should be handled by policy.

The thesis is organised as follows: in chapter two, we review Korean industrial policy over the past three decades and consider its impact on the allocation of resources. Shadow prices are estimated in chapter three and used to evaluate industrial policy in chapter five. In chapter four, we assess the protection of heavy and chemical industries under infant industry grounds using the productivity-related tests and estimations of revealed comparative advantage. Bilateral trade problems are considered in chapter six and concluding remarks follow in chapter seven.

Chapter Two.

Industrial Policy in Korea: Neutral or Distortionary?

1. Introduction.

Korea has achieved outstanding growth over the past three decades. Over the period 1965-1987, its GNP per capita increased in real terms at an average rate of 6.4 percent, compared to 3.1 percent for the low-income countries, 2.5 percent for the middle-income countries, and 2.3 percent for the high-income countries (World Development Report, 1989). This rapid growth has been largely export-led: over the period 1965-1980, the real value of exports increased at an astounding rate of 27.2 percent (the corresponding growth rates for the three income categories are only 5.6 percent, 2.4 percent and 7.0 percent respectively).

Although there is general agreement on the export-led nature of Korean growth, there is still much discord over the contribution made by government intervention. On the one hand, the 'neoclassical' school views Korea as having achieved rapid growth under a relatively laissez-faire or 'neutral' policy regime, e.g. Bhagwati, 1978, 1986, Krueger, 1978, 1983, and Lal and Rajapatirana, 1987. On the other hand, the 'planning' school sees Korea as an example of rapid growth gained through extensive government intervention, e.g. Sen, 1983, Wade, 1985, and Yusuf and Peters, 1985. The focus on Korea is understandable; an economic theory which can identify the causes of this phenomenal growth could well dominate economic thinking on policies for growth for years ahead. However, it is interesting that one country can be seen as providing support for such diametrically opposed views.

Several studies by influential economists over the past two decades have given the 'neoclassical' view some current predominance in the field of development economics. Indeed, the entire 1987 World Development Report by the World Bank was devoted to extolling the virtues of free trade, as

was the recent survey on the third world by The Economist (23rd September, 1989). The purpose of this chapter is to show that the neoclassical description of the policy regime in Korea over the 1960s and 1970s is not entirely accurate and that the wholesale rejection of planning may be unwarranted. We will argue, that government intervention may have been influential in a beneficial direction in the determination of resource allocation in Korea.

We will proceed as follows: policies pursued during the export promotion (1962-73) and heavy and chemical industrial drive (1973-1979) phases are reviewed in some detail in sections 2 and 3, indicating the types and magnitudes of incentives where possible. In section 4, we assess the extent of government-induced distortions and biases, and consider the validity of the neoclassical view of the Korean policy regime. Recent changes in the policy stance are reviewed in section 5 (as an introduction for some following chapters) and concluding remarks are presented in section 6.

2. The Export Promotion Phase (1962-73).

2.1. A Brief Background.

The Japanese occupation (1910-45) and the Korean War (1950-53) had left the economy in ruins. The country was characterised by sluggish growth (financed by foreign aid) and high inflation throughout the 1953-1960 period (see Kim and Roemer, 1979). In the mid 1950s, there was little in the way of an industrial policy, although some emphasis was placed on import substitution through tariffs and quantitative restrictions. There was widespread discontent with the state of the economy, culminating in the student revolt of 1960, which forced Syngman Rhee out of power. The replacement government was subsequently overthrown in 1961 by a military coup led by the late president Park Chung Hee. His government immediately launched the 'big-push' for industrialisation.

2.2. Export-Led Growth Strategy.

Export growth was the primary objective of the First Five-Year Economic and Social Development Plan (1962-66). A major component of the outward-oriented strategy was a reform of the exchange rate policy. As we noted above, the destruction of war created shortages of essentials, which gave rise to rapid inflation. Pursuing an import substitution policy, the government was reluctant to devalue the Korean currency (Won) during the 1950s and the Won became significantly overvalued as a result. Major devaluations were carried out in 1961 and 1964 to correct this and a sliding-peg system of continued adjustment was introduced to maintain the real exchange rate. By the mid 1960s, the Korean government had established an exchange rate regime which appears to have been critical to the success of the export promotion strategy.

Apart from maintaining a realistic exchange rate, the government provided a comprehensive package of incentives to encourage exports. Exporters (and their domestic suppliers) were exempt from tariffs on imports needed in their production (changed to a rebate system in 1974). Both parties were also exempt from domestic indirect taxes on their inputs and outputs. Furthermore, exporters were allowed access to restricted imports under the so-called export-import link (terminated in 1965). These particular measures effectively allowed Korean exporters to avoid to a large extent the distortions involved in the protection of domestic markets and therefore compete under world prices.

There were also incentives that constituted 'genuine' export subsidies. Income tax was reduced by 50 percent on earnings from exports (until 1972) and exporters were allowed up to an additional 30 percent of normal depreciation allowances (since 1967), depending on the share of export revenue in total earnings. In addition, exporters could import more of the restricted items than were needed for production; the so-called 'wastage allowances' could then be sold in the domestic market for large profits.

Moreover, the exporters were entitled to subsidised credit from the government-controlled banking sector in the form of 'policy loans' (the government has been the major shareholder of Korean banks up to 1981).

Initially, the export incentives were not designed to systematically favour specific industries with a view to their factor intensity; the government did not envision a major role for labour-intensive industries. However, private initiative quickly focused on those sectors, which could best make use of Korea's abundant supply of low-cost labour, e.g. textiles, clothing, plywood and wigs. Once this became evident, the government encouraged investment in these emerging sectors.

The types of incentives offered to the exporter are presented in table 2.1, and the magnitudes of the more important ones are measured in table 2.2. Export promotion seems to have been at its most intensive over 1966-1974. During this period, subsidies reached some thirty cents per dollar export (using the official exchange rate), i.e. a producer would have been indifferent between selling his output for a dollar abroad or for a dollar and thirty cents at home.

Table 2.1: Types of Export Incentives and Dates of Operation (1950-75).

Type of Export Promotion Scheme	Dates Applicable
Tariff exemptions on imports of raw materials and spare parts	1959-75
Tariff and tax exemptions granted to domestic suppliers of exporting firms	1965-75
Domestic indirect and direct tax exemptions	1961-72
Accelerated depreciation	1966-75
Wastage allowance subsidies	1965-75
Import entitlement linked to exports	1951-55 1963-65
Registration as an importer condition on export performance	1957-75
Reduced rates on public utilities	1967-75
Dollar-denominated deposits held in Bank of Korea by private traders	1950-61
Monopoly rights granted in new export markets	1967-71
Korea Trade Promotion Corporation	1965-75
Direct export subsidies	1961-64
Export targets of industry	1962-75
Credit subsidies	
Export credits	1950-75
Foreign exchange loans	1971-75
Production loans for exporters	1959-75
Bank of Korea discount of export bills	1950-75
Import credit for exporters	1964-75
Capital loans by the medium industry bank	1964-75
Credits for overseas marketing activities	1965-75

Source: Krueger, 1979, p93, Table 24.

Table 2.2: Export Subsidies in Korea.

	Direct Tax Reduction	Interest Subsidy	Indirect Tax Exemption	Tariff Exemption	Subsidy Rate (see note)	Official Exchange Rate
1962	0.6	0.9	5.1	4.7	0.09	130.0
1963	0.8	2.9	5.3	6.6	0.12	130.0
1964	0.7	6.0	7.6	10.1	0.11	214.3
1965	2.3	7.6	13.9	15.4	0.15	265.4
1966	2.3	10.3	17.8	21.3	0.19	271.3
1967	5.2	14.7	17.8	24.6	0.23	270.7
1968	3.0	15.2	19.9	39.6	0.28	276.6
1969	3.7	14.7	27.4	34.3	0.28	288.2
1970	3.5	17.3	27.0	40.4	0.28	310.7
1971	4.8	18.1	32.2	48.0	0.30	347.7
1972	1.9	10.5	26.4	66.3	0.27	391.8
1973	1.4	7.4	21.0	64.4	0.24	398.3
1974	0.0	8.6	22.5	55.1	0.21	407.0
1975	0.0	12.9	33.8	34.3	0.17	485.0

Source: Westphal and Kim, 1977, Table B1.
Note: The official exchange rate and the subsidies are expressed as won per dollar; the subsidy rate measures total subsidies (in dollars) per dollar exports.

Moreover, although it is difficult to quantify, we should not ignore the importance of the government's commitment to export growth. The government has been involved "at all levels from the president down to the officials responsible for export administration work, together with the entire private sector related to exports, through the monthly sessions of the 'Expanded Meetings for Export Promotion'. It is at these meetings that various problems in export expansion are identified and activities coordinated. Furthermore, successful exporters are highly honoured and encouraged. This honour and encouragement bestowed on exporters has undoubtedly helped channel the best of the entrepreneurial class in Korea into export activities." (Hong, 1981, p348).

Whatever the mechanisms involved, the improvement in the growth performance is undeniable (see Table 2.3). Whilst the boom in world trade over the 1960s may have contributed to some extent, the coincidence of the start of the phenomenal growth and the policy changes suggests that government incentives were indeed influential.

Table 2.3. Selected Growth Indicators.

	Average Annual Growth Rate	
	Exports	GDP
Korea 1953-60	-6.1	5.2
1960-70	40.2	8.5
1970-76	43.9	10.3
	Trade	Output
World 1953-63	6.1	4.3
1963-73	8.9	5.1
1973-83	2.8	2.5

Source: Krueger, 1983, Table 3.4, p44 (Korea), Bhagwati, 1988, p3-4 (world).

Furthermore, the export growth was concentrated largely in light manufactures. By 1970, the light industry was responsible for nearly half of Korea's exports, textiles alone accounting for 26.8 percent. The heavy and chemical industries still only accounted for some 13 percent (source: Bank of Korea). We noted above that government incentives were focused on light manufactures; although the law of comparative advantage may have been partly responsible for the growth in labour-intensive exports, the degree of concentration suggests that government incentives were also important. We will consider the impact of government policy further in section four.

The export-led growth strategy continues even now, but the policy emphasis shifted somewhat over the 1970s to the development of heavy and chemical industries, e.g. shipbuilding, automobiles, petrochemicals, electronics and machinery.

3. Selective Import Substitution: The Heavy and Chemical Industry Drive (1973-79).

The 1970s saw changes in the economic and political environment which prompted the government to encourage the development of the heavy and chemical industries (H&C). Economically, the government perceived reduced possibilities for continued export growth in light manufactures due to: rising real wages; increasing competition from other developing countries with lower labour costs (such as China); and rising protectionism in the developed countries against imports of light manufactures.

Although such changes were clearly visible to the private sector, the government felt that its decisive leadership was needed to encourage private investment in these industries. The development of H&C industries require by their nature large-scale investments with long gestation periods, and it was uncertain whether such risky investments would be undertaken by the private sector without government backing (indeed, given the government's control over industrial finance, no significant changes in

economic structure could have taken place without its consent). The government's view appears to have been that a second generation of export-leaders was needed for continued growth, and that in time, the heavy and chemical industries could play such roles. The infant industry argument seems to have been important.

The heavy and chemical industrial drive was also a reaction to increasing uncertainty in the world political theatre. The US-China relations improved in the early 1970s and there were fears of a possible withdrawal of US troops from Korea. This prompted the government to seek an industrial base necessary for an independent defence effort.

The policy tools implemented to promote heavy and chemical industries were basically the same as those used to encourage exports. Perhaps the most significant, was the access to subsidised credit. The high interest rate policy of the 1960s was discontinued in 1972. The lower interest rate ceilings and the high rates of inflation (from the oil shock) meant that the real rate of interest was negative for most of the 1970s, resulting in severe excess demand for credit. The differential between bank interest rates and those charged in the informal credit market therefore represented a substantial advantage for those eligible for the government-directed loans. Tables 2.4, 2.5 and 2.6 show clearly that H&C industries, such as iron and steel, electronics and machinery, were allowed much greater access to heavily subsidised loans. In addition, the flexible repayment schedules made the government a de facto shareholder, thereby sharing the risk with the private sector.

Table 2.4: Interest Rates on Various Loans (in percent).

Year	Curb Market	Bank Loans				GNP Deflator (% Growth)
		General Loans	Policy Loans			
			Export	MIPF	NIF	
1971	46.41	22.0	6.0	-	-	13.92
1972	38.97	19.0	6.0	-	-	16.11
1973	33.30	15.5	7.0	10.0	-	13.40
1974	40.56	15.5	9.0	12.0	12.0	29.54
1975	41.31	15.5	9.0	12.0	12.0	25.73
1976	40.47	17.0	8.0	13.0	14.0	20.73
1977	38.07	15.0	8.0	13.0	14.0	15.67
1978	41.22	18.5	9.0	15.0	16.0	21.39
1979	42.39	18.5	9.0	15.0	16.0	21.20
1980	44.94	24.5	15.0	20.0	22.0	25.60
1981	35.25	18.0	15.0	11.0	17.5	15.90
1982.6	33.12	10.0	10.0	10.0	10.0	7.60
1983	25.77	10.0	10.0	10.0	10.0	3.00
1984	24.84	10.0	10.0	10.0	10.0	3.90
			-11.5	-11.5	-11.5	
1985	24.00	10.0	10.0	10.0	10.0	3.50
		-13.0	-11.5	-11.5		

Source: Bank of Korea, World Bank, 1987, Vol II, p112.
Notes: MIPF is Machinery Industry Promotion Fund.
: NIF is National Investment Fund.

Table 2.5: Incremental Credit Allocation by the Banking Sector.

Manufactures	1973	1975	1977	1979	1981	1983	1985
(in percent)							
Light Industry	64.4	34.3	39.3	41.7	47.5	41.7	36.6
Textiles	42.2	12.9	26.6	18.5	20.1	14.0	14.5
H&C Industry	35.6	65.8	60.8	58.4	52.5	58.3	63.4
Chemicals	7.6	25.3	16.0	14.0	16.0	15.7	16.2
Basic Metals	12.3	8.9	12.3	14.7	16.3	4.7	8.11
Fabricated Metals and Equipment	15.7	31.6	32.4	29.7	20.2	38.0	39.0

Source: Bank of Korea, Economic Statistics Yearbook and National Income Accounts.

Table 2.6: Average Cost of Borrowing by Sector.

	1974	1976	1978	1980	1982	1984
H&C Industry	10.4	10.1	10.1	17.6	15.3	14.4
Light Industry	10.6	13.7	15.6	20.1	16.9	14.5
Light minus H&C	0.2	3.6	5.5	2.5	1.6	0.1
Large Firms	10.5	11.8	11.9	18.4	16.1	14.5
Small Firms	11.4	14.4	15.6	20.8	15.4	14.1
Small minus Large	0.9	2.6	3.7	2.4	-0.7	-0.4

Source: Bank of Korea, Financial Statement Analysis, Various Issues.

The heavy and chemical industries were also entitled to accelerated depreciation rights. According to the Presidental Emergency Decree on Economic Stabilisation and Growth issued in August 1972, firms in specified key industries were entitled to an additional 40 to 80 percent of the normal depreciation allowance during the Third Five-Year Plan (1972-76). Petrochemicals, steel, nonelectrical machinery, electronics and shipbuilding were entitled to an additional 80 percent; electrical machinery, nonmetallic mineral products, textiles, and deep-sea fishing to 60 percent; and chemicals to 40 percent.

The trade regime was also used to protect the heavy and chemical industries (see table 2.7). For example, the chemical products subsector was subject to an effective rate of protection (ERP) of 113 percent; the ERPs for electric appliances and transportation equipment were 141 percent and 256 percent respectively (these rates were calculated for 1978 using the Balassa convention; see Young et al., 1982). By comparison, the ERP for fibre yarn and textiles was only 0.6 percent. The trade regime in Korea during the 1970s was much more distortionary than during the 1960s; this point is often missed by the neoclassical school.

Table 2.7: Effective Rates of Protection in Korea by Industry.

	Balassa Method		Corden Method	
	1978	1982	1978	1982
Agriculture & Fishery	57.1	74.3	54.5	70.6
Mining & Energy	-1.5	-1.7	-1.3	-1.5
Processed Food	-42.2	-46.7	-28.7	-32.6
Beverages	-0.2	-12.8	-0.1	-8.6
Tobacco	87.0	57.6	73.7	50.0
Fiber Yarn & Textiles	0.6	3.6	0.5	2.8
Fabricated Textile Products	88.6	87.8	61.0	60.6
Lumber & Wood Products	-8.5	29.2	-6.2	19.2
Furniture	36.7	-10.5	23.2	-7.6
Paper & Products	70.2	40.0	37.7	23.4
Printing & Publishing	-5.6	-14.9	-4.3	-11.5
Leather & Products	-7.5	14.6	-5.8	10.7
Rubber Products	-11.3	5.9	-7.6	3.7
Chemical Products	113.1	97.6	55.4	49.7
Petroleum & Coal Products	56.1	294.6	42.4	161.9
Nonmetallic Mineral Prods.	13.0	42.4	9.3	28.1
Metal & Primary Products	33.8	43.3	20.0	24.9
Metallic Products	10.4	-5.4	7.0	-3.8
General Machinery	64.2	30.3	41.6	21.2
Electric Appliances	141.2	63.5	78.7	41.3
Transportation Equipment	256.4	99.7	97.5	52.1
Miscellaneous Manufacturing	8.6	-2.9	6.0	-2.1

Source: Young et al., 1982, p211.
Note: The difference between the Balassa and Corden methods is that the former treats nontraded goods as if they were traded and subject to zero tariff while the latter assumes that nontraded inputs are part of the value added.

Furthermore, to assess the effect of government intervention on resource allocation, it is important to consider all the incentives together. Often only the effective protection rates for Korea are compared with those of other developing countries and on 'finding' them to be less distortionary, it is suggested that resource allocation in Korea is guided to a greater extent by world prices. It is essential, however, to take into account the tax and interest concessions together with the trade regime.

In the event, there was a significant shift of resources away from light manufactures into the H&C industries during the 1970s (see Tables 2.8 and 2.9). The H&C industries' share of total manufactured output increased from 41.4 percent to 57.7 percent between 1970 and 1981; their share in total manufacturing investment increased from 36.4 to 68.4 percent over the same period. This shift may have been partly due to the rise in the real wage, increased competition from other developing countries and greater protectionism in overseas markets. However, the combination of financial, fiscal and trade incentives was probably considerable and at least partly responsible for the deepening of the Korean industrial structure.

Table 2.8: Subsectoral Output as Shares of Manufacturing Output (in percent).

	Light Manufactures		H&C Industry			
	Total	Textiles	Total	Chemicals	Basic Metals	Fabricated Metals
1966	61.0	21.8	36.3	17.1	6.0	13.2
1970	56.2	18.7	41.4	21.3	5.8	14.3
1975	51.2	22.3	47.5	25.8	6.3	15.4
1981	40.7	17.7	57.7	27.1	9.1	21.0

Table 2.9: Subsectoral Investment as Shares of Manufacturing Investment.

	Light Manufactures		H&C Industry			
	Total	Textiles	Total	Chemicals	Basic Metals	Fabricated Metals
1966	65.2	31.5	32.8	15.4	6.0	11.4
1970	60.5	26.3	36.4	19.6	5.3	11.5
1975	44.2	24.1	55.3	17.1	7.6	30.6
1981	30.9	12.7	68.4	20.1	20.8	27.5

Source: Economic Planning Board, Mining and Manufacturing Survey, various years.

4. Government Intervention: 'Neutral' or Distortionary?

The neoclassical prescription for industry and trade policies is that incentives should be non-distortionary or 'neutral', i.e. the ratio of the effective exchange rates for imports and exports should be close to one. Successful countries, it is argued, have generally followed less distortionary policies than those which have grown only slowly. In the absence of government-induced distortions characteristic of import substituting countries, the private agents are able to take full advantage of the potential of the world market. Furthermore, they must maintain efficiency in the face of foreign competition. The proper role for government is thus seen to be one of non-participation and the avoidance of distortion. Indeed, a neutral incentive regime is argued to be essentially the same as one of free trade (see Bhagwati, 1978, p207-8). In this section, we consider the validity of the proposition that government incentives in Korea have been in some sense 'neutral' or non-distortionary.

The neoclassical story usually begins with a cross-country comparison of trade regimes (we will follow the one presented in Krueger, 1983, chapter 3 here). Korea is found to have a relatively low mean effective rate of protection (ERP) and the dispersion of ERPs around the mean is shown to be smaller than in import substituting (IS) countries (see table 2.10). Korea is also shown to have achieved much faster growth than IS countries (see table 2.11). An outward-oriented (and less distortionary) policy regime is thus argued to be preferable to an inward-oriented (and more distorted) one.

Table 2.10. Indicators of Trade Strategy, Various Countries.

Country	Period	Trade Strategy	Average ERP for Manufacturing	Range of ERPs
Brazil	1958	IS	106	17 to 502
	1963	IS	184	60 to 687
	1967	MIS	63	4 to 252
Chile	1967	IS	175	-23 to 1140
Columbia	1969	MIS	19	-8 to 140
Indonesia	1971	MIS	33	-19 to 5400
Ivory Coast	1973	EP	41	-25 to 278
Pakistan	1963-64	IS	356	-6 to 259
	1970-71	IS	200	36 to 595
Korea	1968	EP	-1	-15 to 82
Thailand	1973	MIS	27	-43 to 236
Tunisia	1972	IS	250	1 to 737
Uruguay	1965	IS	384	17 to 1014

Source: Krueger, 1983, Table 3.1, p34.
Note: EP = export promotion, IS = import substitution and MIS = moderate import substitution. ERP = effective rate of protection (in percent).

Table 2.11. Trade Strategy, Export Growth and Real GDP Growth.

Country	Period	Trade Strategy	Export Earnings	Real GDP
Brazil	1955-60	IS	-2.3	6.9
	1960-65	IS	4.6	4.2
	1965-70	EP	28.2	7.6
	1970-76	EP	24.3	10.6
Chile	1960-70	IS	9.7	4.2
Columbia	1955-65	IS	-0.8	4.6
	1960-65	IS	-1.9	1.9
	1970-76	EP	16.9	6.5
Indonesia	1965-73	MIS	18.9	6.8
Ivory Coast	1960-72	EP	11.2	7.8
Pakistan	1953-60	IS	-1.5	3.5
	1960-70	IS	6.2	6.8
Korea	1953-60	IS	-6.1	5.2
	1960-70	EP	40.2	8.5
	1970-76	EP	43.9	10.3
Thailand	1960-70	MIS	5.5	8.2
	1970-76	MIS	26.6	6.5
Tunisia	1960-70	IS	6.8	4.6
	1970-76	MIS	23.4	9.4
Uruguay	1955-70	IS	1.6	0.7

Source: Krueger, 1983, Table 3.4, p44.
Notes: Growth rates are averages for the period indicated. For definitions of EP, IS and MIS, see table 2.3.

However, it is important to realise that outward-orientation and government intervention are not mutually-exclusive concepts. It is possible to have export promotion under an influential incentive regime (we argue that Korea is just such a case). It is therefore possible to benefit from the advantages of outward-orientation, even if the policy stance is not 'neutral'. Indeed, Korea has gone beyond neutrality and has actually promoted exports. Often this distinction is not made, and planning is simply packaged with the (supposedly) doomed import substitution policy. Indeed, the most common definition of export promotion now is a movement toward the neutral free trade position; conversely, import substitution is

defined as a movement away from it (Lal and Rajapatirana, 1987, p197).

The distortionary nature of government incentives may be illustrated in several ways. First, consider the results of the study most often quoted by the neoclassicals in relation to Korea, i.e. Westphal and Kim, 1977 (based on 1968 data). The ERPs are shown to be fairly closely distributed about a relatively low mean. This result is used to suggest that government incentives were not significantly biased and that the market had a relatively important role in determining resource allocation. However, the same study also shows that incentives were biased to some extent in favour of exports, particularly in light manufactures (we noted earlier that export growth was concentrated in precisely these commodities).

Westphal and Kim (1977) estimated the 'effective rates of subsidy' (ERS) in Korea for 1968. The ERS is an adjusted version of the ERP. The value of subsidies (from fiscal and financial concessions) per unit value added (at world prices) is combined with the ERP to derive the bias of all incentives (see tables 2.12 and 2.13; see the annex, Westphal and Kim, 1977, for a more detailed description of ERS). The results in table 2.12 suggest that the incentives in the manufacturing sector as a whole were biased in favour of exports, although the machinery sectors were encouraged more to serve the domestic market. Table 2.13 shows that the industries most geared to serving the export market also received much greater incentives for export sales than for domestic sales; conversely, industries which tended to serve the domestic market received greater incentives for domestic sales than for export sales.

The neoclassicals may argue that these biases were relatively small. It is probably true that the level of government-induced distortions in Korea were much lower than in some other IS countries, particularly in Latin America (see table 2.10). However, this does not mean that policy incentives in Korea were not effective.

Table 2.12. Effective Subsidy Rates in Korea by Industry (1968).

	Balassa Method		Corden Method	
	Export	Domestic	Export	Domestic
Agriculture, Forestry & Fishing	-9.9	22.5	-9.4	21.7
Mining & Energy	3.0	5.1	2.7	4.5
Processed Food	2.3	-25.2	1.8	-19.6
Beverages & Tobacco	14.5	-25.8	12.6	-20.8
Construction Materials	5.9	-16.9	4.4	-12.9
Intermediate Products I	43.4	-29.7	26.0	-21.9
Intermediate Products II	17.5	19.0	11.6	13.1
Nondurable Consumer Goods	5.4	-20.6	4.1	-15.7
Consumer Durables	2.4	38.2	1.5	23.6
Machinery	5.2	31.5	1.9	21.0
Transport Machinery	-22.8	158.7	-5.6	80.8
Manufacturing	12.4	-8.9	8.9	-6.5
All Industries	8.6	10.1	6.5	8.6

Source: Westphal and Kim, 1977, Table 2B.
Note: 'Domestic' refers to sales in the home market. The effective subsidy rate is the effective protection rate plus a fraction, which is equal to the value of subsidies per unit value added.

Table 2.13. Effective Subsidy Rates in Korea, by Sales.

Commodity Category	Balassa Method		Corden Method	
	Export	Domestic	Export	Domestic
Export Manufactures	13.5	-26.2	9.8	-20.4
Import Competing Manufactures	35.3	91.4	15.8	50.2

Source: Westphal and Kim, 1977, Table 3B.
Note: For details, see table 2.11.

Another way in which we may dispute the 'neutrality' proposition is simply to look at other, more recent, data. The Kim and Westphal study (1977) is based on 1968 data. Government policy in Korea has undergone significant changes since then, i.e. the heavy and chemical industry drive. The trade regime became progressively restrictive over the 1970s, as can be seen from table 2.14. The mean ERP for manufacturing increased from -1 percent in 1968 to 21 percent by 1978; the range of ERPs increased from -15 to 82, to -30 to 120. According to Krueger (1983), the Korea of 1978 should be classified not as export promoting but moderately import substituting; Korea's mean ERP and the degree of dispersion of ERPs around it are greater than Columbia, categorised as MIS (see table 2.10). We are not suggesting that Korea pursued an import substitution policy in the 1970s; there is little doubt that the strategy has been on the whole one of export promotion. However, it is important to realise that i) there was significant government intervention and ii) a more in-depth study of the policies pursued are required to properly understand Korean growth; the broad-brush description provided by the neoclassical school is wholly inadequate.

Table 2.14. Effective Rates of Protection in Korea: An Intertemporal Comparison (1968, 1978, 1982).

	Balassa Method			Corden Method		
	1968	1978	1982	1968	1978	1982
Agriculture, Forestry & Fishing	18.5	57.1	74.3	17.9	54.5	70.6
Mining & Energy	4.0	-1.5	-1.7	3.5	-1.3	-1.5
Processed Food	-18.2	-44.0	-48.4	-14.2	-30.0	-33.8
Beverages & Tobacco	-19.3	33.4	15.0	-15.5	23.1	10.8
Construction Materials	-11.5	11.8	51.1	-8.8	8.5	33.5
Intermediate Products I	-25.5	37.6	61.9	-18.8	25.5	39.7
Intermediate Products II	26.1	20.6	39.6	17.4	13.3	24.3
Nondurable Consumer Goods	-10.5	67.4	42.4	-8.0	42.2	28.1
Consumer Durables	64.4	242.9	52.5	39.8	119.4	36.0
Machinery	44.2	44.2	31.3	29.5	29.5	21.5
Transport Machinery	163.5	326.6	123.9	83.2	108.8	60.4
Manufacturing	-1.4	31.7	28.2	-1.1	20.6	18.5
All Industries	10.5	43.1	48.9	9.0	34.1	38.4

Source: Westphal and Kim, 1977, and Young et al., 1982.
Note: For the definition of effective protection rates, see table 2.7.

Some empirical evidence on the effectiveness of incentives on investment is also available. Van Wijnbergen (1982) estimated an investment relation in which private fixed investment is a function of the real interest rate in the curb (or unofficial) market and the change in the flow of real credit from the banking sector. The quantity and price variables were hypothesised to affect two different sectors of the economy: the subsectors currently encouraged by the government with access to credit from the banking sector, and the subsectors denied official sources of credit and therefore dependent on the curb market for funds. The results showed a significant and negative effect for the curb market interest rate variable and a significant and positive effect for the credit variable. This suggests that government's credit allocation policy has been effective, although the credit variable probably represents other policy incentives as well, given that preferential credit was offered as a part of a 'package'.

Further evidence of the impact of policy on investment is provided by Yusuf and Peters (1985). Realising that government intervention shifted away from light manufactures toward the H&C industries in the 1970s, they hypothesised that conventional market-related variables would be unhelpful in explaining investment in the H&C sector, but more important in the light industrial sector. Using data over the period 1968-81, they estimated an investment function for each of the sectors using variables for lagged change in output, lagged investment and credit. For the H&C sector, the coefficient on the output variable (representing the accelerator) was found to be insignificant, consistent with the hypothesis that investment in this sector was influenced not by the market, but by the future export markets anticipated by the government. The credit variable was again strongly significant, reflecting the importance of credit availability in a country with a limited number of channels for investible funds. The lagged investment variable was also significant reflecting the long gestation of

investment in this sector. The output variable is significant for the light industry, interpreted as indicating greater market influence, and the credit variable is also significant for the same reason as above. The lagged investment variable is not significant, perhaps due to shorter gestation lags.

Yusuf and Peters then estimated an investment function using three financial indicators: profit rate, tax rate and depreciation rate. In the light industry, all three variables were significant at the 90 percent level and of the correct sign. For the H&C sector, neither the profit rate nor the depreciation rate were found to be significant. However, the tax rate was highly significant, suggesting that taxation incentives are indeed effective. They conclude that a model based on government policy objectives and planners' preferences would be apparently a more appropriate vehicle for analysing aggregate investment in Korea. The evidence at least suggests that industrial policy has been important in determining the allocation of resources in Korea.

Perhaps the most convincing evidence against the 'neutrality' proposition is provided by the Korean government itself. At the end of the 1970s, the government (as well as the private sector) increasingly felt that intervention should be curbed and that the market should play a greater role in the allocation of resources. The main reason was that the Korean economy was becoming increasingly complex and therefore difficult to control. It was also because Korea's major trading partners were applying pressure on the Korean government to reduce its controls on trade. The shift in policy is clearly articulated in the Fifth Plan (1982-1986).

In view of the evidence presented in this section the proposition, that government intervention was unimportant in the determination of resource allocation in Korea, appears to be rather tenuous. As Sen eloquently puts it,

"The pattern of South Korean economic expansion has been carefully planned by a powerful government. If this is a free market, then Walras's auctioneer can surely be seen as going around with a government white paper in one hand and a whip in the other" (Sen, 1983, p752).

5. Market Liberalisation.

In the rest of this chapter, we will review this policy of market liberalisation. The major objectives are twofold: the liberalisation of the financial market and the lowering of import barriers.

5.1. Financial Liberalisation.

In the financial market, the government increased the real interest rate -- positive since 1981 -- by maintaining the nominal interest rate when the rate of inflation was falling (see table 2.4). This was intended to decrease the differential in the cost of borrowing between the official and the curb markets. Furthermore, the government denationalised the commercial banks in 1981 by divesting its share (completed by 1983). The banks were encouraged to be more autonomous in their lending decisions and more accountable to the public. In addition, the policy loans -- and the differential in bank interest rates -- were eliminated in June 1982. This was intended to reduce the divergence of rates of return on investment. In 1984, the interest rate bands were widened, presumably so that the banks could make greater allowances for investment risks. All these measures were designed to increase the efficiency in the allocation of resources by giving greater role to the financial market.

Although not entirely consistent with the policy of financial liberalisation, the government has directed the banks to give greater access to funds for small and medium-sized firms (S&M). In the 1970s, the H&C industry drive had virtually starved the S&M firms of funds, and the government mandated in 1980 that 55 percent of the increase in any local banks' credit and 35 percent of the nationwide banks' credit should go to

these S&M firms. The reason for the increased concern is that these firms are the predominant producers of parts and components, commodities which the government believes will become important exports in the future, i.e. again an infant industry argument.

5.2. Import Liberalisation.

The second leg of the market-oriented policy has been the liberalisation of the import regime. This was seen to have two advantages: first, it would improve the competitiveness of Korean industry by reducing the cost of imports or by forcing domestic producers to be more efficient; second, it would go some way to appease important trading partners, such as the US, who have increasingly accused Korea of being mercantilist (in the sense of taking advantage of other nations' markets without opening its own).

The import liberalisation policy has mainly taken the form of reducing the number of items requiring government approval. The import control mechanism in Korea is largely based on the so-called Automatic Approval List (AA), where items not named require government permission. In the 1980s, the government has pursued a program whereby it announces in advance items to be put on the AA list (to give time for any necessary adjustment by the domestic producers). The government intends to raise the Import Liberalisation Ratio (ILR, the number of items on the list as a percentage of all imported items) to over 95 percent in line with the developed countries by the end of this decade.

According to data collected by the Korea Trading Associaton (KOTRA), there appears to have been some increases in imports of the newly liberalised items. The value of newly liberalised import items increased at an average rate of 37 percent in the first year, -4 and -8 percent in the second and third years, and 12 and 17 percent in the following two years (the figures refer to the period 1978-84; see World Bank, Volume I, p68). This increase is partly because the newly liberalised items were not

subject to any additional import barriers, e.g. higher tariffs.

The increase in the ILR notwithstanding, Korea continues to be the subject of accusations of mercantilism by the US and the EEC, not least because of the many Special Laws regarding imports. As of 1985, there were still 37 of these laws regulating imports of individual commodities, e.g. Pharmaceutical Act, Grain Management Act, and Fishing Vessels Act. Special Laws tend to impose health, safety and other public standards on imports, but they also serve as opaque barriers to trade. In view of this, the ILR may overstate the degree of liberalisation of the Korean import regime.

5.3. Technology Promotion Policy.

One area where the government has increased its participation in recent years has been that of technology promotion. It is generally accepted in Korea that the greatest potential for future exports lies in technology-intensive industries such as telecommunications and computers. The government has therefore encouraged the establishment of new institutions to train scientists and engineers, as well as to conduct basic and applied research. The Sixth Plan (1987-91) aims to increase the national R&D investment to 2.5 percent by 1990, a level comparable to the OECD.

Although the technology policy is essentially 'functional' as opposed to 'sectoral' in nature and therefore apparently consistent with the aim of reducing sectoral intervention, it does embody some sectoral bias. Industries will benefit more from government aid if they are technology-oriented. Indeed, the National Project for Research and Development was formed in 1982 to fund public as well as public-private joint projects with the high-tech areas of electronics, fine chemicals and engineering in mind.

6. Concluding Remarks.

The purpose of this chapter has been threefold: to review industrial policy in Korea from the start of the big-push in 1962 to the present; to show the importance of government incentives in the determination of resource allocation in Korea; and to point out some inadequacies of the treatment of Korean economic history in the cross-country studies of the neoclassical school and their broad-brush recommendations for rapid growth.

We hope to have clarified the nature of policy intervention in Korea. Our review strongly suggests that incentives have been important in Korea and that their characterisation as neutral is somewhat misleading.

Chapter Three.

Estimation of Shadow Prices for Korea.

Introduction.

The central purpose of policy appraisal is the identification of socially desirable policy reforms. If the criteria to be employed are based on economic consequences, then this requires i) the estimation of changes in the net supplies of goods and in the distribution of income, which would result from a possible reform and ii) their evaluation according to some definition of social welfare. Our approach to evaluation is based on the fundamental idea of social opportunity cost. The problem for the planner, particularly in developing countries, is that the market price of a good may not adequately reflect its social opportunity cost, or as we term it, shadow price. When this is true, the planner cannot use market prices to guide his decisions.

The purpose of this chapter is to estimate economy-wide shadow prices for Korea (for the years 1975 and 1983). By so doing, we hope to provide the policymaker with a most useful tool in the design of policy reform. We ourselves will use the estimates to assess Korean industrial policy since the early 1960s (in chapter 5). Specifically, we estimate Little/Mirrlees (1974) shadow prices, which are based on world prices. We use the estimation procedure found in Ahmad, Coady and Stern (1986, 1987).

This chapter is divided into two parts. In part I, we review some of the important theory pertaining to shadow prices. In section I.1, we consider the conditions required for shadow prices to coincide with market prices. We then review some of the reasons, why this coincidence is less likely in developing countries, in section I.2. The Little/Mirrlees guidelines for shadow prices are considered in section I.3, and the arguments underlying them are formalised in section I.4, using the Drèze/Stern (1987) model. In part II, we turn to the practical estimation

of the Little/Mirrlees shadow prices. The estimation procedure is explained in section II.1. The data and other details are described in section II.2. The results are presented in section II.3, and their possible uses and limitations are considered in section II.4. Concluding remarks follow in section II.5.

Part I: Theory of Shadow Prices.

I.1. Equality of Shadow and Market Prices.

Shadow and market prices coincide under first-best conditions. It is a well known result of classical welfare economics that under certain conditions, a first-best allocation may be achieved as a competitive equilibrium with optimal lump-sum transfers. In this case, the marginal rates of substitution between commodities are the same for each consumer and producer. Furthermore, with optimal lump-sum transfers, the marginal social utility of a commodity going to any two individuals are the same. It follows that the relative social value of commodities is the same in every use and coincides with their private marginal rates of substitution, i.e. shadow prices may be suitably normalised to equal market prices (see Drèze and Stern, 1987, p936 for a formal proof). However, the conditions for a first-best equilibrium are rather restrictive, including the assumptions that all markets are present and competitive, that there are no externalities or non-convexities, and that lump-sum taxes and transfers are unrestricted.

In a second-best economy with no lump-sum transfers, the shadow and market prices may still coincide if: i) all goods can be taxed and indirect taxation is fully under the control of the planner; ii) private production is competitive and production sets are convex; iii) private profits are fully taxed; and iv) no quantity rationing applies to private producers. When these assumptions are satisfied, the government can control the

production of private firms by setting appropriate producer prices; at the same time, consumers are not affected since profits are fully taxed and consumer prices may be manipulated separately. The government will therefore set the marginal rates of transformation in private firms equal to shadow prices and these will also equal market prices (see Diamond and Mirrlees, 1971, or Drèze and Stern, 1987, p939-940 for a formal proof).

If the assumption of unrestricted indirect taxation is relaxed, shadow prices may still be proportional to producer prices, if there is constant returns to scale, production is competitive (i.e. no pure profits), and there are sufficiently many different and active firms. Diamond and Mirrlees (1976) show that under these conditions, private firms break even at shadow prices. However, since this gives us a condition on shadow prices corresponding to each active firm, a corollary of this result is that shadow prices are proportional to producer prices if there are sufficiently many different and active firms (see Drèze and Stern, 1987, p942-943 for a formal proof and a discussion of the restrictiveness of the conditions).

It should be evident that the conditions ensuring the coincidence of shadow and market prices are rather restrictive and unrealistic, particularly for developing countries where the markets may not yet be fully established and policy instruments are rather limited. We now consider a number of causes for the divergence between shadow and market prices, with the developing countries in mind.

I.2. Reasons for the Divergence between Shadow and Market Prices.

A. Non-Lump-Sum Taxes.

Indirect and income taxes introduce a wedge between the prices facing consumers and producers. Thus, consumer prices will not be proportional to shadow prices, even if producer prices are (such as in the Diamond and Mirrlees case; 1971). With indirect taxes, households equate their

marginal rates of substitution to relative consumer prices and firms equate their marginal rates of transformation to relative producer prices; the inequality between the two marginal rates implies Pareto inefficiency. Similarly, income tax creates a divergence between wages before and after tax; the wedge between marginal rates of transformation in consumption and production again indicates inefficiency.

B. Non-Competitive Markets.

Markets may be oligopolistic or monopolistic, so that market prices are not equal to marginal costs.

C. Inflation.

If inflation proceeded uniformly, so that relative prices were unaffected, then it would not be a reason for prices to be an inadequate measure of social costs and benefits. However, rapid inflation (more common in developing countries) may affect relative prices, because wages and prices may not be perfectly indexed and often the governments use price controls to reduce the rate of inflation. In other words, there may be sluggish adjustment to rapid market disturbances.

D. Currency Overvaluation.

One particular price which many governments control is the foreign exchange rate. If this price is not continuously adjusted with inflation, domestic prices get out of line with world prices -- the domestic prices of imports and exports will tend to be too low relative to those of nontraded goods. If a devaluation is not forthcoming, there will be excess demand for imports and the government will be forced to restrict imports, often in ways which create divergences between domestic and world prices. If the government does devalue, but not very frequently, then the currency may be alternately undervalued and overvalued.

E. Large Projects.

Large projects, particularly in small developing countries with little development, may affect prices and therefore profits elsewhere in the

economy. In this case, profitability of the project itself may not be a good measure of the net social benefit.

F. Protection of the Domestic Market.

Many governments, including those of the developed countries, attempt to protect domestic industry by restricting imports. The use of quotas and tariffs, as well as other means such as quality standards, creates a gap between the domestic and world prices of goods. If so, then the domestic price may overstate the social cost of procuring these restricted commodities.

G. Domestic Rationing and Investment Licensing.

If prices are controlled, resulting in excess demands (or supplies), then some form of rationing will occur; unless rations are optimal, the marginal social value of the rationed good will not be equalised across uses. Similarly, investment licences and input (or output) quotas may be allocated by the government in an inefficient manner.

H. Underemployment.

It is often argued that the wage in the urban sector overstates the social opportunity cost of labour. The urban wage for unskilled labour in developing countries tends to be much greater than the rural wages for casual or family labour, differences that may not be accounted for by the higher cost of living. This is often attributed to labour immobility, political sensitivity to the urban work-force, legislation and trade unions. Whatever the reason, the urban wage apparently exceeds the loss of rural production, assuming that the rural wages measure labour's marginal contribution to production. In the case of family labour (where sacking is not an option), the payments or receipts may overstate the marginal product of labour because the family income tends to be shared. If so, then the social opportunity cost of labour may be less than the rural wage.

I. Deficiency of Savings.

The government may view social value of income as depending on whether it is used for current consumption or for investment. For an individual free to choose whether to spend or save, additional saving should be equally valuable to that individual as additional spending (if he is optimising over his lifetime). However, the aggregate of such individual intertemporal decisions may underestimate the social value of investment and future consumption. For instance, the individual may be unduely impatient, or may give insufficient weight to consumption by future generations. The government may then value present savings more than present consumption.

A divergence between the market and social rates of discount may arise for similar reasons as a divergence getween market and shadow prices. This may be expressed in terms of the relationship between market and shadow prices over time. Consider a two-period model. If a good i is chosen as the numeraire, the social rate of discount (ρ^i) may be expressed as

$$\rho^i = (\nu_{i0} - \nu_{i1}) \; / \; \nu_{i1},$$

where ν_{ij} = social value of good i, available for consumption in time j.

The social rate of discount, therefore, is the rate at which the value of the numeraire falls over time. The expression for the market rate of discount, with good i as numeraire (r^i), is the same, except market prices p replace shadow prices ν. We can show that $\rho^i = r^i$, only if $\nu_{i0}/p_{i0} = \nu_{i1}/p_{i1}$, i.e. if the relative divergence between shadow and market prices remains the same over time. The social rate of discount is less than the market rate if $\nu_{i0}/p_{i0} < \nu_{i1}/p_{i1}$, i.e. if the divergence increases over time (when we normalise, such that $\nu_{i0} = p_{i0} = 1$). Intuitively, a unit market value in the future has greater social value than a unit market value now; alternatively, a unit social value is given less market value in the future than now. In this sense the market would be biasing consumption

towards the present. If so, then consumption in the future has greater value to society than to the individual, and savings is socially more valuable than current consumption.

J. Distribution of Wealth.

Income redistribution is a policy objective of many governments, both in developing and developed countries, and the social value of income may therefore depend on the economic status of the earner, e.g. income accruing to poorer groups may be socially more valuable than that accruing to richer groups. This affects the relationship between market and shadow prices for factors of production, such as labour. For instance, if we define the shadow price of labour as the wage paid, less the social value of any increase in income resulting from its payment, then, the shadow price of labour would be lower, the greater the social value of income accruing to the hired worker (see the next section for further explanation).

K. Externalities.

Some projects or firms may have important effects on the rest of the economy which cannot be, or anyway are not, reflected in the price obtained for its output (or paid for its input). An example often used to illustrate this argument is smoke produced by a factory (in addition to its output), which generates a cost to others (e.g. higher laundering costs); this additional cost remains 'external' to its decisionmaking. A (positive) externality, which may be particularly important for developing countries, is learning-by-doing; if the production of a good generates learning-by-doing, which is passed on to other firms, then the price of the good understates the social value of its production, i.e. the infant industry argument.

Not all of these factors are relevant for Korea. However, it should be obvious, in light of the distortions reviewed in chapter 2, that market prices may not provide accurate indicators of social opportunity costs. A set of shadow prices, therefore, would be most valuable.

I.3. The Little/Mirrlees Shadow Prices.

The shadow price of a good may be defined as "the net impact on social welfare of a unit increase in the supply of that good by the public sector" (Drèze and Stern, 1987, p911). Such a definition requires us to identify the general equilibrium effects of a unit additional supply and to evaluate them according to our definition of social welfare. This type of analysis should ideally involve a general equilibrium model of the economy, but this is unlikely to be available, in any satisfactory form, in most countries. Little and Mirrlees (1974) have proposed a set of guiding principles for estimating shadow prices, which may be used in the absence of a fully articulated model of the economy (the theoretical justification for these guidelines are considered in the next section).

One of the foundations of the Little/Mirrlees method is that if we follow the chain of events resulting from a project using or producing a commodity, we will eventually end at commodities that are exported or substituted for imports. To illustrate this line of argument, consider the chain of events which takes place when a project uses an input. Some of it will be imported directly and some procured from domestic sources. It is a common but bad practice, when considering projects in developing countries, to count only such direct foreign exchange costs (or benefits) in the evaluation of the net effect on the balance of payments. If there is no domestic excess capacity in the input supplying industry, then a purchase from it may result in some previous customer of that industry importing the commodity. If there is excess capacity, the increase in output may require imported inputs and so on. Even the use of unskilled labour may have foreign exchange consequences -- if it were not employed by the project, it may have produced something which may now have to be imported.

The other foundation of the method is that the social value of additional income depends on the economic characteristics of the recipient and the use to which it is put. In general, most governments attach

greater social value to income accruing to poorer groups than to richer groups. Furthermore, investment may be socially more valuable than current consumption if the private sector attaches inadequate weight to future consumption.

Little and Mirrlees adopt as the unit of account, or numeraire, uncommitted convertible foreign exchange in the hands of the government today. The terms 'in the hands of the government' and 'uncommitted' are included because the social value of income may be lower if it accrues to the private sector or if it is earmarked for a particular use, e.g. consumption for a particular income group. Convertible foreign exchange is adopted since the value of commodities can be expressed in this unit of account. The term 'today' implies that future income may be less valuable.

The Little/Mirrlees method requires us to classify commodities as either traded or nontraded. A good is defined as traded if it is imported or exported at the margin. It is a nontraded good if it results in increased domestic production (or reduced consumption). Little and Mirrlees suggest the use of world or 'border' prices whenever possible. "Border prices are used, not because it is thought that they are, in any sense, necessarily more 'rational' than domestic prices, but simply because they represent a set of opportunities open to a country, and the actual terms on which it can trade." (Little and Mirrlees, 1974, p161).

If a good is imported at the margin, then its Little/Mirrlees shadow price is equal to the c.i.f. price plus the social cost of getting it to the user (trade and transportation costs). If the good is exported at the margin, then its shadow price is equal to the f.o.b. price minus the social cost of distribution.

If the project uses a good that is nontraded at the margin, the result may be either an increase in domestic production or a reduction in consumption elsewhere in the economy. The shadow price may then depend on the source of the input. If the source is additional production, then the

shadow price is the value (in shadow prices) of the resources required to produce an extra unit of the commodity. This is called the 'marginal social cost' of the good (MSC). If the source is consumption, the shadow price is the benefit, evaluated in social terms, derived from supplying an extra unit of the commodity to the economy. This is the 'marginal social benefit' (MSB).

It is generally easier to estimate the MSC than the MSB; the difficulty with the MSB is that the policymaker must estimate the gains and losses to various social groups which occur directly and indirectly as a result, and then weight them according to the definition of social welfare. In comparison, it is easier to estimate the input requirements and their border prices. Well designed policy, for example optimal indirect taxation, should ensure equality between MSC and MSB at the margin, although in practice such optimality may not be assumed with any confidence.

The shadow price of labour (or the shadow wage rate, SWR) is a particularly important concept, because the well-being of suppliers is often a major concern of the policymaker. If the labour market is competitive and the wage represents the marginal product of labour, then there is no change in the worker's income and the shadow price is the output foregone valued at shadow prices. However, in developing countries, the urban wage may be considerably greater than the rural wage (as discussed above in section I.2.H) and it is important to take account of the increased consumption arising from extra employment.

The Little/Mirrlees shadow wage rate may be expressed as:

$$SWR = c - \beta(c-m),$$

where c = the urban wage,

β = social value of income accruing to the worker, relative to the numeraire,

and m = marginal product of labour.

(Note that all variables are valued at shadow prices). The point is that although the employment of labour by the project incurs a cost equal to the wage, it also brings about the benefit of increasing the income of the worker and the people left behind, e.g. on the farm.

Finally, we consider the social cost of capital. This is equal to the annual depreciation (at shadow prices) plus the interest cost (the value of the fixed and working capital stock, also at shadow prices, multiplied by the social discount rate or the accounting rate of interest; see Little and Mirrlees, 1974, p213-214).

The accounting rate of interest (ARI) is the rate at which the social value of the numeraire falls through time (see Drèze and Stern, 1987, p967-p973, and Scott, MacArthur and Newbery, 1976, Chapter 2). It is equal to the social rate of return on the marginal public sector project ('marginal' in the sense that profits are zero at shadow prices). This is a necessary condition for the optimality of public sector investment (see Drèze and Stern, p969-970, for a formal treatment).

For practical purposes, we may use interest rates on foreign loans. This is correct, if we take foreign exchange as the numeraire, and regard borrowing or lending abroad as a marginal project. Then, interest rates on the world capital market simply represent alternative marginal rates of transformation available to the government. This is a useful application of the equality condition between the ARI and the social rate of return on the marginal project (see Drèze and Stern, 1987, p970).

This completes our review of the Little/Mirrlees shadow prices. The underlying arguments have been formalised by Drèze and Stern (1987), as we have already noted regarding the accounting rate of interest. We now consider the theoretical justification for the other Little/Mirrlees shadow prices.

I.4. The Dreze/Stern Model.

I.4.1 Private Agents.

Private agents consist of H consumers and G producers. The hth consumer, confronted with a price vector q, money income m^h, and a vector of consumption quotas x'^h chooses a consumption plan $x^h(q,x'^h,m^h)$ solving

$$\max \quad U^h(x^h),$$

$$\text{s.t.} \quad qx^h = m^h \text{ and the non-violation of } x'^h$$

(to simplify notation we write a single vector x'^h, but we may think of it more generally as a set of upper and lower bounds, some of which may not be binding).

Similarly, the net supply vector $y^g(p,y'^g)$ of the gth producer solves

$$\max \quad \Pi^g = py^g,$$

$$\text{s.t.} \quad y^g \in Y^g \text{ and the non-violation of } y'^g,$$

where Y^g is a convex production set, p is the vector of producer prices and y'^g is the vector of production quotas. Π^g is the profit of firm g and this is distributed to shareholders -- the lump-sum income of consumer h is then the lump-sum transfer from the government (r^h) plus h's share in the profits of the G firms ($\Sigma_g \theta^{gh} \Pi^g$, where θ^{gh} is h's share in g's profits).

To simplify the presentation, foreign trade is treated as follows. Foreign exchange is considered as a separate commodity indexed by the subscript f -- the exchange rate is therefore p_f. We shall regard the vector of net import levels n as a vector of rations applying with equality to a specific firm, indexed by the superscript f -- this is a sort of State Trading Corporation (STC). Thus $y_i'^f = n_i$. Given a vector of net imports n, the foreign exchange earnings from trade are given by $y_f^f(y^f)$, where $p_i^f = -[\, \partial y_f^f / \partial y_i'^f \,]$ is the marginal cost in terms of foreign exchange of commodity i on the world market. If the country is 'small', p_i^f is just the world price of good i. The balance of payments is simply the fth scarcity constraint, $-y_f^f(.) = z_f$, where z_f is the foreign exchange reserve.

I.4.2. The Planner.

The task of the planner is to maximise a Bergson-Samuelson Social Welfare Function (W) subject to scarcity constraints. His problem may be expressed as

$$\max_s W[\ \ldots,\ V^h(\ p+t,\ x'^h,\ r^h+\Sigma_g\ \theta^{gh}\Pi^g(.)\ ),\ldots\ ]$$

$$\text{s.t. } \Sigma_h\ x^h(.) - \Sigma_g\ y^g(.) - z = 0,$$

$$\text{and } s \in S,$$

where V^h is the indirect utility function for individual h, t is the vector of indirect taxes ($t = q-p$), z is the vector of public sector production and s denotes the vector of government control variables. S is the opportunity set, determined by constraints other than that of scarcity; they are referred to as side constraints. In this model, s may consist of the following variables: (p_i), (t_i), (r^h), $(x_i'^h)$, $(y_i'^g)$ and (θ^{gh}). However, some of them may be fixed (e.g. at zero), in which case they must be treated as exogenous predetermined variables.

The Lagrangian of the planner's problem with no side constraints is $L = W(.) - \nu\ [\ E(.) - z\ ]$, where ν is the vector of Lagrange multipliers and E(.) is the vector of excess demand (in the Drèze/Stern model, the planner's problem is set up in such a way, that the Lagrange multipliers are equal to shadow prices). The first-order conditions imply

$$\frac{\partial W}{\partial s_k} - \nu\frac{\partial E}{\partial s_k} = 0, \text{ for each unrestricted } s_k.$$

I.4.3. Shadow Pricing Rules.

The first-order condition with respect to the import quota (y'^f) yields the border price rule for traded goods:

$$\nu_i = \nu_f\ p_i^f.$$

i.e. the shadow price of the ith traded commodity is its world price or marginal cost multiplied by the marginal social value of foreign exchange (the numeraire in Little/Mirrlees). This result holds whenever the variable $y_i'^f$ is an unrestricted control variable, i.e. the planner can directly or implicitly control the level of imports of the ith good. This

is true if either the good i is traded under a quota which is set optimally or trade adjusts endogenously to clear the ith market (see Drèze and Stern, 1987, section 2.1.3.).

The marginal social cost rule for nontraded goods may be justified under two circumstances. The first is if both the producer price p_i and the indirect tax t_i are unrestricted control variables, e.g. if the ith good is optimally taxed and exchanged at a market-clearing price. The first-order condition for p_i is:

$$-\Sigma_h \beta^h x_i^h - \nu\left[\frac{\partial x}{\partial q_i} - \frac{\partial y}{\partial p_i} \right] + \Sigma_g \Sigma_h \theta^{gh} b^h \frac{\partial \Pi^g}{\partial p_i} = 0,$$

where $b^h = \beta^h - \nu \frac{\partial x^h}{\partial m^h}$

is the marginal social value of income given to h and β^h is the social value of h's income relative to the numeraire. Optimal indirect taxation implies:

$$-\Sigma_h \beta^h x_i^h = \nu \frac{\partial x}{\partial q_i}.$$

Thus we have the shadow pricing rule:

$$\nu_i = \Sigma_g \frac{\partial y_i^g/\partial p_i}{\partial y_i/\partial p_i} MSC_i^g - \frac{\Sigma_g b^g y_i^g}{\partial y_i/\partial p_i},$$

where $MSC_i^g = -\Sigma_j \nu_j \frac{\partial y_j^g/\partial p_i}{\partial y_i^g/\partial p_i}$, j excluding i,

and $b^g = \Sigma_h \theta^{gh} b^h$, the marginal social value of a unit of profit of firm g.

This rule may be explained intuitively as follows. Suppose an extra unit of good i is required and its price is increased to bring about its production. The first part of the cost is the marginal social cost of production, averaged appropriately -- the averaging is based on how much comes from each firm. The second part is an adjustment to take account of the social value of the change in profits resulting from the price increase. Strictly speaking, the Little/Mirrlees MSC rule applies when the adjustment for changes in profits vanishes, i.e. when profits are optimally or fully taxed such that $b^g=0$. This is also true of the second

justification of the MSC rule.

The shadow price of a good i may be equal to its SMC if the gth producer's ration of the good is optimal or endogenous, as when a firm produces to meet demand. Then we have:

$$\nu_i = MSC_i^g - b^g(p_i - MC_i^g),$$

where $$MSC_i^g = -\Sigma_j \nu_j \frac{\partial y_j^g}{\partial y_i'^g} \quad , \; j \text{ excluding } i,$$

and MC_i^g is the marginal cost of i at producer prices, substituting p_j for ν_j.

The Little/Mirrlees shadow wage rate is a special case of the above MSC rule. Consider an unemployment situation where residual labour is absorbed in self-employment (e.g. on peasant farms), labour supplies being fixed. We shall treat a peasant farm absorbing residual labour as a particular firm g, owned by a single individual h (so that $\theta^{gh} = 1$). The subscript 1 is used for labour. The farm faces a quota on its employment of labour, $y_1'^g$, determined endogenously from the solution of the 1th scarcity constraint. When $y_1'^g$ is unrestricted, we have:

$$\nu_1 = MSP_1^g - b^h(p_1 - MP_1^g),$$

where MSP and MP denote marginal social product and marginal product of labour on the farm respectively. The first term represents the social value of the net loss of output caused by the withdrawal of one unit of labour from the farm and the second measures the marginal social value of the increase in income accruing to the peasant household. This can be shown to be equivalent to the Little/Mirrlees shadow wage as follows: since $\theta^{gh} = 1$, $b^g = b^h$, which in turn equals

$$\beta^h - \nu \frac{\partial x^h}{\partial m^h} .$$

To simplify, let us assume that there is just one sort of input (labour) and one sort of output (e.g. rice). Then, $b^h = \beta^h - \nu/p$. Substituting for b^h in the Drèze/Stern expression for the shadow wage, and recognising that $SMP_1 = (\nu/p)*MP_1$, we can obtain

$$\nu_1 = (\nu/p)*w - \beta^h(w - MP_1)$$

(note that w and MP are at market prices). This is now comparable to the Little/Mirrlees shadow wage.

This completes our brief exposition of the formal arguments underlying the Little/Mirrlees shadow prices. The interested reader is referred to Drèze and Stern, 1987, for further details. It may be worth considering the restrictiveness of the assumptions required for the validity of these rules. On the whole, they do not seem unreasonable for a 'small open' developing economy, e.g. fixed world prices may be applicable for many commodities. However, the MSC rule for non-traded goods may be somewhat restrictive in its suggestion that the source of these goods lies exclusively in additional production. We now turn to the estimation of shadow prices.

Part II. Estimation of Shadow Prices.

II.1. The Estimation Procedure.

In this section, we describe the procedure for the application of Little/Mirrlees guidelines, which may be summarised briefly as follows:

i) "border prices can be used as accounting (shadow) prices for all traded goods, because they represent the opportunity costs or benefits of using or producing a traded good." (Little and Mirrlees, 1974, p68);

ii) "when considering the use of a non-traded good whose output will be consequentially expanded, then the accounting price is equal to the marginal social costs of production" (p70). (we should however bear in mind that it does involve some rather restrictive assumptions; see section I.4.3); and,

iii) "government consumption, government saving, private consumption and private savings may all be considered to have different social values" (p71). Little and Mirrlees suggest "the use of shadow wages as a means of

allowing for the effects of a project on equality" (p72) and propose that profits be "weighted according to whom they accrue" (p72).

II.1.1. Commodity Classification.

The Little/Mirrlees method requires that all goods be classified as either imported, exported or non-traded. Simply, a good is defined as imported if, at the margin, additional demand is met by increased imports (similarly for the other categories). In practice, the classification of commodities is not so simple.

As we are using aggregated data, a 'good' is composed of many sub-goods, and therefore may belong to more than one category. Secondly, we must take into account the affect of government policy on commodity classification. For example, even if a good is imported in large quantities, it may still be non-traded at the margin, if there is a binding quota on that good. (in such cases, additional demand would not be met by imports, but by increased domestic output). Thirdly, the classification of goods may change over time, as the pattern of comparative advantage, conditions in the world markets, and tastes both at home and abroad undergo changes.

II.1.2. The Use of Input-Output Matrices.

The shadow price of a good by definition embodies the full general equilibrium effects of its incremental availability, and its estimation therefore requires a model of the economy. Lack of data often dictates that this model be rather simple, essentially based on input-output information.

To use input-output matrices, we must take into account the convention under which they are calibrated (this point is often missed in other studies, e.g. Lal, 1978). Input-output matrices are most often evaluated at either purchaser or producer prices. Under the former convention, the cost of using a good includes the cost of getting it to the user, i.e. the trade and transport margins. Under the latter convention, the distribution

costs are recorded as separate items. To illustrate, consider a project using a unit of good i. The cost of using it consists of the payment for the good itself and the payment for its distribution. The project manager can record both components under the same heading i (i.e. at purchaser prices), or under separate headings, i and distribution (i.e. at producer prices). It is important to be aware of this difference in estimating shadow prices, as will be made clear in the next sub-section (our estimates will be based on input-output matrices calibrated at producer prices; see Ahmad, Coady and Stern, 1987, for the procedure under purchaser prices).

II.1.3. The Accounting Ratios.

We will estimate accounting ratios, i.e. the shadow prices expressed as proportions of the corresponding market prices. Accounting ratios may then be used to convert market values into their social values. They are effectively shadow prices, when the units of commodities are chosen, such that their values are equal to one at domestic prices.

II.1.3.1. Accounting Ratios for Imported Goods.

Under the producer price convention, the trade and transport margin is recorded separately from the good actually delivered to the purchaser. Imported inputs are therefore valued at the point of origin, i.e. the border. So,

$$\nu_i^m = p_i^{cif},$$

where ν_i^m = shadow price of imported good i,

and p_i^{cif} = c.i.f. price of good i.

The producer price of good i, is

$$p_i = p_i^{cif} (1 + t_i^m),$$

where t_i^m = rate of tariff on good i.

The accounting ratio for the imported good i is then

$$r_i = 1 /(1 + t_i^m).$$

The accounting ratios of imported goods may therefore be calculated independently of those for other goods.

II.1.3.2. Accounting Ratios for Exported Goods.

The Little/Mirrlees shadow price for an input used in a project which is an exported good is the border price, less the social cost of getting it from the producer to the border, plus the social cost of distribution to the user project (the latter distribution cost is often unjustifiably ignored). Under the producer price convention, the cost of getting it to the user is again recorded separately, and so the social cost of the 'exported item' is

$$\nu_i^x = p_i^{fob} (1 - a_{ri} p^r),$$

where ν_i^x = shadow price of exported good i,

p_i^{fob} = f.o.b. price of good i,

a_{ri} = trade and transport margin for good i,

and p^r = shadow price of trade and transport.

The producer price of exported good i, is

$$p_i = p_i^{fob} (1 - a_{ri} - t_i^x),$$

where t_i^x = rate of tax on exports.

So, the accounting ratio is

$$r_i = (1 - a_{ri} p^r)/(1 - a_{ri} - t_i^x).$$

The accounting ratios (ARs) of exported goods therefore depend on the ARs for trade and transport (which are non-traded goods). The marginal social cost rule implies that the shadow price (and AR) of a non-traded good depends on those of other non-traded goods. Thus, under the producer price convention, we must estimate the ARs for exported and non-traded goods simultaneously.

II.1.3.3. Accounting Ratios for Non-Traded Goods.

The shadow price of a non-traded good is equal to the value at shadow prices of the marginal inputs involved. So,

$$\nu_i = \nu_n x_{ni} + \nu_x x_{xi} + \nu_m x_{mi} + \nu_f x_{fi},$$

where x_{ji} = input of j into a unit i,

where n,x,m denote non-traded, exported, and imported goods, and f denotes

factors of production. Its AR is then, on the assumption that marginal and average input coefficients are the same,

$$r_i = r_n a_{ni} + r_x a_{xi} + r_m a_{mi} + r_f a_{fi},$$

where a_{ji} = share of input j in total inputs for i,

i.e. the input-output coefficient.

II.1.3.4. Accounting Ratios for Factors of Production.

The shadow price of labour is by definition the net impact on social welfare of an additional unit of the factor being employed by the public sector. If the payment to the factor is no more than its earnings elsewhere, then the opportunity cost is the output foregone as a result of the extra unit being hired by the public sector. If those earnings represent its marginal product at market prices, then the shadow price of the factor is calculated by multiplying this value by the ratio of shadow price to market price for the type of goods the factor would have produced otherwise. This ratio is often called a 'standard conversion factor' (SCF). If the factor would have been used to produce a selection of goods, then its shadow price would be equal to the sum of its various outputs, each valued at shadow prices.

If a rise in earnings accompanies the public sector employment, then the payment to the factor overstates the cost, since we have to take into account the benefits arising from the increased income. Then, we must use the Little/Mirrlees shadow wage rate, i.e.

$$SWR = SCF * \{ w - \mu(w-m) \},$$

where w = wage, μ = value of extra income accruing to the worker relative to that of the numeraire, and m = earnings elsewhere, assumed to equal the marginal product. The assumption implicit is that only one person moves away from the rural sector for each worker hired. The accounting ratio for labour is then

$$r_l = SCF * \{ 1 - \mu(1-m/w) \}.$$

The SCF may be expressed as follows:

$$SCF = \Sigma_j \, a_j r_j,$$

where a_j = weight of good j ($\Sigma_j \, a_j = 1$).

Then, we have

$$r_l = \Sigma_j \, r_j * a_j\{.\}.$$

The AR for labour depends on the ARs of other goods. However, {.} may be seen as being determined separately from the other ARs. It is a function of two things: it is larger, the more competitive the labour market (and thus the closer m/w is to one) and the larger the μ (i.e. the more deserving the worker). The former should be observable and the latter is a policy-determined variable.

We noted earlier, in section I.3, that the cost of capital is equal to the depreciation (at shadow prices) plus interest payments at ARI on the capital stock (again at shadow prices). To evaluate the cost of capital, we require a conversion rate for capital goods, i.e. an AR for capital. We will estimate it as

$$r_k = \Sigma_j \, a_{jk} r_j,$$

where a_{jk} = weight of good j in fixed investment ($\Sigma_j \, a_{jk} = 1$).

The composition of a unit (value) fixed investment (i.e., a_{jk}) may be obtained from input-output data.

The shadow cost of profit depends on the type of profit earned. If it is normal profit, then it is the supply price of entrepreneurship, i.e. the return to a productive factor. Its shadow price will therefore be the return multiplied by the accounting ratio of the goods that the entrepreneurial energies would have produced otherwise.

Monopoly profit, however, represents a rent and may be regarded as a transfer payment. Its AR may be expressed as

$$r_\pi = \alpha(1-\lambda),$$

where r_π = shadow cost of a unit of monopoly profit,

α = one minus the tax rate on corporate income, and

λ = social value of income accruing to shareholders

relative to the numeraire.

Thus, the AR for monopoly profit will be higher the smaller the government's share in profits and the lower the social value of the shareholder's income. It is a function of policy-determined variables, and will therefore be treated as predetermined.

Lastly, the AR for indirect tax is equal to zero, as it represents a transfer within the government. The system of equations for the simultaneously determined ARs are presented in table 3.1.

Table 3.1. The System of Simultaneous Equations.

$$r_l^n = r_l^n a_{ll} + \ldots + r^r a_{rl} + \ldots + r_n^n a_{nl} + r_l a_{ll} + r_k a_{kl} + r_i^x a_{il} + \ldots + r_j^x a_{jl} +$$
$$r_g^m a_{gl} + \ldots + r_h^m a_{hl} + r_\pi a_{\pi i}$$

$$r_n^n = r_l^n a_{ln} + \ldots + r^r a_{rn} + \ldots + r_n^n a_{nn} + r_l a_{ln} + r_k a_{kn} + r_i^x a_{in} + \ldots + r_j^x a_{jn} +$$
$$r_g^m a_{gn} + \ldots + r_h^m a_{hn} + r_\pi a_{\pi n}$$

$$r_l = \Sigma_j \; r_j a_{jl}\{1-\mu(1-m/w)\}$$

$$r_k = \Sigma_j \; r_j a_{jk}$$

$$r_i^x = -r^r a_{ri} + r_i^{fob}$$

to

$$r_j^x = -r^r a_{rj} + r_j^{fob}$$

where

r_i^x = accounting ratio (AR) for exported goods, i...j,
r_n^n = AR for non-traded goods, 1...n,
r_g^m = AR for imported goods, g...h,
r_l = AR for labour,
r_k = AR for capital,
r_π = AR for monopoly profits,
r^r = AR for transportation and distribution,
r_i^{fob} = ratio of f.o.b. price over domestic price, and
a_{ij} = input of good i per unit production of good j.

II.1.4. Solving the Simultaneous Equations.

In matrix form, the system of equations may be represented as follows:

$$p^{nx} = A^{nx}.p^{nx} + A^{mf}.p^{mf},$$

where $p^{nx\prime} = [r_1^n,\ldots,r_n^n,r_1,r_k,r_i^x,\ldots,r_j^x]$, a row vector of ARs for 'endogenous' commodities,

A^{nx} = a matrix of 'endogenous' inputs into 'endogenous' goods,

A^{mf} = a matrix of 'exogenous inputs into 'endogenous' goods, and

$p^{mf\prime}$ = a row vector of ARs for 'exogenous' goods and factors.

So, the matrix p^{nx} may be written as

$$p^{nx} = [I - A^{nx}]^{-1}A^{mf}p^{mf}$$

II.2. Data and Details of Estimation for Korea.

Shadow prices are estimated for the years 1975 and 1983. In addition to input-output matrices being available, these years were chosen because they represent important landmarks in Korea's industrial development. The export promotion of light manufactures reached its peak in the mid 1970s and the heavy and chemical industrial drive gained momentum at this time. By 1983, the heavy and chemical drive was essentially over, and the liberalisation policy was being enforced. We believe, therefore, that shadow prices for these periods would be useful for assessing Korean development policy, both in the past and present.

II.2.1. Commodity Classification.

The classification of a commodity depends on the answer to the following question: how is additional demand for it met? i.e. from imports, exports, or domestic sources? Our classification is based on trade data and on information on the trade regime ruling at the time. A good was treated in the first instance as imported, if imports made up 10 percent or more of total supply (domestic output plus imports). Similarly, it was treated as exported if exports were greater than 10 percent of supply. If neither imports nor exports exceeded this mark, then it was treated as

non-traded. If, however, both exceeded 10 percent, then both classifications were used in different treatments; if imports were greater than exports, then it was categorised as imported in classification 1 and exported in 2, and vice versa.

Furthermore, we took into consideration the government policy on imports at the time. Particularly during the 1970s, quantitative restrictions were important. As late as 1977, only 50 percent of all items were automatically approved for import (Young, 1988). Thus, in classification 2, some commodities subject to import substitution were treated as non-traded. However, we do not believe import restrictions to be as important for 1983; by then, the liberalisation policy was well under way (currently, only the primary sector retains significant protection; see Young, 1988, and table 2.15). The classifications are presented in tables 3.2 and 3.3, and the trade data in tables A3.1 and A3.2 of the appendix to this chapter.

Table 3.2. Commodity Classification, 1975.

		Classification	
		1	2
1	Cereals	M	N
2	Fruits & Vegetables	N	N
3	Industrial Crops	M	M
4	Livestock	N	N
5	Forestry Products	M	M
6	Fishery Products	X	X
7	Coal Mining	M	M
8	Metallic Ores	M	X
9	Nonmetallic Minerals	M	M
10	Meat,Dairy & Fruits	M	M
11	Seafood Processing	X	X
12	Polished Grains	N	N
13	Flour & Cereal Preparations	N	N
14	Other Food Preparations	M	M
15	Beverages	N	N
16	Tobacco Products	N	N
17	Fiber Yarn	X	X
18	Textile Fabrics	X	X
19	Fabricated Textile Products	X	X
20	Leather & Leather Products	X	X
21	Lumber & Plywood	X	X
22	Wood Products & Furniture	X	X
23	Pulp & Paper	M	M
24	Printing & Publishing	N	N
25	Basic Organic Chemicals	M	N
26	Basic Inorganic Chemicals	M	N
27	Chemical Fertilizers	M	N
28	Drugs & Cosmetics	M	N
29	Synthetic Resins & Rubber	M	X
30	Other Chemicals	M	N
31	Petroleum Products	M	N
32	Coal Products	N	N
33	Rubber Products	X	X
34	Nonmetallic Mineral Products	X	X
35	Iron & Steel Manufacturing	M	N
36	Primary Iron & Steel Products	M	X
37	Primary Nonferrous Metal Manufacturing	M	N
38	Fabricated Metal Products	X	M
39	General Industrial Machinery	M	N
40	Household Electrical Appliances	M	N
41	Industrial Electrical Appliances	M	X
42	Electronic & Communication Equipment	X	M
43	Shipbuilding	M	X
44	Motor Vehicles	M	N
45	Other Transport Equipment	M	N
46	Measuring,Medical & Optical Instruments	M	X
47	Miscellaneous Manufacturing	X	X

Table 3.2. contd.

48 Building Construction & Maintenance	N	N
49 Public Works	N	N
50 Electric Power & Gas	N	N
51 Water & Sewer Services	N	N
52 Wholesale & Retail Trade	N	N
53 Restaurants & Hotels	N	N
54 Transportation & Warehousing	N	N
55 Communications	N	N
56 Finance & Insurance	N	N
57 Real Estate & Rental	N	N
58 Public Administration & Defense	N	N
59 Social Services	N	N
60 Other Services	N	N
61 Office Supplies	N	N
62 Business Consumption	N	N
63 Unclassifiable	N	N

Note: N,M and X denote Non-Traded, Imported and Exported Goods respectively.

Table 3.3. Commodity Classification, 1983.

		Classification	
		1	2
1	Cereals	M	N
2	Fruits & Vegetables	N	N
3	Industrial Crops	M	M
4	Livestock	N	N
5	Forestry Products	M	M
6	Fishery Products	X	X
7	Coal Mining	M	M
8	Metallic Ores	M	M
9	Nonmetallic Minerals	M	M
10	Meat,Dairy & Fruits	M	M
11	Seafood Processing	X	X
12	Polished Grains	N	N
13	Flour & Cereal Preparations	N	N
14	Sugar	M	M
15	Backery & Confectionery	N	N
16	Other Food Preparations	N	N
17	Beverages	N	N
18	Tobacco Products	N	N
19	Fiber Yarn	X	X
20	Textile Fabrics	X	X
21	Fabricated Textile Products	X	X
22	Leather & Leather Products	X	X
23	Lumber & Wood Products	X	X
24	Pulp & Paper	M	M
25	Printing & Publishing	N	N
26	Basic Chemicals	M	N
27	Chemical Fertilizers	X	X
28	Drugs & Cosmetics	M	N
29	Synthetic Resins & Rubber	M	X
30	Chemical Fibers	N	N
31	Other Chemicals	M	N
32	Petroleum Products	M	M
33	Coal Products	N	N
34	Rubber Products	X	X
35	Nonmetallic Mineral Products	X	X
36	Iron & Steel Manufacturing	M	N
37	Primary Iron & Steel Products	X	X
38	Primary Nonferrous Metal Manufacturing	M	N
39	Fabricated Metal Products	X	X
40	General Industrial Machinery	M	N

Table 3.3. contd.

41 Household Electrical Appliances	X	X
42 Industrial Electrical Appliances	M	X
43 Household Electronic Appliances	X	X
44 Electronic Appliances	M	X
45 Semi-conductors & Integrated Circuits	M	X
46 Other Electronic Components	M	X
47 Communication Equipment	M	X
48 Shipbuilding	X	X
49 Motor Vehicles	X	X
50 Motor Vehicle Parts	M	N
51 Other Transport Equipment	M	N
52 Measuring,Medical & Optical Instruments	M	X
53 Miscellaneous Manufacturing	X	X
54 Building Construction & Maintenance	N	N
55 Public Works	N	N
56 Electric Power Services	N	N
57 Gas,Steam & Hot Water Services	N	N
58 Water & Sewer Services	N	N
59 Wholesale & Retail Trade	N	N
60 Restaurants & Hotels	N	N
61 Transportation & Warehousing	N	N
62 Communications	N	N
63 Finance & Insurance	N	N
64 Real Estate & Rental	N	N
65 Public Administration & Defense	N	N
66 Education & Research	N	N
67 Medical Services	N	N
68 Social Services	N	N
69 Other Services	N	N
70 Office Supplies	N	N
71 Business Consumption	N	N
72 Unclassifiable	N	N

Note: N,M and X denote Non-Traded, Imported and Exported Goods respectively.

II.2.2. Effective Rates of Tariff

We noted earlier, in chapter 2, that exporters were exempt from tariffs on imports, i.e. the ARs for imports are equal to one for exporters. We are, therefore, interested in estimating the ARs for other users. These ARs are calculated as follows. The Bank of Korea provides inter-industry transaction matrices for both domestically-produced and imported goods. We are, therefore, able to see how much imports of each good is used by each industry. By taking into account how much of each industry's output is exported (and so exempt from tariffs), we are able to estimate what fraction of imports are for domestic use. The effective rate of tariff is then derived by dividing the amount of tariff collected (also provided by the Bank of Korea) by the value of imports so estimated. The AR is then simply 1/(1+effective tariff).

Alternatively, the value of imports of good i for domestic use (M_i)may be expressed as

$$M_i = \Sigma_j M_{ij} \{ 1 - (X_j/O_j) \}$$

where M_{ij} = imports of good i, used by industry j,

X_j = exports by industry j, and

O_j = output by industry j.

We believe that these estimates are preferable to simply using the statutory rates of tariff, because they take into account tax evasion and any deductions or exemptions, which may be important. They are relevant for the purposes for which they are used: a) the calculation of shadow prices for non-tradeables and b) the shadow value of production of importables used domestically.

II.2.3. Export Subsidies and Costs of Distribution.

To estimate the ARs for exported goods, we require data on the rates of export subsidy (or tax) and the cost margins for trade and transport. An alternative expression for the AR of an exported good is

$$\frac{p^{fob}}{p^d} - \frac{\text{social costs of trade and transport (T\&T}^s)}{p^d} ,$$

where p^{fob} = the f.o.b. price of exports, and

p^d = the domestic price

(note that the trade and transport refer to the distribution from the exporter to the border, and not from the exporter to the potential project). The domestic price is equal to

$p^d = p^{fob}$ + subsidy (s) - distribution cost (at market prices; T&T).

So, p^{fob}/p^d may be expressed as

$$\frac{p^{fob}}{p^d} = 1 - \frac{s}{p^d} + \frac{T\&T}{p^d},$$

$$= 1 - \frac{s}{p^{fob}}\frac{*p^{fob}}{p^d} + \frac{T\&T*p^{fob}}{p^{fob}\ p^d}$$

$$= 1/\{\ 1 + (s/p^{fob}) - (T\&T/p^{fob})\ \}.$$

Similarly,

$$\frac{T\&T^s}{p^d} = AR_{T\&T} * \frac{T\&T}{p^{fob}}\frac{p^{fob}}{p^d}.$$

Export subsidies in Korea tend to be based on export performance. For example, short-term loans are extended to exporters on the basis of their export earnings. Subsidies, therefore, are provided at a relatively uniform rate and are often measured in won per dollar export (note that the uniformity applies to exports, and not across industries, i.e. an industry is more likely to benefit, if it exports more of its output). Westphal and Kim (1977) estimated the rate of subsidy to be equal to 81 won per dollar export in 1975, or 17 cents per dollar at the official exchange rate (see table 2.2). Kim (1987) later estimated that the subsidy rate decreased steadily over time, falling to only some 2 percent in 1983 (and zero by 1984; see also World Bank Development Report, 1987, p100). So, s/p^{fob} is assumed to be 17.0 percent and 2.5 percent for 1975 and 1983 respectively.

Our estimates of the trade and transport margins are based on 1980 data. The 1980 input-output table is evaluated at both producer and purchaser prices, allowing us to estimate the distribution costs per unit value of export, f.o.b. This is further adjusted by the ratio p^{fob}/p^d (see

tables 3.4 and 3.5).

Table 3.4. Transport and Trade Margins for Exported Goods, 1980.

	TRANS/X	TRADE/X	T&T/X
Fishery Products	0.005	0.082	0.087
Metallic Ores	0.018	0.011	0.028
Seafood Processing	0.011	0.066	0.077
Fiber Yarn	0.005	0.017	0.022
Textile Fabrics	0.006	0.041	0.047
Fabricated Textile Products	0.004	0.114	0.118
Leather & Leather Products	0.006	0.085	0.091
Lumber & Wood Products	0.030	0.062	0.092
Chemical Fertilizers	0.044	0.000	0.044
Synthetic Resins & Rubber	0.005	0.079	0.084
Rubber Products	0.006	0.082	0.088
Nonmetallic Mineral Products	0.043	0.061	0.104
Primary Iron & Steel Products	0.013	0.031	0.045
Fabricated Metal Products	0.043	0.076	0.119
Electrical Machinery	0.006	0.037	0.043
Electronic Equipment	0.006	0.050	0.056
Transport Machinery	0.004	0.002	0.006
Measuring,Medical & Optical Instruments	0.001	0.118	0.119
Miscellaneous Manufacturing	0.008	0.115	0.123

Source: Korean Input-Output Table, 1980.
Note: Trans/X = transport cost per unit export, f.o.b. Trade/X = trade cost per unit export, f.o.b. T&T = sum of transport and trade costs.

Table 3.5. Selected Indicators for Exported Goods, 1975 and 1983.

1975.	PFOB/PD	ADJ.A.TS	ADJ.A.TR
Fishery Products	0.932	0.005	0.076
Metallic Ores	0.884	0.016	0.009
Seafood Processing	0.924	0.011	0.061
Fiber Yarn	0.879	0.004	0.015
Textile Fabrics	0.898	0.005	0.037
Fabricated Textile Products	0.959	0.003	0.109
Leather & Leather Products	0.935	0.006	0.079
Lumber & Wood Products	0.936	0.028	0.058
Chemical Fertilizers	0.896	0.040	0.000
Synthetic Resins & Rubber	0.930	0.005	0.074
Rubber Products	0.933	0.006	0.076
Nonmetallic Mineral Products	0.947	0.040	0.058
Primary Iron & Steel Products	0.897	0.012	0.028
Fabricated Metal Products	0.960	0.041	0.073
Electrical Machinery	0.895	0.005	0.033
Electronic Equipment	0.906	0.005	0.045
Transport Machinery	0.867	0.003	0.002
Measuring,Medical & Optical Instruments	0.961	0.001	0.113
Miscellaneous Manufacturing	0.965	0.008	0.111

Table 3.5. contd.

1983	PFOB/PD	ADJ.A.TS	ADJ.A.TR
Fishery Products	1.060	0.006	0.087
Metallic Ores	0.998	0.018	0.011
Seafood Processing	1.050	0.012	0.069
Fiber Yarn	0.992	0.005	0.017
Textile Fabrics	1.017	0.006	0.042
Fabricated Textile Products	1.096	0.004	0.125
Leather & Leather Products	1.065	0.007	0.090
Lumber & Wood Products	1.066	0.032	0.066
Chemical Fertilizers	1.014	0.045	0.000
Synthetic Resins & Rubber	1.057	0.005	0.084
Rubber Products	1.061	0.006	0.087
Nonmetallic Mineral Products	1.079	0.046	0.066
Primary Iron & Steel Products	1.015	0.014	0.032
Fabricated Metal Products	1.097	0.047	0.083
Electrical Machinery	1.013	0.006	0.038
Electronic Equipment	1.027	0.006	0.051
Transport Machinery	0.977	0.004	0.002
Measuring,Medical & Optical Instruments	1.098	0.001	0.129
Miscellaneous Manufacturing	1.103	0.009	0.127

Note: PFOB/PD = f.o.b. price/domestic price. ADJ.A.TS = adjusted coefficient for transport, i.e. cost margin per unit export at domestic prices. Similarly for TD (=trade).

II.2.4. Input-Output Coefficients.

The input requirements for the production of non-traded goods in 1975 and 1983 are obtained from input-output matrices for the same years (Bank of Korea). Furthermore, shares in total output are used as weights to estimate the AR for labour; similarly, the composition of fixed investment is derived from input-output data.

II.2.5. The Cost of Capital and Monopoly Profits.

The social cost of capital consists of two parts: i) depreciation, converted by the AR for capital (r_k), and ii) interest payments on the capital stock at the ARI, again converted by r_k, i.e.

$$r_k * \left(\frac{D + ARI*K}{O} \right),$$

where D, K, and O denote depreciation, capital stock and output respectively. Korean input-output tables provide figures for depreciation, although it is uncertain, if they accurately reflect 'economic' depreciation, i.e. the annual sum needed to maintain capital intact. However, the lack of data dictates that we proceed on the assumption, that

the figures are reasonable approximations of economic depreciation.

The second component is estimated as follows: estimates of capital-output ratios (in values) are provided by Kim et al. (1988; for manufacturing) and the World Bank (1987; for primary and service sectors) (see table 3.6). In section I.3, we suggested the use of interest rates on foreign loans for the ARI. We, therefore, estimate ARI as LIBOR (London International Borrowing Rate) minus the rates of inflation and currency depreciation. For 1975, this is equal to -19.31 percent and for 1983, it is equal to 8.75 percent (see table 3.7 for details).

However, it seems unlikely that the ARI -- the social rate of return on the marginal public sector project -- was so low in 1975. The interest rate on foreign loans is a suitable measure of the ARI, only if funds are freely available at that rate. Although the world capital market was dominated by petro-dollars at the time, it is doubtful whether funds were freely forthcoming at such low real interest rates. Indeed, there was a severe shortage of funds over the 1970s in Korea. In view of this, we have arbitrarily selected an alternative ARI of 10 percent; this is more in line with other estimates (e.g. Lal, 1978, and Hong, 1981, estimated it to be around 15 percent).

Table 3.6. Capital-Output Ratios for 1975 and 1983.

	1975	1983
Agriculture, Forestry and Fishing	1.28	2.54
Mining	1.07	1.02
Food	0.49	0.33
Beverages	0.51	0.57
Tobacco Products	0.66	0.78
Textile Yarn & Fabrics	1.03	1.08
Fabricated Textile Products	0.33	0.49
Leather & Products	0.99	0.62
Lumber & Products	0.93	0.93
Pulp & Paper	0.74	0.61
Printing & Publishing	1.48	1.00
Basic Chemicals & Fertilisers	0.74	0.83
Other Chemicals	0.61	0.37
Petroleum Products	0.20	0.30
Coal Products	0.24	0.39
Rubber Products	0.59	0.89
Nonmetallic Mineral Products	1.04	1.08
Iron & Steel Products	0.71	1.01
Nonferrous Metal Products	1.02	1.14
Fabricated Metal Products	1.03	0.77
General Machinery	1.34	0.87
Household Electrical Equipment	0.66	0.47
Industrial Electrical Equipment	0.59	0.47
Electronic Equipment	0.47	0.38
Shipbuilding	1.39	0.99
Motor Vehicles	1.25	0.88
Other Transport Equipment	1.24	1.37
Measuring and other Instruments	0.43	0.49
Miscellaneous Manufacturing	0.45	0.35
Manufacturing	0.63	0.65
Construction	0.16	0.41
Electricity, Gas & Water	3.45	7.14
Wholesale & Retail	1.16	1.72
Transport & Communication	3.89	8.55
Finance & Insurance	0.47	0.53
Public Administration & Defence	5.38	22.89
Social Services	3.09	4.44

Source: Kim et al., 1988, and World Bank, 1987.
Note: Values are at 1980 prices. Output is lagged one year. Capital stock includes land. The figure for public administration, etc. appears to be rather high for 1983. However, any error here would not significantly affect the results elsewhere, since public administration is not an important input for other industries.

We now turn to the estimation of monopoly profits. The input-output tables provide figures for operating surplus (equal to value added minus wages, depreciation and indirect taxes), which combines (market) interest payments and profits (also included is imputed labour, but this is only important in agriculture). We attempted an approximate separation in the following manner. To obtain interest payments at market values, the

capital-output ratios are multiplied with the real market rate of interest. Profit was then derived by subtracting interest payments from operating surplus.

We noted earlier in chapter two, that some sectors were given greater access to policy loans, i.e. interest rates varied across industries. Estimates for the average cost of borrowing by industry are provided by the World Bank (1987, Vol.II, table 5.15, p124; see table 3.7) and they were used to estimate market interest payments.

Table 3.7. Nominal and Real Interest Rates by Sector.

1974

Inflation	29.50%
LIBOR	10.19%
Exchange Rate Depreciation	0.00%
Real ARI	-19.31%
	or 10.00%

	Interest Rates			
	Nominal	Real	ARI/MRI	10/MRI
Agriculture, Forestry & Fishing	7.30	-22.20	0.87	-0.45
Mining	11.10	-18.40	1.05	-0.54
Manufacturing	10.50	-19.00	1.02	-0.53
Food & Beverages	10.62	-18.88	1.02	-0.53
Textiles	9.05	-20.45	0.94	-0.49
Wood Products	9.80	-19.70	0.98	-0.51
Paper & Printing	14.44	-15.06	1.28	-0.66
Chemicals	13.23	-16.27	1.19	-0.61
Nonmetallic Mineral Products	8.33	-21.17	0.91	-0.47
Basic Metals	8.09	-21.41	0.90	-0.47
(Steel)	7.93	-21.57	0.90	-0.46
Fabricated Metals & Machinery	12.11	-17.39	1.11	-0.58
Shipbuilding & Motor Vehicles	10.50	-19.00	1.02	-0.53
Other Manufacturing	14.60	-14.90	1.30	-0.67
Electricity & Gas	5.30	-24.20	0.80	-0.41
Construction	11.70	-17.80	1.08	-0.56
Wholesale & Retail Trade	12.00	-17.50	1.10	-0.57
Transport & Storage	8.30	-21.20	0.91	-0.47
Real Estate & Business Services	8.20	-21.30	0.91	-0.47
Other Services	10.00	-19.50	0.99	-0.51

Table 3.7. contd.

1982

Inflation	7.10%		
LIBOR	9.50%		
Exchange Rate Depreciation	6.35%		
Real ARI	8.75%		
	Interest Rates		
	NOMINAL	REAL	ARI/MRI
Agriculture, Forestry and Fishing	14.55	7.45	1.17
Mining	15.00	7.90	1.11
Manufacturing	15.97	8.87	0.99
Food & Beverages	18.86	11.76	0.74
Textiles	15.98	8.88	0.99
Wood Products	15.18	8.08	1.08
Paper & Printing	19.17	12.07	0.72
Chemicals	18.12	11.02	0.79
Nonmetallic Mineral Products	16.06	8.96	0.98
Basic Metals	11.67	4.57	1.91
(Steel)	11.23	4.13	2.12
Fabricated Metal Products & Machinery	15.69	8.59	1.02
Shipbuilding & Motor Vehicles	13.15	6.05	1.45
Other Manufacturing	15.44	8.34	1.05
Electricity & Gas	5.80	-1.30	-6.73
Construction	16.10	9.00	0.97
Wholesale & Retail Trad	18.40	11.30	0.77
Transport & Storage	16.10	9.00	0.97
Real Estate & Business Services	11.40	4.30	2.03
Other Services	14.00	6.90	1.27

Source: World Bank, 1987, Volumes I and II.
Note: ARI denotes the accounting rate of interest. It is equal to LIBOR (London Borrowing Rate) minus the rates of devaluation and inflation. MRI denotes the real interest rate in the home market.

We simply assumed that the residual, after the subtraction of interest payments (calculated using the relevant real market rate of interest for each industry) from operating surplus, is monopoly profits. Our estimates are presented in tables 3.8 and 3.9. One noticeable feature is that monopoly profits were rather high in 1975. This may be attributed to the real interest rates being significantly negative following the oil shock (the government maintained low nominal interest rates despite rapid inflation to encourage investment).

Table 3.8. Estimates of Monopoly Profits and Real Interest Payments in 1975.

		Profit	Interest
1	Cereals	0.491	-0.171
2	Fruits & Vegetables	0.402	-0.171
3	Industrial Crops	0.377	-0.171
4	Livestock	0.283	-0.171
5	Forestry Products	0.507	-0.171
6	Fishery Products	0.350	-0.171
7	Coal Mining	0.176	-0.126
8	Metallic Ores	0.298	-0.126
9	Nonmetallic Minerals	0.457	-0.126
10	Meat,Dairy & Fruits	0.141	-0.092
11	Seafood Processing	0.161	-0.092
12	Polished Grains	0.509	-0.092
13	Flour & Cereal Preparations	0.423	-0.092
14	Other Food Preparations	0.182	-0.092
15	Beverages	0.205	-0.097
16	Tobacco Products	0.282	-0.125
17	Fiber Yarn	0.244	-0.210
18	Textile Fabrics	0.307	-0.210
19	Fabricated Textile Products	0.183	-0.068
20	Leather & Leather Products	0.334	-0.202
21	Lumber & Plywood	0.228	-0.171
22	Wood Products & Furniture	0.601	-0.502
23	Pulp & Paper	0.212	-0.112
24	Printing & Publishing	0.336	-0.222
25	Basic Organic Chemicals	0.215	-0.121
26	Basic Inorganic Chemicals	0.246	-0.121
27	Chemical Fertilizers	0.195	-0.121
28	Drugs & Cosmetics	0.257	-0.099
29	Synthetic Resins & Rubber	0.195	-0.099
30	Other Chemicals	0.202	-0.099
31	Petroleum Products	0.089	-0.032
32	Coal Products	0.105	-0.039
33	Rubber Products	0.154	-0.096
34	Nonmetallic Mineral Products	0.356	-0.220
35	Iron & Steel Manufacturing	0.185	-0.153
36	Primary Iron & Steel Products	0.203	-0.153
37	Primary Nonferrous Metal Manufacturing	0.317	-0.218
38	Fabricated Metal Products	0.263	-0.179
39	General Industrial Machinery	0.371	-0.234
40	Household Electrical Appliances	0.127	-0.114
41	Industrial Electrical Appliances	0.222	-0.103
42	Electronic & Communication Equipment	0.185	-0.082
43	Shipbuilding	0.397	-0.265
44	Motor Vehicles	0.302	-0.238
45	Other Transport Equipment	0.318	-0.216
46	Measuring,Medical & Optical Instruments	0.149	-0.074
47	Miscellaneous Manufacturing	0.266	-0.068

Table 3.8. contd.

48	Building Construction & Maintenance	0.138	-0.035
49	Public Works	0.138	-0.035
50	Electric Power & Gas	1.208	-1.088
51	Water & Sewer Services	1.248	-1.088
52	Wholesale & Retail Trade	0.782	-0.112
53	Restaurants & Hotels	0.597	-0.112
54	Transportation & Warehousing	0.876	-0.705
55	Communications	1.042	-0.705
56	Finance & Insurance	0.342	-0.055
57	Real Estate & Rental	0.582	-0.055
58	Public Administration & Defense	0.484	-0.468
59	Social Services	0.512	-0.393
60	Other Services	0.724	-0.393
61	Office Supplies	0.122	-0.122
62	Business Consumption	0.122	-0.122
63	Unclassifiable	0.192	-0.122

Note: Monopoly profits were calculated by subtracting payments for labour, capital and indirect taxes from value added. Real interest payments were calculated by applying the real interest rate to the capital stock. The figures are per unit output at producer prices.

Table 3.9. Estimates of Monopoly Profits and Real Interest Payments in 1983.

		Profit	Interest
1	Cereals	0.215	0.110
2	Fruits & Vegetables	0.083	0.110
3	Industrial Crops	0.078	0.110
4	Livestock	0.044	0.110
5	Forestry Products	0.230	0.110
6	Fishery Products	0.138	0.110
7	Coal Mining	0.111	0.050
8	Metallic Ores	0.050	0.050
9	Nonmetallic Minerals	0.169	0.050
10	Meat,Dairy & Fruits	0.011	0.039
11	Seafood Processing	0.005	0.039
12	Polished Grains	-0.030	0.039
13	Flour & Cereal Preparations	-0.029	0.039
14	Sugar	0.022	0.039
15	Backery & Confectionery	0.023	0.039
16	Other Food Preparations	0.013	0.039
17	Beverages	-0.018	0.067
18	Tobacco Products	-0.050	0.091
19	Fiber Yarn	-0.049	0.096
20	Textile Fabrics	-0.030	0.096
21	Fabricated Textile Products	0.005	0.044
22	Leather & Leather Products	-0.032	0.055
23	Lumber & Wood Products	-0.031	0.075
24	Pulp & Paper	-0.004	0.073
25	Printing & Publishing	-0.050	0.121

Table 3.9. contd.

26 Basic Chemicals	-0.012	0.092
27 Chemical Fertilizers	-0.031	0.092
28 Drugs & Cosmetics	0.101	0.041
29 Synthetic Resins & Rubber	0.021	0.041
30 Chemical Fibers	0.078	0.041
31 Other Chemicals	0.041	0.041
32 Petroleum Products	0.028	0.033
33 Coal Products	0.011	0.043
34 Rubber Products	-0.046	0.098
35 Nonmetallic Mineral Products	-0.007	0.097
36 Iron & Steel Manufacturing	0.023	0.042
37 Primary Iron & Steel Products	0.012	0.042
38 Primary Nonferrous Metal Manufacturing	-0.022	0.052
39 Fabricated Metal Products	-0.010	0.066
40 General Industrial Machinery	0.003	0.075
41 Household Electrical Appliances	0.019	0.041
42 Industrial Electrical Appliances	0.039	0.040
43 Household Electronic Appliances	0.053	0.033
44 Electronic Appliances	0.011	0.033
45 Semi-conductors & Integrated Circuits	0.055	0.033
46 Other Electronic Components	0.030	0.033
47 Communication Equipment	0.069	0.033
48 Shipbuilding	0.029	0.060
49 Motor Vehicles	0.040	0.053
50 Motor Vehicle Parts	0.035	0.053
51 Other Transport Equipment	-0.040	0.118
52 Measuring,Medical & Optical Instruments	0.031	0.042
53 Miscellaneous Manufacturing	0.093	0.030
54 Building Construction & Maintenance	0.090	0.036
55 Public Works	0.085	0.036
56 Electric Power Services	0.307	-0.084
57 Gas,Steam & Hot Water Services	0.053	-0.084
58 Water & Sewer Services	0.250	-0.084
59 Wholesale & Retail Trade	0.367	0.119
60 Restaurants & Hotels	0.096	0.119
61 Transportation & Warehousing	-0.410	0.567
62 Communications	-0.397	0.567
63 Finance & Insurance	0.093	0.012
64 Real Estate & Rental	0.491	0.012
65 Public Administration & Defense	-1.285	1.285
66 Education & Research	-0.186	0.188
67 Medical Services	-0.062	0.188
68 Social Services	-0.149	0.188
69 Other Services	0.088	0.188
70 Office Supplies	-0.058	0.058
71 Business Consumption	-0.058	0.058
72 Unclassifiable	-0.058	0.058

II.2.6. The Korean Labour Market and Relative Social Values of Income.

In section II.1.3.4, we noted that the AR for labour depends partly on the functioning of the labour market and partly on the social value of income accruing to the worker relative to that of the numeraire. To remind ourselves,

$$AR_1 = SCF * \{ 1 - \mu(1-m/w) \}.$$

Hong (1981) found that the ratio of marginal product over the wage (m/w) increased gradually over the 1960s and early 1970s, reaching about two-thirds by 1975. Furthermore, Lindauer (1984) later showed that there followed a period of rapid real wage growth (1976-1979), which was difficult to attribute to non-market forces, given that neither union power nor government involvement in wage determination was a significant factor during this period. He suggests that 'surplus labour', in the 'Lewis' sense, was absorbed by the latter half of the 1970's, and that at present, wages in both the modern and non-modern sectors reflect marginal productivity. We may expect, therefore, that m/w is fairly close to one for 1983.

The size of μ involves social values, although we would expect it to be less than one, if the option of income subsidy is available to the government. In view of this, and the tightness of the Korean labour market, we estimate alternative sets of ARs assuming values 1, 0.85 and 0.75 for $\{ 1 - \mu(1-m/w) \}$ in 1983; an additional value 0.67 is used for 1975, to allow for the greater presence of surplus labour at the time.

Finally, we turn to the AR for monopoly profit. Corporate tax rates in Korea are between 20 and 30 percent (see Government of Korea, 1986), implying an α of about 0.75 (see section II.1.3.4). The AR may, therefore, range between zero and 0.75, depending on the value of income accruing to shareholders (λ). Given that the government has often expressed its wish to reduce income inequality in Korea, one might assume that additional consumption by this group has lower social value than for say, workers and

their families.

On the other hand, savings may be viewed as being valuable in a country like Korea with an emphasis on rapid growth. Profits are usually earned by higher income groups, who in turn are important sources of savings (marginal propensity to save increases with income). This idea that there may be a deficiency in savings, and that savings may be more valuable than current consumption, has already been discussed in section I.2.I. We suggest that this argument may have been more important in 1975 than in 1983, as the fastest growth took place during the 1970s. In view of these considerations, we assume the values 0.6 and 0.4 for the AR of monopoly profits.

II.3. Results.

The accounting ratios for imported goods are provided in tables 3.10 and 3.11. For the simultaneously determined ARs, numerous sets are available for different assumptions concerning classification and relative income values. These results are presented in full in the appendix to this chapter, tables A3.3 to A3.8. Here, we include the ARs only for our central cases for 1975 and 1983 (tables 3.12 to 3.14).

In general, the ARs for imported goods are higher the lower the effective tariff. Those for exported goods are higher the lower the rate of export subsidy. For non-traded goods, the accounting ratios tend to be higher the higher the ARs for their major inputs and the smaller the share of indirect taxes and monopoly profits in total costs. Furthermore, they tend to be more affected by changes in assumptions concerning relative income values, the greater the share of wages or monopoly profits in total costs.

To illustrate, let us consider a few examples for 1983: the AR for tobacco products is only about 0.25, because indirect taxes (with an AR of zero) made up some 70 percent of the market price. Coal products, on the

other hand, has an AR of about 0.95, because coal is the major input (accounting for some 70 percent of total cost) and its AR is 0.97.

Table 3.10. ARs for Imported Goods, 1975.
Classification 1.

1	Cereals	0.984
3	Industrial Crops	0.967
5	Forestry Products	0.901
7	Coal Mining	0.994
8	Metallic Ores	0.989
9	Nonmetallic Minerals	0.991
10	Meat,Dairy & Fruits	0.947
14	Other Food Preparations	0.868
23	Pulp & Paper	0.889
25	Basic Organic Chemicals	0.902
26	Basic Inorganic Chemicals	0.864
27	Chemical Fertilizers	0.993
28	Drugs & Cosmetics	0.771
29	Synthetic Resins & Rubber	0.869
30	Other Chemicals	0.788
31	Petroleum Products	0.912
35	Iron & Steel Manufacturing	0.956
36	Primary Iron & Steel Products	0.903
37	Primary Nonferrous Metal Manufacturing	0.875
39	General Industrial Machinery	0.920
40	Household Electrical Appliances	0.727
41	Industrial Electrical Appliances	0.885
43	Shipbuilding	0.985
44	Motor Vehicles	0.736
45	Other Transport Equipment	0.990
46	Measuring,Medical & Optical Instruments	0.859

Classification 2.

3	Industrial Crops	0.967
5	Forestry Products	0.901
7	Coal Mining	0.994
9	Nonmetallic Minerals	0.991
10	Meat,Dairy & Fruits	0.947
14	Other Food Preparations	0.868
23	Pulp & Paper	0.889
38	Fabricated Metal Products	0.837
42	Electronic & Communication Equipment	0.914

Note: The accounting ratio is defined as the ratio of the shadow price over the corresponding market price.

Table 3.11. ARs for Imported Goods, 1983.
Classification 1.

1	Cereals	0.935
3	Industrial Crops	0.916
5	Forestry Products	0.911
7	Coal Mining	0.971
8	Metallic Ores	0.975
9	Nonmetallic Minerals	0.952
10	Meat,Dairy & Fruits	0.817
14	Sugar	0.770
24	Pulp & Paper	0.885
26	Basic Chemicals	0.858
28	Drugs & Cosmetics	0.824
29	Synthetic Resins & Rubber	0.773
31	Other Chemicals	0.782
32	Petroleum Products	0.934
36	Iron & Steel Manufacturing	0.942
38	Primary Nonferrous Metal Manufacturing	0.880
40	General Industrial Machinery	0.893
42	Industrial Electrical Appliances	0.893
44	Electronic Appliances	0.902
45	Semi-conductors & Integrated Circuits	0.890
46	Other Electronic Components	0.824
47	Communication Equipment	0.937
50	Motor Vehicle Parts	0.804
51	Other Transport Equipment	0.932
52	Measuring,Medical & Optical Instruments	0.858

Classification 2.

3	Industrial Crops	0.916
5	Forestry Products	0.911
7	Coal Mining	0.971
8	Metallic Ores	0.975
9	Nonmetallic Minerals	0.952
10	Meat,Dairy & Fruits	0.817
14	Sugar	0.770
24	Pulp & Paper	0.885
32	Petroleum Products	0.934

Table 3.12. Simultaneous ARs for 1975, Classification 1. Accounting Rate of Interest = 10%.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
2	Fruits & Vegetables	0.909	0.789
4	Livestock	1.013	0.922
12	Polished Grains	0.982	0.806
13	Flour & Cereal Preparations	1.344	1.237
15	Beverages	0.748	0.655
16	Tobacco Products	0.564	0.496
24	Printing & Publishing	1.116	0.995
32	Coal Products	1.056	0.986
48	Building Construction & Maintenance	0.854	0.794
49	Public Works	0.883	0.814
50	Electric Power & Gas	1.872	1.575
51	Water & Sewer Services	2.166	1.777
52	Wholesale & Retail Trade	0.831	0.638
53	Restaurants & Hotels	0.842	0.676
54	Transportation & Warehousing	1.560	1.320
55	Communications	1.404	1.145
56	Finance & Insurance	0.789	0.660
57	Real Estate & Rental	0.617	0.481
58	Public Administration & Defense	1.204	1.046
59	Social Services	1.197	1.030
60	Other Services	1.183	0.968
61	Office Supplies	1.028	0.966
62	Business Consumption	1.000	0.856
63	Unclassifiable	1.005	0.917
64	AR Labour	0.716	0.664
65	AR Capital	0.876	0.834
6	Fishery Products	0.861	0.877
11	Seafood Processing	0.857	0.871
17	Fiber Yarn	0.859	0.863
18	Textile Fabrics	0.860	0.868
19	Fabricated Textile Products	0.863	0.885
20	Leather & Leather Products	0.860	0.877
21	Lumber & Plywood	0.844	0.862
22	Wood Products & Furniture	0.844	0.862
33	Rubber Products	0.861	0.877
34	Nonmetallic Mineral Products	0.836	0.857
38	Fabricated Metal Products	0.836	0.860
42	Electronic & Communication Equipment	0.860	0.870
47	Miscellaneous Manufacturing	0.860	0.883
	SCF	0.954	0.886

Table 3.12. contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
2	Fruits & Vegetables	0.968	0.844
4	Livestock	1.046	0.952
12	Polished Grains	1.016	0.837
13	Flour & Cereal Preparations	1.353	1.245
15	Beverages	0.763	0.668
16	Tobacco Products	0.572	0.503
24	Printing & Publishing	1.147	1.023
32	Coal Products	1.069	0.998
48	Building Construction & Maintenance	0.882	0.820
49	Public Works	0.913	0.842
50	Electric Power & Gas	1.893	1.595
51	Water & Sewer Services	2.200	1.808
52	Wholesale & Retail Trade	0.851	0.656
53	Restaurants & Hotels	0.873	0.704
54	Transportation & Warehousing	1.592	1.350
55	Communications	1.448	1.186
56	Finance & Insurance	0.839	0.707
57	Real Estate & Rental	0.626	0.490
58	Public Administration & Defense	1.314	1.148
59	Social Services	1.265	1.093
60	Other Services	1.220	1.002
61	Office Supplies	1.034	0.972
62	Business Consumption	1.021	0.876
63	Unclassifiable	1.028	0.938
64	AR Labour	0.824	0.765
65	AR Capital	0.892	0.848
6	Fishery Products	0.859	0.875
11	Seafood Processing	0.855	0.869
17	Fiber Yarn	0.859	0.863
18	Textile Fabrics	0.859	0.867
19	Fabricated Textile Products	0.861	0.883
20	Leather & Leather Products	0.859	0.876
21	Lumber & Plywood	0.842	0.860
22	Wood Products & Furniture	0.842	0.860
33	Rubber Products	0.859	0.875
34	Nonmetallic Mineral Products	0.833	0.854
38	Fabricated Metal Products	0.833	0.857
42	Electronic & Communication Equipment	0.859	0.869
47	Miscellaneous Manufacturing	0.857	0.881
	SCF	0.970	0.900

Note: (.) = 1 - μ(1-m/w), where μ = the value of income accruing to workers relative to that of the numeraire, m = marginal product of labour, and w = wage. ARP = the accounting ratio for monopoly profits.

Table 3.13. Simultaneous ARs for 1975, Classification 1. Accounting Rate of Interest = -19.31%.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
2	Fruits & Vegetables	0.625	0.519
4	Livestock	0.747	0.668
12	Polished Grains	0.609	0.451
13	Flour & Cereal Preparations	1.174	1.075
15	Beverages	0.510	0.429
16	Tobacco Products	0.379	0.320
24	Printing & Publishing	0.626	0.529
32	Coal Products	0.833	0.775
48	Building Construction & Maintenance	0.725	0.671
49	Public Works	0.725	0.663
50	Electric Power & Gas	0.712	0.471
51	Water & Sewer Services	0.663	0.347
52	Wholesale & Retail Trade	0.582	0.401
53	Restaurants & Hotels	0.561	0.409
54	Transportation & Warehousing	0.615	0.421
55	Communications	0.501	0.285
56	Finance & Insurance	0.558	0.441
57	Real Estate & Rental	0.511	0.381
58	Public Administration & Defense	0.489	0.366
59	Social Services	0.556	0.421
60	Other Services	0.517	0.335
61	Office Supplies	0.798	0.747
62	Business Consumption	0.589	0.465
63	Unclassifiable	0.739	0.663
64	AR Labour	0.575	0.531
65	AR Capital	0.792	0.753
6	Fishery Products	0.885	0.899
11	Seafood Processing	0.882	0.895
17	Fiber Yarn	0.867	0.871
18	Textile Fabrics	0.874	0.881
19	Fabricated Textile Products	0.894	0.914
20	Leather & Leather Products	0.886	0.901
21	Lumber & Plywood	0.885	0.901
22	Wood Products & Furniture	0.885	0.901
33	Rubber Products	0.885	0.900
34	Nonmetallic Mineral Products	0.888	0.906
38	Fabricated Metal Products	0.893	0.914
42	Electronic & Communication Equipment	0.876	0.885
47	Miscellaneous Manufacturing	0.895	0.917
	SCF	0.767	0.708

Table 3.13. contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
2	Fruits & Vegetables	0.668	0.559
4	Livestock	0.769	0.689
12	Polished Grains	0.631	0.471
13	Flour & Cereal Preparations	1.179	1.080
15	Beverages	0.518	0.436
16	Tobacco Products	0.383	0.324
24	Printing & Publishing	0.644	0.545
32	Coal Products	0.841	0.781
48	Building Construction & Maintenance	0.745	0.690
49	Public Works	0.747	0.684
50	Electric Power & Gas	0.712	0.472
51	Water & Sewer Services	0.668	0.352
52	Wholesale & Retail Trade	0.594	0.412
53	Restaurants & Hotels	0.582	0.427
54	Transportation & Warehousing	0.627	0.432
55	Communications	0.523	0.306
56	Finance & Insurance	0.596	0.475
57	Real Estate & Rental	0.518	0.387
58	Public Administration & Defense	0.567	0.438
59	Social Services	0.601	0.462
60	Other Services	0.537	0.353
61	Office Supplies	0.799	0.749
62	Business Consumption	0.600	0.475
63	Unclassifiable	0.753	0.676
64	AR Labour	0.660	0.609
65	AR Capital	0.803	0.763
6	Fishery Products	0.884	0.898
11	Seafood Processing	0.881	0.894
17	Fiber Yarn	0.867	0.871
18	Textile Fabrics	0.873	0.881
19	Fabricated Textile Products	0.892	0.913
20	Leather & Leather Products	0.885	0.900
21	Lumber & Plywood	0.884	0.900
22	Wood Products & Furniture	0.884	0.900
33	Rubber Products	0.884	0.899
34	Nonmetallic Mineral Products	0.887	0.905
38	Fabricated Metal Products	0.891	0.913
42	Electronic & Communication Equipment	0.876	0.885
47	Miscellaneous Manufacturing	0.894	0.916
	SCF	0.776	0.716

Table 3.14. Simultaneous ARs for 1983, Classification 1.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
2	Fruits & Vegetables	0.899	0.878
4	Livestock	0.875	0.857
12	Polished Grains	0.932	0.937
13	Flour & Cereal Preparations	0.927	0.928
15	Backery & Confectionery	0.796	0.785
16	Other Food Preparations	0.828	0.819
17	Beverages	0.485	0.484
18	Tobacco Products	0.261	0.270
25	Printing & Publishing	0.851	0.856
30	Chemical Fibers	0.882	0.851
33	Coal Products	0.944	0.945
54	Building Construction & Maintenance	0.834	0.812
55	Public Works	0.845	0.827
56	Electric Power Services	1.367	1.293
57	Gas,Steam & Hot Water Services	1.444	1.421
58	Water & Sewer Services	1.549	1.458
59	Wholesale & Retail Trade	0.766	0.687
60	Restaurants & Hotels	0.790	0.756
61	Transportation & Warehousing	0.980	1.056
62	Communications	0.858	0.928
63	Finance & Insurance	0.868	0.842
64	Real Estate & Rental	0.612	0.508
65	Public Administration & Defense	1.544	1.772
66	Education & Research	0.999	1.030
67	Medical Services	0.942	0.944
68	Social Services	0.923	0.944
69	Other Services	0.852	0.822
70	Office Supplies	0.916	0.916
71	Business Consumption	0.762	0.753
72	Unclassifiable	0.857	0.857
73	AR Labour	0.920	0.921
74	AR Capital	0.863	0.847
6	Fishery Products	0.989	0.995
11	Seafood Processing	0.985	0.989
19	Fiber Yarn	0.974	0.975
20	Textile Fabrics	0.979	0.982
21	Fabricated Textile Products	0.996	1.006
22	Leather & Leather Products	0.989	0.996
23	Lumber & Wood Products	0.984	0.987
27	Chemical Fertilizers	0.970	0.967
34	Rubber Products	0.989	0.995
35	Nonmetallic Mineral Products	0.984	0.986
37	Primary Iron & Steel Products	0.977	0.979
39	Fabricated Metal Products	0.988	0.991
41	Household Electrical Appliances	0.979	0.981
43	Household Electronic Appliances	0.981	0.985
48	Shipbuilding	0.971	0.971
49	Motor Vehicles	0.971	0.971
53	Miscellaneous Manufacturing	0.997	1.006
	SCF	0.920	0.921

Table 3.14. contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
2	Fruits & Vegetables	0.805	0.784
4	Livestock	0.815	0.798
12	Polished Grains	0.927	0.933
13	Flour & Cereal Preparations	0.909	0.910
15	Backery & Confectionery	0.761	0.750
16	Other Food Preparations	0.805	0.796
17	Beverages	0.458	0.456
18	Tobacco Products	0.252	0.261
25	Printing & Publishing	0.798	0.804
30	Chemical Fibers	0.861	0.830
33	Coal Products	0.925	0.926
54	Building Construction & Maintenance	0.790	0.768
55	Public Works	0.797	0.778
56	Electric Power Services	1.327	1.253
57	Gas,Steam & Hot Water Services	1.409	1.385
58	Water & Sewer Services	1.490	1.399
59	Wholesale & Retail Trade	0.721	0.642
60	Restaurants & Hotels	0.734	0.700
61	Transportation & Warehousing	0.910	0.986
62	Communications	0.782	0.851
63	Finance & Insurance	0.762	0.736
64	Real Estate & Rental	0.590	0.487
65	Public Administration & Defense	1.408	1.635
66	Education & Research	0.863	0.895
67	Medical Services	0.862	0.864
68	Social Services	0.836	0.857
69	Other Services	0.790	0.761
70	Office Supplies	0.907	0.907
71	Business Consumption	0.726	0.717
72	Unclassifiable	0.810	0.809
73	AR Labour	0.756	0.757
74	AR Capital	0.834	0.818
6	Fishery Products	0.993	0.999
11	Seafood Processing	0.989	0.993
19	Fiber Yarn	0.975	0.976
20	Textile Fabrics	0.982	0.985
21	Fabricated Textile Products	1.002	1.012
22	Leather & Leather Products	0.994	1.000
23	Lumber & Wood Products	0.989	0.992
27	Chemical Fertilizers	0.974	0.970
34	Rubber Products	0.993	0.999
35	Nonmetallic Mineral Products	0.990	0.992
37	Primary Iron & Steel Products	0.980	0.981
39	Fabricated Metal Products	0.995	0.998
41	Household Electrical Appliances	0.981	0.983
43	Household Electronic Appliances	0.984	0.988
48	Shipbuilding	0.972	0.971
49	Motor Vehicles	0.972	0.971
53	Miscellaneous Manufacturing	1.003	1.013
	SCF	0.889	0.890

II.4. Uses and Qualifications.

The level of aggregation in our shadow prices (accounting ratios) is fairly high, being dictated by that of the input-output data. However, they may still be useful for policymaking at both micro and macro levels. At the project level, our ARs may be used as conversion factors for some of the inputs (and outputs). When evaluating the net effect of a project on social welfare, the policymaker should value all the various inputs and outputs at their individual shadow prices. As we have seen, this involves subtracting tariffs and other commodity taxes on imports, evaluating trade and transport margins at shadow prices for exports, and the calculation of the social marginal cost for non-traded goods. This is hard work, and it may not be practical to do it for all the commodities. Thus if an item is only a small proportion of total costs, or if it cannot easily be broken down into various parts, then it may be worth using our accounting ratios as short-cuts.

At the macro level, the ARs may be used in the evaluation of tax reform. For example, in the Drèze/Stern model, an increase in the indirect tax on good i is socially desirable if

$$-\Sigma_h \beta^h x_i^h - \nu \frac{\partial x}{\partial q_i} > 0$$

(β^h refers to the value of income accruing to household h relative to the numeraire, and q denotes consumer prices; see section I.4. for details). The ARs may then be used to value changes in demands, resulting from the price changes. In particular, our estimates for 1975 seem ideal in evaluating the establishment of the Korean VAT in 1977. The 1983 ARs may help in evaluating any planned tax reforms.

Indeed, the ARs may be used to evaluate any policy reform, which involves changes in the allocation of resources between broad classes of goods. We ourselves will put them to use to evaluate industrial policy in Korea, in chapter five.

However, the user should be aware of some qualifications. Firstly, the

ARs for non-traded goods are based on the assumption, that input-output coefficients represent input requirements at the margin. Secondly, the ARs vary with assumptions concerning classifications, tightness of the labour market and relative income values. However, some informed judgement concerning the state of the economy and the objectives of society should allow the user to decide which of the sets are most appropriate.

Lastly, it is important to consider the validity of the Little/Mirrlees guidelines. They are based on an implicit model of the economy, where additional demand is eventually satisfied by i) increased imports, ii) reduced exports or iii) increased domestic production. In this, these short-cuts are rather intuitive, but in the absence of a fully articulated model of the economy, they are practical.

We are aware of only one other study of economy-wide shadow prices for Korea (Lal, 1978) -- Lal estimated Little/Mirrlees shadow prices using 1973 input-output data. We believe that our estimates are significant improvements on several counts. The most obvious is the use of more recent data; our estimates for 1983 should be more relevant for current policymaking. Secondly, our procedure is more sound, in that the convention used for the compilation of the input-output data is taken explicitly into account. Furthermore, we recognise the simultaneity between the ARs for exported and non-traded goods; in Lal, the ARs for trade and transport are given some arbitrary values and the ARs for all traded goods are treated as exogenously determined. Thirdly, our shadow prices embody much more of the conditions existing in Korea at the time of estimation, e.g. effective tariff rates were used instead of the statutory rates, to allow for any leakages in the tax system. Anyway, there are some significant differences between his and our estimates of accounting ratios for some commodities. For example, Lal's estimates for communications and fabricated metal products are 0.714 and 1.05; ours are 1.145 and 0.86 respectively (see Lal, 1978; for our estimates, see table 3.12).

II.5. Concluding Remarks.

Our main purpose in this chapter has been to estimate economy-wide shadow prices (accounting ratios) for Korea. In so doing, we hoped to provide the policymaker with a valuable tool for policy appraisal. A further objective has been to provide ourselves with the means to assess industrial policy in Korea since the start of the 'big-push' in 1962.

The shadow prices were estimated using the Little/Mirrlees guidelines, which essentially recommend the use of border prices wherever possible. This is based on the argument that border prices represent the opportunity costs of traded goods. Their theoretical justification was considered using the Drèze/Stern model, and we found the required assumptions to be fairly non-restrictive.

Alternative sets of shadow prices were estimated to encompass a range of possibilities, concerning the state of the economy and social objectives. However, only limited knowledge about them is required to select the more appropriate sets. Probably, the most appropriate values for $\{ 1 - \mu(1-m/w) \}$ and r_π are 0.75 and 0.4 in 1975, and 1 and 0.6 for 1983. We believe that our estimates are among the best currently available, and that they are much better indicators of social opportunity costs than market prices.

Chapter Four.

Infant Industries in Korea: An Assessment of Performance.

1. Introduction.

The policy drive in Korea for the development of heavy and chemical industries over the 1970s was motivated, in part, by declining possibilities for continued growth in light manufactures. Other developing countries with lower labour costs were becoming increasingly competitive and the level of protection was rising in the developed countries. The government's intention appears to have been to 'nurture' these industries to become the second generation of export leaders, i.e. the infant industry argument. They were provided with significant protection, in addition to powerful fiscal and financial incentives. In the event, there was a massive flow of resources into these industries over the 1970s (see chapter two for details).

Given the importance of the infant industry argument, it is surprising to find that little has been done to test its empirical relevance. This is certainly true for Korea and is also true for most developing countries (see Krueger and Tuncer, 1982). The purpose of this chapter is to assess the performance of infant industries in Korea and thereby test the importance of the infant industry argument.

We shall first use the test introduced by Krueger and Tuncer (1982). They argue that greater protection of an industry on infant industry grounds can only be justified if it experiences greater reduction in unit production cost than other less-protected sectors.

Secondly, we shall compare the rates of productivity growth in the infant industries against those of the established counterparts abroad. The argument underlying this test is as follows: for the protection of an infant industry to be justified, it must not only become competitive, but become able to produce at sufficiently lower cost to recover the costs

resulting from the price distortions which provides that protection. A necessary (but not sufficient) condition for this is that production costs of the infant industry must fall faster than those of its established counterpart -- at least at some point in time.

Lastly, we shall see if any of the Korean infant industries have succeeded in becoming competitive. The previous two tests allow us to identify those infant industries that have not met the necessary conditions for maturity. For those that do show signs of maturing, it would be interesting to see if they have yet become competitive. If they have, then we would expect them to perform well in the world market. Balassa's Revealed Comparative Advantage Index (RCA) may provide a suitable measure.

The chapter is organised as follows: in section 2, we briefly review the infant industry argument. In section 3, we assess the performance of Korean infant industries using the three tests discussed above. Conclusions follow in section 4.

2. The Infant Industry Argument.

The argument for fostering infant industries has been succintly put by John Stuart Mill in his Principles:

"The only case in which, on mere principles of political economy, protecting duties can be defensible, is when they are imposed temporarily (especially in a young and rising nation) in hopes of naturalizing a foreign industry, in itself perfectly suitable to the circumstances of the country. The superiority of one country over another in a branch of production often arises only from having begun it sooner. There may be no inherent advantage on one part, or disadvantage on the other, but only a present superiority of acquired skill and experience. A country which has this skill and experience yet to acquire, may in other respects be better adapted to the production than those that were earlier in the field ... But it cannot be expected that individuals should, at their own risk, or rather

to their certain loss, introduce a new manufacture, and bear the burden of carrying it on until the producers have been educated up to the level of those with whom the processes are traditional. A protecting duty, continued for a reasonable time, might sometimes be the least inconvenient mode in which the nation can tax itself for the support of such an experiment." (John Stuart Mill, 1965, Principles of Political Economy, Book V, Ch.10, p918-919).

However, the mere presence of 'learning-by-doing' does not provide sufficient justification for infant industry intervention. If i) the firm has correct expectations about the fruits of the learning process, ii) finance is freely available to the firm at a rate of interest that correctly indicates the social discount rate, and iii) there are no uncorrected divergences of any kind in the economy, then there would be no case for intervention through tariffs or subsidies. Under these assumptions, social and private interests converge and production would take place under private initiative if this is socially beneficial. The case for infant industry intervention is therefore based on the absence of at least one of the three conditions.

The private sector in developing countries may have less information or may be less able to assess the same information than the government. The accumulation of the necessary skill and experience may take a long time -- many years of production may be needed before significant fruits emerge. It may then be argued that the private sector simply does not look so far ahead and that the government -- in the form of civil servants and planners -- has a longer view and sees a more favourable learning curve. However, this argument may be unconvincing as it is not obvious why the private sector should be less efficient at gathering and processing information than the government. Indeed, the private sector may be more efficient as the consequences of success or failure are more immediate.

Infant industry intervention may also be justified if the capital

market is imperfect. Investment in human capital is not embodied in physical goods and may therefore be more difficult to finance, i.e. the capital market may be biased against intangible investment. Furthermore, the rate of interest for long-term investment may be too high. There may be a divergence between social and private rates of time preference and the agents on the capital market may be more 'myopic' than the government (see chapter 3, section I.2.I on the deficiency of savings). In addition, the private discount for risk on long-term investment may be higher -- private investors may be less prepared to endure the suspense of the years of infancy. If there is such a bias in the capital market against infant industries, then some government intervention may be justified.

Lastly, there may be externalities which necessitate government action. Learning-by-doing often cannot be kept within the firm which generates it. Workers are free to move between firms and knowledge gained from production inevitably spreads to other firms. The development of an infant industry implies production activity in new fields and it may involve significant external economies which would not be taken into account by the private sector. Protection may then be warranted.

However, it is important to note that protection through tariffs rarely offers the first-best solution. If the private sector is not fully informed, then it may be best for the government to spread more information. If the capital market is imperfect, then it may be optimal to improve it. If there are external economies in the form of labour training and knowledge diffusion, then it is best to subsidise labour training and knowledge creation, e.g. research and development. This is the familiar argument that a policy that is applied as close as possible to the point of the relevant divergence is generally superior to one applied further away. Nevertheless, protection through tariffs may offer the most convenient policy option, particularly if the government is subject to fiscal constraints.

Finally, even the presence of the market failures discussed above is not sufficient to warrant infant industry intervention. For this, the infant must mature sufficiently to be able to produce at a cost which is not only competitive, but allows the full recovery of the costs incurred during the learning period, i.e. not only the additional production costs but also the costs from reduced consumption. This is the Mill-Bastable Test (see Corden, 1974).

We now proceed to the empirical tests for infant industries. They are essentially based on the conditions necessary for the satisfaction of the Mill-Bastable test.

3. The Empirical Tests.

Empirical testing for the relevance of the infant industry argument should ideally involve only the Mill-Bastable test; this is the only test which ensures whether the protection of an infant is justified. However, it should be evident that the informational requirements for such a test are severe; we would require data on the costs arising on both the production and consumption sides over an extended period. Actual testing procedures are therefore designed to indicate whether the conditions necessary for the satisfaction of the Mill-Bastable test are met and so identify cases where protection may not be warranted.

3.1. The Krueger-Tuncer Test.

The Krueger-Tuncer (1982) argument is as follows: in order for the infant industry argument to be empirically valid, a necessary (but not sufficient) condition is that costs in (temporarily) assisted or protected industries should have fallen over time more rapidly than costs in non- or less-protected industries.

Their argument is based on two assumptions: i) world prices are given and ii) they do not change over time due to differential rates of technological development. The reasoning may be as follows: under these

simplifying conditions, domestic prices would be given at world prices in a free trade regime. Protection for any industry would be necessary only if it were not competitive at such prices and therefore the fostering of this industry would involve a cost to the economy. This cost would only be recovered if the infant industry reduced its unit costs more rapidly than the non-protected industries. If there were differential technological changes, they note that intervention would be warranted only if unit costs were expected to decline more rapidly in the infant industry than in its established foreign counterpart. We shall treat this alternative in the next subsection; here, we shall adopt the two assumptions noted above.

There are two ways that one industry's unit output costs can change relative to another's: either its share-weighted inputs per unit output must fall more (or rise less) than the other's, or the relative price(s) of the factor(s) it uses relatively intensively in production must fall. Using Krueger and Tuncer's notation, we may define total cost, C, of the ith industry as

$$C_i = \Sigma_j \, W_j V_{ji},$$

where W_j = the reward to the jth factor of production,

and V_{ji} = the quantity of the jth factor employed in the ith industry.

Then,

$$dC_i = \Sigma_j \, dW_j V_{ji} + \Sigma_j \, dV_{ji} W_j,$$

and the proportionate change in costs per unit output is

$$\frac{d(C_i/X_i)}{C_i/X_i} = \Sigma_j \, \alpha_{ij} \frac{dW_j}{W_j} + \Sigma_j \, \alpha_{ij} \frac{dV_{ji}}{V_{ji}} - \frac{dX_i}{X_i} \, ,$$

where X_i = output of good i,

and α_{ij} = share of the jth factor in total costs in industry i, i.e. $\frac{W_j V_{ji}}{C_i}$.

Thus the proportionate change in unit production costs in the ith industry is the share-weighted sum of changes in input prices plus that of input

quantities less the rate of change of output. We shall denote the proportionate change in (C_i/X_i) as C_i'. The difference in C' between industries i and k is then

$$C_i'-C_k' = \Sigma_j (\alpha_{ij} - \alpha_{kj}) \frac{dW_j}{W_j} + \{ \Sigma_j \alpha_{ij}\frac{dV_{ji}}{V_{ji}} - \frac{dX_i}{X_i} \} - \{ \Sigma_j \alpha_{kj}\frac{dV_{jk}}{V_{jk}} - \frac{dX_k}{X_k} \} .$$

The first term on the right represents the change in relative costs due to changing relative input prices and contains no element associated with learning. It is therefore ignored in our analysis; changes in relative input prices do not provide grounds for infant industry protection. Thus the proposition is that if there are dynamic factors warranting intervention, they will be reflected in a difference in the two remaining terms of the last equation. This equation may alternatively be written as

$$C_i'-C_k' = \frac{dA_k}{A_k} - \frac{dA_i}{A_i} ,$$

where $\frac{dA_i}{A_i} = \frac{dX_i}{X_i} - \Sigma_j \alpha_{ij}\frac{dV_{ji}}{V_{ji}}$, which is simply the conventional formula for total factor productivity growth.

In sum, infant industry intervention in favour of industry i over k may be warranted only if costs per unit output fall more rapidly in i than k. The last equation shows that a necessary condition for this is that industry i experiences greater total factor productivity growth.

Passing this test is a necessary condition for intervention, but it is not sufficient. This is because i) the industry may have developed under its own power (if the market imperfections or externalities were insignificant), ii) the reduction in costs may have come about for reasons other than learning-by-doing, and iii) the cost reductions may not be sufficient to provide an adequate return on earlier losses. If, however, costs in industry i do not fall relative to industry k, then it is clear that protection is not justified.

Actual estimates of total factor productivity growth for Korea by industrial sector have recently been made available by Kim et al. (1988). They provide four alternative sets of estimates for the period 1966-1983 for thirty eight manufacturing sectors. Two of these sets were estimated using the Growth Accounting Method, one taking into account the increase in intermediate inputs as well as capital and labour, and the other just including the latter two inputs. This method simply applies the equation for total factor productivity (TFP) growth as written above (dA/A). TFP growth simply denotes increases in output not accounted for by increases in inputs.

In the two other sets, Kim et al. use the Translog Production Function Method, where output is represented as a particular function of inputs and time (this method is normally associated with Jorgenson). One then simply estimates the relation between output and time, taking into account the relation between output and the inputs. Two sets of estimates are provided, one assuming Hicks-Neutrality of technological progress and the other not (Hicks-Neutrality refers to the case where technological progress is treated as being separable from capital, i.e. not embodied). We shall not pursue the methodology any further here, as this is outside the scope of this chapter. The interested reader is referred to Nadiri, 1970, and Gallop and Jorgenson, 1980, for further details.

Fortunately, the four sets of TFP growth estimates appear to be fairly consistent. Simple and rank correlation coefficients were relatively high, suggesting that internal rankings are similar between sets. We should note, however, that the TFP growth estimates derived using the Growth Accounting Method and taking into account only capital and labour (set B) are significantly larger than the other estimates, because they partially reflect the output increases resulting from increases in intermediate inputs.

Table 4.1.
Total Factor Productivity Growth In Korea, 1966-73.

(in percent)	Method of Estimation		
Light Manufacturing.	A	B	C
Food	2.51	12.18	2.60
Beverages	5.26	11.11	5.93
Tobacco	6.16	8.65	8.10
Yarn & Fabrics	3.52	22.32	3.54
Fabricated Textile Products	1.74	6.09	2.32
Fabric Products	2.66	8.18	3.53
Other Fabricated Textile Products	2.23	6.57	2.47
Wearing Apparel	1.31	5.25	1.85
Leather Products	1.57	1.98	2.32
Leather & Products	-0.08	-8.13	1.59
Leather Footwear	2.46	7.46	2.72
Lumber & Plywood	4.15	12.66	2.78
Wooden Furniture	2.33	7.06	3.97
Pulp & Paper	3.42	23.28	3.01
Printing & Publishing	0.51	1.32	0.43
Nonmetallic Mineral Products	2.37	7.70	2.93
Ceramics	-0.14	-0.09	2.00
Glass & Products	1.33	5.44	4.93
Other Nonmetallic Products	2.64	8.40	2.72
Miscellaneous Manufacturing	4.26	11.70	3.64
Heavy & Chemical Industry.			
Chemicals	6.53	17.62	3.15
Basic Chemicals	8.47	19.92	0.78
Drugs & Cosmetics, etc.	6.34	19.57	6.87
Rubber Products	2.97	13.04	3.36
Plastic Products	2.65	8.55	0.82
Petroleum & Coal Products	6.72	15.93	-1.59
Petroleum Products	7.88	16.88	-2.49
Coal Products	2.13	12.20	1.92
Primary Metal Products	4.07	28.73	2.98
Iron & Steel	4.58	33.01	3.19
Primary Nonferrous Metal Manufacturing	1.16	4.27	1.79
Fabricated Metal Products	4.51	13.93	4.39
General Machinery	3.79	13.71	3.76
Power Generating Machinery	2.86	7.21	4.11
Metal Working & Processing Machinery, etc.	3.21	9.96	3.07
Office Machinery	5.57	25.37	5.25
Electrical Equipment	6.48	13.53	3.92
Industrial Electrical Equipment	7.35	10.11	4.10
Electronic & Communication Equipment	13.16	26.79	7.05
Household Electrical Equipment	-0.28	-9.04	1.41
Other Electrical Equipment	2.58	9.70	2.08
Transportation Equipment	4.67	13.68	3.50
Shipbuilding	6.67	15.35	4.68
Railroad Vehicles	1.83	7.34	2.19
Motor Vehicles	4.55	13.81	3.35
Other Transport Equipment	6.72	20.73	4.48
Measuring, Medical & Optical Instruments	6.31	21.63	4.88

Source: Kim et al., 1988.
Note: A and B are total factor productivity growth measures using the growth accounting method; A takes into account intermediate inputs as well as capital and labour, unlike B. C is estimated using a translog production function, not assuming Hicks-Neutral technology growth (see text for further details).

Table 4.1. contd.
Total Factor Productivity Growth in Korea, 1973-83.
(in percent)

Light Manufacturing.	A	B	C
Food	1.52	7.26	1.29
Beverages	0.46	0.86	0.17
Tobacco	2.14	3.19	0.99
Yarn & Fabrics	1.73	7.91	1.20
Fabricated Textile Products	1.25	4.30	0.87
Fabric Products	2.02	6.38	1.39
Other Fabricated Textile Products	1.72	5.27	1.41
Wearing Apparel	0.71	2.91	0.44
Leather Products	2.22	7.37	1.81
Leather & Products	2.66	10.34	2.31
Leather Footwear	1.83	4.75	1.37
Lumber & Plywood	0.56	2.88	-0.33
Wooden Furniture	7.93	25.57	6.67
Pulp & Paper	1.90	8.16	1.41
Printing & Publishing	2.95	8.05	2.92
Nonmetallic Mineral Products	1.63	4.28	1.49
Ceramics	3.38	8.28	3.71
Glass & Products	2.44	5.73	2.21
Other Nonmetallic Products	1.40	3.83	1.26
Miscellaneous Manufacturing	2.43	7.56	2.16
Heavy & Chemical Industry.			
Chemicals	-0.93	3.69	0.64
Basic Chemicals	-7.81	-8.36	-2.42
Drugs & Cosmetics, etc.	4.48	15.11	3.36
Rubber Products	0.72	3.18	0.23
Plastic Products	0.16	-0.06	0.23
Petroleum & Coal Products	-3.83	-10.37	-4.47
Petroleum Products	-4.32	-11.54	-5.05
Coal Products	-0.32	-1.89	-0.30
Primary Metal Products	0.27	1.37	0.15
Iron & Steel	0.06	0.62	-0.02
Primary Nonferrous Metal Manufacturing	1.92	7.17	1.41
Fabricated Metal Products	2.58	9.63	2.07
General Machinery	4.68	12.33	3.90
Power Generating Machinery	11.22	26.28	8.83
Metal Working & Processing Machinery, etc.	1.37	4.15	1.27
Office Machinery	4.34	12.97	3.81
Electrical Equipment	2.82	9.41	1.95
Industrial Electrical Equipment	3.20	11.47	2.28
Electronic & Communication Equipment	2.50	8.71	1.76
Household Electrical Equipment	7.77	16.38	3.93
Other Electrical Equipment	2.32	8.76	1.86
Transportation Equipment	2.46	7.34	1.69
Shipbuilding	3.17	8.88	2.00
Railroad Vehicles	1.38	5.05	1.02
Motor Vehicles	2.49	7.55	1.91
Other Transport Equipment	0.76	2.87	0.04
Measuring, Medical & Optical Instruments	3.12	11.25	2.56

Table 4.1. contd.
Total Factor Productivity Growth in Korea, 1966-83.
(Growth Accounting Method; in percent)

	A	B
Light Manufacturing.		
Food	1.93	9.26
Beverages	2.40	4.97
Tobacco	3.78	5.41
Yarn & Fabrics	2.46	13.62
Fabricated Textile Products	1.45	5.04
Fabric Products	2.28	7.12
Other Fabricated Textile Products	1.93	5.80
Wearing Apparel	0.96	3.87
Leather Products	1.95	5.15
Leather & Products	1.52	5.90
Leather Footwear	2.09	5.83
Lumber & Plywood	2.02	6.80
Wooden Furniture	5.59	17.59
Pulp & Paper	2.53	14.15
Printing & Publishing	1.94	5.23
Nonmetallic Mineral Products	1.93	5.68
Ceramics	1.92	4.76
Glass & Products	1.98	5.61
Other Nonmetallic Products	1.91	5.69
Miscellaneous Manufacturing	3.18	9.25
Heavy & Chemical Industry.		
Chemicals	2.15	9.43
Basic Chemicals	-1.43	2.37
Drugs & Cosmetics, etc.	5.24	16.93
Rubber Products	1.64	7.13
Plastic Products	1.18	3.40
Petroleum & Coal Products	0.51	0.46
Petroleum Products	0.52	-0.78
Coal Products	0.68	3.68
Primary Metal Products	1.84	12.64
Iron & Steel	1.90	12.87
Primary Nonferrous Metal Manufacturing	1.61	5.97
Fabricated Metal Products	3.37	11.38
General Machinery	4.31	12.90
Power Generating Machinery	7.70	18.04
Metal Working & Processing Machinery, etc.	2.12	6.50
Office Machinery	4.85	17.92
Electrical Equipment	4.33	11.11
Industrial Electrical Equipment	4.89	10.91
Electronic & Communication Equipment	6.76	15.82
Household Electrical Equipment	4.38	5.15
Other Electrical Equipment	2.43	9.15
Transportation Equipment	3.37	9.95
Shipbuilding	4.60	11.50
Railroad Vehicles	1.56	5.98
Motor Vehicles	3.33	10.09
Other Transport Equipment	3.17	9.88
Measuring, Medical & Optical Instruments	4.42	15.41

Table 4.1. contd.
Total Factor Productivity Growth in Korea, 1966-83.
(Translog Production Function Method; in percent)

	D	C
Light Manufacturing.		
Food	1.17	1.87
Beverages	2.64	2.73
Tobacco	4.24	4.15
Yarn & Fabrics	2.26	2.24
Fabricated Textile Products	-	1.46
Fabric Products	2.34	2.34
Other Fabricated Textile Products	2.49	1.88
Wearing Apparel	0.93	1.07
Leather Products	-	2.02
Leather & Products	1.88	1.99
Leather Footwear	2.00	1.97
Lumber & Plywood	1.28	1.05
Wooden Furniture	5.28	5.47
Pulp & Paper	2.15	2.12
Printing & Publishing	1.78	1.81
Nonmetallic Mineral Products	-	2.08
Ceramics	2.46	2.95
Glass & Products	3.64	3.42
Other Nonmetallic Products	1.94	1.91
Miscellaneous Manufacturing	2.85	2.82
Heavy & Chemical Industry.		
Chemicals	-	1.68
Basic Chemicals	-1.14	-1.00
Drugs & Cosmetics, etc.	4.27	4.92
Rubber Products	1.74	1.62
Plastic Products	0.52	0.49
Petroleum & Coal Products	-	-3.29
Petroleum Products	-5.00	-3.91
Coal Products	0.37	0.69
Primary Metal Products	-	1.32
Iron & Steel	1.57	1.41
Primary Nonferrous Metal Manufacturing	1.08	1.58
Fabricated Metal Products	3.83	3.10
General Machinery	-	3.84
Power Generating Machinery	8.06	6.73
Metal Working & Processing Machinery, etc.	1.93	2.07
Office Machinery	5.29	4.45
Electrical Equipment	-	2.76
Industrial Electrical Equipment	2.97	3.09
Electronic & Communication Equipment	4.17	4.11
Household Electrical Equipment	4.55	2.81
Other Electrical Equipment	1.64	1.96
Transportation Equipment	-	2.44
Shipbuilding	2.78	3.19
Railroad Vehicles	1.66	1.54
Motor Vehicles	2.73	2.55
Other Transport Equipment	2.10	2.01
Measuring, Medical & Optical Instruments	2.84	3.59

Note: D is estimated using a translog production function under the assumption of Hicks-Neutral technology growth; C does not involve this assumption.

As in the Krueger-Tuncer study, we measure the extent of infant industry intervention using the effective rate of protection (ERP). The ERP represents the protection offered to the value added in an industry (see Krueger, 1984, for details). The Korea Development Institute provides ERP estimates for twenty manufacturing sectors for the years 1978 and 1982 (see Young et al., 1982). ERP estimates for the early 1970s would have been preferable, since the causation supposedly runs from protection to productivity growth. Nevertheless, the trade regime stayed fairly constant over most of the 1970s (import liberalisation started only in the early 1980s) and it is likely that at least the 1978 estimates reflect the pattern of protection over the entire decade. The ERPs were estimated using both the Balassa and Corden methods, the difference between the two methods lying in the definition of value added (see Balassa, 1971 and Corden, 1974).

A brief look at the ERP estimates shows immediately that the recipients of the greatest protection over the 1970s were the heavy and chemical industries; namely those manufacturing chemicals, petroleum and coal products, primary metal products, general and electrical machinery, and transport machinery. Interestingly, the wearing apparel sector also received significant protection. This probably reflects the government intention to subsidise export growth in this industry by taxing domestic consumers. However, we shall focus on the heavy and chemical industries in this chapter.

It follows, that if the additional protection provided to the heavy and chemical industries were to have been warranted, then they should also have experienced the highest rates of total factor productivity growth. Let us now consider the productivity performance of the chemical, metal and machinery industries in turn.

Overall, the chemical industry experienced relatively high TFP growth over 1967-73, but not over 1973-83. Some sectors, such as drugs,

cosmetics, synthetic resins and rubbers, and other chemicals produced high TFP growth over the entire period (1967-83). For them, the additional protection seems more likely to have been warranted. The same may not be said for the plastics and coal products subsectors, however, since they experienced low TFP growth over the entire period. Some subsectors, such as basic chemicals and petroleum products, produced high productivity growth over the first period, but not over the second. The petroleum products subsector developed mainly during the first period (after the construction of the Ulsan Refinery in 1964) and so the possibility remains, that it attained maturity by the mid 1970s. However, the main growth phase for basic chemicals came after the construction of the Ulsan Petrochemical Complex in 1972 and the low TFP growth thereafter suggests that the protection may not have been warranted.

The primary metal industry is divided into two subsectors: iron and steel, and primary nonferrous metal manufacturing. For the former, TFP growth was relatively high for the first period, but not over the second. For the latter, TFP growth was relatively low over both periods. Given that this industry expanded mainly after the third Five-Year Plan (1972-76), infant industry considerations may not have been sufficient to justify protection.

The fabricated metal products industry did succeed in attaining rapid productivity growth over both periods. This industry was highly protected at the start of the 1970s (see Westphal and Kim, 1977) and here the infant industry considerations may have been important.

The machinery industry consists of general and electrical machinery, electronics, transport equipment and measuring, medical and optical instruments. All these subsectors experienced above-average TFP growth over the entire period; the general machinery subsector experienced TFP growth rates some 200 to 300 percent greater than the average. Also, within the transport equipment subsector, the TFP growth rates for

shipbuilding and motor vehicles were particularly high. Protection may well have been justified here.

To summarise, it would seem that the protection of chemical and primary metal industries was only in part justified on infant industry grounds. The protection may have been more warranted in the fabricated metal products and machinery industries.

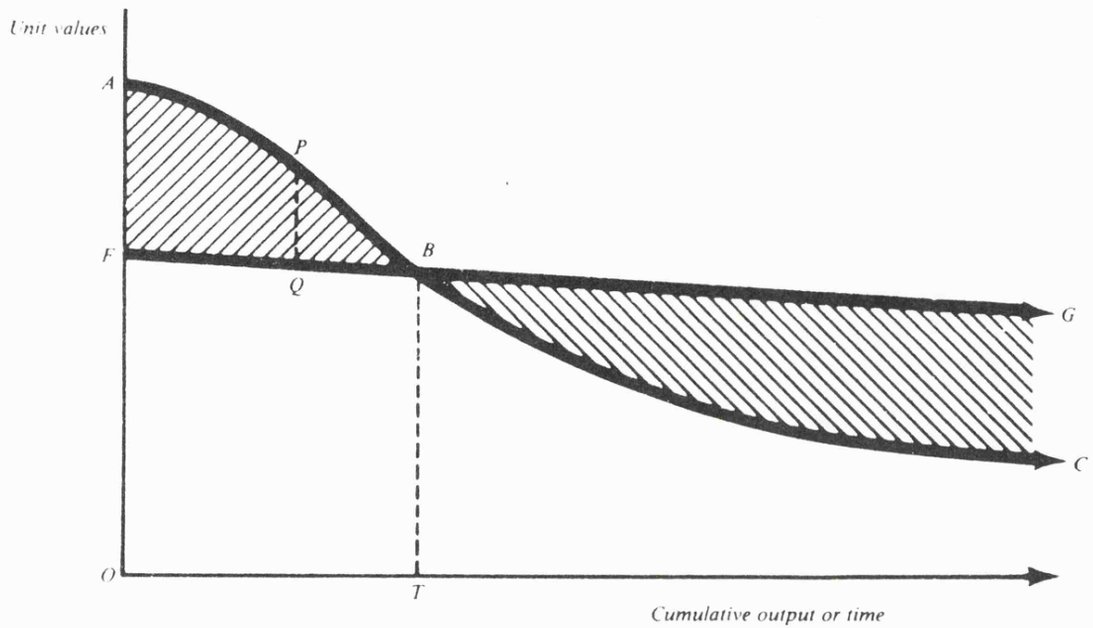
The implication is that protection should perhaps have been more finely tuned. However, it may not have been easy to identify the appropriate subsectors ex ante and to direct support only to them. This should be borne in mind, when assessing the heavy and chemical industry drive. This is left until some more evidence has been examined.

3.2. International Comparison of Productivity Growth.

The Krueger-Tuncer test assumes that world prices are given and that they do not change over time due to differential rates of technological progress. They noted that if this assumption were relaxed, then the infant industry case would need to be reformulated to state that intervention would be warranted only if unit costs were expected to decline more rapidly in the infant industry than in the mature counterpart abroad. We shall carry out this alternative test for infant industry intervention in this subsection.

The logic behind this test may be explained using Figure 1. FBG represents the trend in the unit cost of production in the established foreign counterpart. ABC represents the trend for the same in the domestic infant industry. The cost of supporting the infant in the first year of production is AF per unit output. In time, the learning-by-doing reduces the unit costs and eventually the infant becomes 'mature' or competitive from time T onwards. If we view the horizontal axis as now depicting cumulative output, the area ABF represents the undiscounted costs of the infancy and the area BGC represents the undiscounted benefits of maturity.

Fig. 1. The Cost, Benefit, and Duration of Infancy



Using the social rate of discount, the present value of BCG should be at least as large as that of ABF. This is the Mill-Bastable test.

In order for the net present value of infant industry promotion to be positive, the infant must become able to undercut the price of the established counterpart at some point in time. A necessary condition for this is that the unit production cost of the infant must at some time decline more rapidly than that of its counterpart; that is, the infant must produce faster total factor productivity growth.

That said, it should be noted that international comparisons of total factor productivity growth are not easily made. First, there are very few studies available on TFP growth by industrial sector. Second, as we have already discussed, there are several ways to estimate TFP growth. Thus even if TFP estimates were available by sector, they may not be comparable across countries. Third, it is difficult to find TFP estimates for the same time period. We are therefore limited in how many countries we can include in this comparison.

Fortunately, comparable TFP growth estimates are available for the US (1966-1973) and Japan (1966-1983). This is important given that these two nations are historically Korea's largest trading partners; over the 1970s, they have been the destination of some 50 to 70 percent of Korean exports and the source of some 60 to 70 percent of Korean imports (these figures based on IMF trade data). Thus, they are likely to be the 'established counterparts' with whom the infant industries must compete.

The TFP growth estimates for the US are provided by Gallop and Jorgenson (1980). These estimates were derived using a translog production function, not assuming Hicks-Neutrality of technological progress (see earlier discussion in section 3.1). Kim et al. provide estimates for the same period (1966-73) using the same approach -- the only difference being that Gallop and Jorgenson assume constant returns to scale and Kim et al. do not. The estimates are presented in table 4.2.

Table 4.2.
A Comparison of Total Factor Productivity Growth Between Korea and USA.

(1966-1973)

	USA	Korea
Chemicals	2.67	3.15
Petroleum & Coal Products	0.94	-1.59
Rubber Products	1.87	3.15
Primary Metal Products	-0.46	2.98
Fabricated Metal Products	0.90	4.39
General Industrial Machinery	1.05	3.76
Electrical machinery	1.60	3.92
Transport Machinery except Motor Vehicles	0.59	3.50
Motor Vehicles	1.04	3.35
Measuring, Medical and Optical Instruments	2.43	4.88

Source: Table 1.30, Gallop and Jorgenson, 1980, and Kim et al., 1988.
Note: These measures are derived using a translog production function, not assuming Hicks-Neutrality in technological growth (in percent).

It should be noted that the 1966-73 period precedes the main heavy and chemical industrial phase in Korea. However, the plans for their development were already formulated by the late 1960s and many of the special promotional laws were enacted at this time: in 1967 for the machinery and shipbuilding industries, in 1970 for the iron and steel and the petrochemical industries, and in 1971 for the nonferrous metal industry. Moreover, general and transport machinery industries were also the recipient of the highest effective protection over the late 1960s (see Westphal and Kim, 1977). Thus, this Korea-US comparison may indicate whatever learning-by-doing took place during the early years.

Table 4.2 suggests that the Korean infant industries performed rather well at least over the 1966-73 period. They produced faster TFP growth relative to the US industries, with the exception of the petroleum and coal products industry.

The TFP growth estimates for Japan are provided by the Japan Development Bank (1984) for the period 1966-1983. This study was at a much greater level of industrial aggregation, but a Korea-Japan comparison for the heavy and chemical industries may still provide useful information. The Growth Accounting Method was used, and only the inputs of capital and labour were taken into account (see tables 4.3 and 4.4).

Table 4.3.
Total Factor Productivity Growth in Japan.

	Textiles	Chemicals	Metal Industry	Machinery Industry		
				General	Electrical	Transport
1966	7.99	8.48	3.47	-1.07	-1.53	1.58
1967	5.04	7.51	24.27	-0.09	19.15	15.18
1968	6.64	10.84	1.02	11.66	10.09	12.71
1969	13.29	12.81	9.54	14.44	23.57	8.19
1970	6.55	5.29	6.76	5.59	21.47	12.23
1971	3.76	19.09	10.77	3.16	8.74	-9.29
1972	0.67	14.38	4.53	-1.84	26.07	-3.34
1973	-5.76	-7.71	-2.74	-4.59	15.15	7.13
1974	19.05	-0.16	-9.55	1.78	5.12	10.75
1975	-0.49	0.11	9.97	9.85	2.83	-0.89
1976	-4.65	4.71	4.53	10.40	25.84	11.96
1977	11.63	18.42	-5.54	0.61	11.66	4.37
1978	-4.69	18.86	1.66	11.78	13.33	4.26
1979	4.35	-4.93	14.18	3.70	16.36	7.02
1980	-1.56	-3.62	3.12	3.77	18.49	3.71
1981	5.12	11.64	-8.51	8.92	8.75	-3.29
1982	1.44	11.12	1.08	8.91	11.27	3.58
		Annual Average Rates				
1966-73	6.28	11.20	8.62	4.55	15.37	5.32
1973-83	2.44	4.84	0.82	5.51	12.88	4.86
1966-83	4.02	7.46	4.03	5.12	13.90	5.05

Source: 'Chosa', Table 1, p.16, Japan Development Bank, May 1984.
Note: These estimates are derived using the growth accounting method and only capital and labour are taken into account (in percent).

Table 4.4.
A Comparison of Total Factor Productivity Growth Between Korea and Japan.

	1966-73		1973-83	
	Korea	Japan	Korea	Japan
Chemicals	17.62	11.20	3.69	4.84
Petroleum & Coal Products	15.93	11.20	-10.37	4.84
Primary Metal Products	28.73	8.62	1.37	0.82
Fabricated Metal Products	13.93	8.62	9.63	0.82
General Machinery	13.71	4.55	12.33	5.51
Electrical Equipment	13.53	15.37	9.41	12.88
Transportation Equipment	13.68	5.32	7.34	4.86

	1966-83	
	Korea	Japan
Chemicals	9.43	7.46
Petroleum & Coal Products	0.46	7.46
Primary Metal Products	12.64	4.03
Fabricated Metal Products	11.38	4.03
General Machinery	12.90	5.12
Electrical Equipment	11.11	13.90
Transportation Equipment	9.95	5.05

Source: Calculated from 'Chosa', Table 1, p16, Japan Development Bank, 1984 and Kim et al., 1988.
Note: These measures are derived using the growth accounting method and only labour and capital are taken into account (in percent).

The chemical industry attained higher TFP growth rates than the Japanese counterpart over 1966-73, but not over 1973-83 (we noted earlier that this industry developed mainly in the second period). This again suggests that infant industry considerations may not have been particularly important for the chemical industry.

The primary metal products industry showed higher TFP growth over both periods than the corresponding Japanese industry. In contrast to our earlier finding, the implication here is that the additional protection may have been warranted. It may be possible that, although it performed poorly relative to other domestic industries, its TFP growth rates were sufficiently high to narrow the productivity gap relative to the Japanese counterpart.

The general and transport machinery industries maintained TFP growth rates twice as high as those in Japan. This suggests that infant industry intervention may well have been justified in these cases and this is

consistent with our results from the Krueger-Tuncer test. However, the electrical machinery industry only managed TFP growth rates slightly lower than those of the Japanese competitor. Nevertheless, this may not be inconsistent with this Korean industry achieving international competitiveness. It still performed better than the US counterpart and Japan has been a world leader in this field in the recent past. The Korean electrical industry may therefore have succeeded in closing the gap with, and indeed may have passed, many of the established industries around the world.

These findings are basically consistent with those from the Krueger-Tuncer test. Let us, therefore, make some preliminary observations. It seems that the government may have been successful in nurturing some 'infants' into maturity, at least as far as the fabricated metal products and machinery industries are concerned. Obvious examples are shipbuilding and, lately, automobiles. Inasmuch as these infant industries have become new sources of growth, policy intervention may have played a contributory role (this is discussed further in section 3.3).

Finally, let us see if any of these infants have succeeded in achieving 'maturity' (as opposed to 'infancy') over the 1970s and 1980s.

3.3. Revealed Comparative Advantage.

The previous two methods for testing the empirical relevance of the infant industry argument rely on the presence (or absence) of the productivity growth necessary for the satisfaction of the Mill-Bastable test. An alternative method is to see if 'maturity' has yet been achieved, i.e. if the infant industry has become competitive. This again is not sufficient, but it is necessary for the justification of infant industry intervention.

For this purpose, we shall use the Balassa Revealed Comparative Advantage Index (RCA). This is formally defined for a country k and good i as

$$RCA_i = (E_{i,k}/E_k) \; / \; (E_{i,world}/E_{world}),$$

where $E_{i,k}$ = exports of good i by country k,

and E_k = total exports by country k.

The RCA index shows a country's share in world exports of a given product, relative to its share in total world exports. With increasing maturity and competitiveness, we would expect the infant to show increasing RCA, which should eventually become equal to or greater than one, indicating world-wide competitiveness. RCA indices were calculated for the period 1973-1986 using United Nations trade data (at two-digit SITC level). The level of disaggregation was chosen so as to allow comparison with other chapters of this thesis (see table 4.5).

The results from this test are generally consistent with those of the other two tests. The chemical industry appears not to have succeeded in achieving comparative advantage, with the exception of chemical fertilisers (and other agricultural chemicals) and rubber products (including rubber shoes). However, rubber products have not been subject to additional protection and therefore may not qualify as an infant industry in this sense. The Krueger-Tuncer test suggested that drugs, cosmetics, synthetic resins and rubber, and some other chemicals have shown the required productivity growth. The RCA indices indicate, however, that maturity has so far not been achieved; sectors 28, 29 and 31 still show RCAs of less than 0.5 in 1986. These sectors may become competitive in the future; this possibility cannot be ruled out. However, the longer the period needed to reach maturity, the greater the costs to be recovered and the less likely that the Mill-Bastable test will be satisfied. For the other subsectors within the chemical industry, the results are not encouraging. They have not yet achieved comparative advantage, and their productivity growth rates do not indicate that they will in the future.

Table 4.5.
Revealed Comparative Advantage Indices for Korea.

		1973	1974	1975
1	Cereals	0.125	0.046	0.027
2	Fruits & Vegetables	0.564	0.426	0.467
3	Industrial Crops	1.487	1.216	0.743
4	Livestock	0.021	0.017	0.104
6	Fishery Products	5.647	6.573	12.222
7	Coal Mining	0.134	0.012	0.000
8	Metallic Ores	0.409	0.391	0.410
9	Nonmetallic Minerals	0.079	0.047	0.034
10	Meat,Dairy & Fruits	0.234	0.363	0.424
11	Seafood Processing	4.787	5.022	5.301
14	Sugar	0.354	0.670	1.458
16	Other Food Preparations	0.098	0.142	0.206
17	Beverages	0.031	0.027	0.036
18	Tobacco Products	1.370	2.409	2.817
19	Fiber Yarn	2.268	2.714	4.943
20	Textile Fabrics	4.355	3.752	4.300
21	Fabricated Textile Products	8.559	9.608	9.385
22	Leather & Leather Products	1.381	2.310	2.990
23	Lumber & Wood Products	3.920	2.629	2.817
24	Pulp & Paper	0.396	0.358	0.328
25	Printing & Publishing	1.232	0.119	0.693
26	Basic Chemicals	0.219	0.393	0.290
27	Chemical Fertilizers	0.344	0.000	0.001
28	Drugs & Cosmetics	0.134	0.152	0.193
29	Synthetic Resins & Rubber	0.393	0.449	0.878
31	Other Chemicals	0.154	0.148	0.120
32	Petroleum Products	0.344	0.544	0.479
34	Rubber Products	3.148	4.894	4.334
35	Nonmetallic Mineral Products	0.638	1.089	1.168
36	Iron & Steel Manufacturing	0.337	0.342	0.205
37	Primary Iron & Steel Products	1.254	1.888	0.905
38	Primary Nonferrous Metal Manufacturing	0.079	0.085	0.074
39	Fabricated Metal Products	0.794	1.246	1.007
40	General Industrial Machinery	0.158	0.171	0.126
41	Household Electrical Appliances	0.054	0.151	0.129
42	Industrial Electrical Appliances	2.069	2.361	1.729
43	Household Electronic Appliances	2.702	3.348	3.577
47	Communication Equipment	1.366	2.034	1.615
48	Shipbuilding	0.089	1.035	1.419
49	Motor Vehicles	0.008	0.008	0.009
51	Other Transport Equipment	0.292	0.675	0.498
52	Measuring,Medical & Optical Instruments	0.342	0.660	0.704
53	Miscellaneous Manufacturing	2.841	3.990	3.713

Source: Estimated from United Nations trade data.
Note: Balassa's revealed comparative advantage index for a good is defined as the share of that good in the country's total exports expressed as a fraction of the share of the world's exports of that good in the world's total exports.

Table 4.5. continued.

		1976	1977	1978
1	Cereals	0.028	0.098	0.096
2	Fruits & Vegetables	0.463	0.510	0.496
3	Industrial Crops	0.405	0.804	0.565
4	Livestock	0.024	0.001	0.002
6	Fishery Products	6.142	10.032	6.400
7	Coal Mining	0.007	0.003	0.002
8	Metallic Ores	0.299	0.278	0.203
9	Nonmetallic Minerals	0.027	0.027	0.034
10	Meat,Dairy & Fruits	0.285	0.309	0.197
11	Seafood Processing	4.172	4.720	3.594
14	Sugar	0.446	0.355	0.316
16	Other Food Preparations	0.140	0.084	0.121
17	Beverages	0.026	0.048	0.094
18	Tobacco Products	2.188	2.332	1.730
19	Fiber Yarn	4.416	3.041	3.218
20	Textile Fabrics	4.083	3.879	4.541
21	Fabricated Textile Products	9.354	8.178	7.476
22	Leather & Leather Products	2.460	2.846	3.121
23	Lumber & Wood Products	2.580	2.341	1.983
24	Pulp & Paper	0.377	0.359	0.392
25	Printing & Publishing	0.098	0.143	0.273
26	Basic Chemicals	0.268	0.312	0.228
27	Chemical Fertilizers	0.405	1.813	2.717
28	Drugs & Cosmetics	0.140	0.124	0.100
29	Synthetic Resins & Rubber	0.262	0.284	0.293
31	Other Chemicals	0.151	0.196	0.211
32	Petroleum Products	0.476	0.268	0.078
34	Rubber Products	5.434	4.964	5.161
35	Nonmetallic Mineral Products	1.235	1.226	0.854
36	Iron & Steel Manufacturing	0.350	0.572	0.266
37	Primary Iron & Steel Products	1.105	0.964	1.038
38	Primary Nonferrous Metal Manufacturing	0.105	0.151	0.151
39	Fabricated Metal Products	1.224	2.264	1.544
40	General Industrial Machinery	0.146	0.125	0.133
41	Household Electrical Appliances	0.195	0.248	0.326
42	Industrial Electrical Appliances	1.789	1.377	1.152
43	Household Electronic Appliances	4.013	3.333	2.658
47	Communication Equipment	1.956	2.051	2.419
48	Shipbuilding	1.809	2.746	4.123
49	Motor Vehicles	0.018	0.035	0.075
51	Other Transport Equipment	0.435	0.770	1.064
52	Measuring,Medical & Optical Instruments	0.911	0.704	0.658
53	Miscellaneous Manufacturing	3.841	4.740	4.361

Table 4.5. continued.

		1979	1980	1981
1	Cereals	0.024	0.017	0.011
2	Fruits & Vegetables	0.432	0.506	0.407
3	Industrial Crops	0.409	0.415	0.281
4	Livestock	0.001	0.008	0.003
6	Fishery Products	7.219	6.286	5.707
7	Coal Mining	0.000	0.000	0.000
8	Metallic Ores	0.191	0.152	0.121
9	Nonmetallic Minerals	0.024	0.017	0.015
10	Meat,Dairy & Fruits	0.187	0.114	0.078
11	Seafood Processing	2.340	1.955	2.068
14	Sugar	0.402	1.373	1.130
16	Other Food Preparations	0.137	0.109	0.090
17	Beverages	0.246	0.369	0.102
18	Tobacco Products	1.436	1.262	1.126
19	Fiber Yarn	3.738	4.778	3.672
20	Textile Fabrics	4.577	5.103	5.148
21	Fabricated Textile Products	7.308	6.741	6.894
22	Leather & Leather Products	2.299	2.782	3.037
23	Lumber & Wood Products	1.804	1.369	1.308
24	Pulp & Paper	0.281	0.395	0.364
25	Printing & Publishing	0.238	0.158	0.181
26	Basic Chemicals	0.322	0.350	0.312
27	Chemical Fertilizers	3.270	3.950	1.965
28	Drugs & Cosmetics	0.127	0.133	0.204
29	Synthetic Resins & Rubber	0.337	0.549	0.547
31	Other Chemicals	0.287	0.283	0.245
32	Petroleum Products	0.025	0.038	0.176
34	Rubber Products	5.239	5.910	5.256
35	Nonmetallic Mineral Products	0.791	1.088	1.485
36	Iron & Steel Manufacturing	0.322	0.603	0.251
37	Primary Iron & Steel Products	1.732	2.495	2.326
38	Primary Nonferrous Metal Manufacturing	0.135	0.220	0.250
39	Fabricated Metal Products	1.673	1.841	2.166
40	General Industrial Machinery	0.183	0.194	0.186
41	Household Electrical Appliances	0.416	0.792	0.992
42	Industrial Electrical Appliances	1.351	1.334	1.121
43	Household Electronic Appliances	2.820	1.997	1.595
47	Communication Equipment	3.223	3.184	2.905
48	Shipbuilding	3.821	4.268	5.862
49	Motor Vehicles	0.099	0.098	0.098
51	Other Transport Equipment	1.545	1.220	1.090
52	Measuring,Medical & Optical Instruments	0.713	0.828	0.743
53	Miscellaneous Manufacturing	4.325	4.023	3.459

Table 4.5. continued.

		1982	1983	1984
1	Cereals	0.010	0.012	0.053
2	Fruits & Vegetables	0.333	0.364	0.284
3	Industrial Crops	0.263	0.242	0.326
4	Livestock	0.001	0.001	0.001
6	Fishery Products	4.432	3.646	3.361
7	Coal Mining	0.000	0.000	0.003
8	Metallic Ores	0.136	0.176	0.098
9	Nonmetallic Minerals	0.019	0.015	0.029
10	Meat,Dairy & Fruits	0.075	0.078	0.080
11	Seafood Processing	2.399	2.432	2.392
14	Sugar	0.535	0.832	0.587
16	Other Food Preparations	0.078	0.062	0.056
17	Beverages	0.097	0.040	0.046
18	Tobacco Products	1.018	0.999	0.826
19	Fiber Yarn	3.100	2.940	2.492
20	Textile Fabrics	4.609	4.408	3.645
21	Fabricated Textile Products	6.159	5.463	4.857
22	Leather & Leather Products	2.781	2.891	2.426
23	Lumber & Wood Products	0.750	0.482	0.335
24	Pulp & Paper	0.246	0.248	0.180
25	Printing & Publishing	0.097	0.122	0.115
26	Basic Chemicals	0.249	0.257	0.232
27	Chemical Fertilizers	2.276	1.836	1.598
28	Drugs & Cosmetics	0.165	0.124	0.112
29	Synthetic Resins & Rubber	0.552	0.455	0.392
31	Other Chemicals	0.443	0.259	0.268
32	Petroleum Products	0.275	0.445	0.615
34	Rubber Products	4.706	4.623	3.878
35	Nonmetallic Mineral Products	1.340	0.885	0.632
36	Iron & Steel Manufacturing	0.401	0.154	0.123
37	Primary Iron & Steel Products	2.258	2.222	1.848
38	Primary Nonferrous Metal Manufacturing	0.271	0.264	0.206
39	Fabricated Metal Products	2.056	2.442	1.980
40	General Industrial Machinery	0.189	0.246	0.222
41	Household Electrical Appliances	1.064	1.393	1.868
42	Industrial Electrical Appliances	1.142	1.244	1.185
43	Household Electronic Appliances	1.398	1.335	1.188
47	Communication Equipment	2.403	2.869	2.463
48	Shipbuilding	9.535	11.203	11.068
49	Motor Vehicles	0.068	0.071	0.100
51	Other Transport Equipment	0.854	0.617	0.884
52	Measuring,Medical & Optical Instruments	0.551	0.549	0.488
53	Miscellaneous Manufacturing	3.396	3.233	3.664

Table 4.5. continued.

		1985	1986
1	Cereals	0.013	0.023
2	Fruits & Vegetables	0.283	0.313
3	Industrial Crops	0.370	0.262
4	Livestock	0.001	0.019
6	Fishery Products	3.059	3.355
7	Coal Mining	0.000	0.002
8	Metallic Ores	0.060	0.076
9	Nonmetallic Minerals	0.037	0.093
10	Meat,Dairy & Fruits	0.093	0.081
11	Seafood Processing	2.469	3.106
14	Sugar	0.757	0.689
16	Other Food Preparations	0.062	0.090
17	Beverages	0.040	0.078
18	Tobacco Products	0.686	0.525
19	Fiber Yarn	2.315	2.102
20	Textile Fabrics	3.416	3.678
21	Fabricated Textile Products	4.556	4.329
22	Leather & Leather Products	2.332	2.556
23	Lumber & Wood Products	0.256	0.281
24	Pulp & Paper	0.184	0.239
25	Printing & Publishing	0.111	0.150
26	Basic Chemicals	0.226	0.268
27	Chemical Fertilizers	1.420	1.087
28	Drugs & Cosmetics	0.114	0.137
29	Synthetic Resins & Rubber	0.483	0.494
31	Other Chemicals	0.243	0.271
32	Petroleum Products	0.791	0.731
34	Rubber Products	3.952	4.152
35	Nonmetallic Mineral Products	0.591	0.633
36	Iron & Steel Manufacturing	0.242	0.312
37	Primary Iron & Steel Products	1.544	1.559
38	Primary Nonferrous Metal Manufacturing	0.212	0.220
39	Fabricated Metal Products	2.048	1.577
40	General Industrial Machinery	0.272	0.310
41	Household Electrical Appliances	1.690	2.485
42	Industrial Electrical Appliances	1.020	1.114
43	Household Electronic Appliances	1.764	2.626
47	Communication Equipment	2.139	2.583
48	Shipbuilding	12.708	5.455
49	Motor Vehicles	0.206	0.380
51	Other Transport Equipment	0.826	0.818
52	Measuring,Medical & Optical Instruments	0.413	0.459
53	Miscellaneous Manufacturing	3.626	4.238

The primary metal industry is divided into three subsectors in our RCA calculations: iron and steel manufacturing, primary steel products and nonferrous metal manufacturing. The RCAs for the iron and steel, and primary nonferrous metal manufacturing subsectors are low and remain so up to 1986. Moreover, their poor productivity growth performances suggest that they will not attain the necessary level of competitiveness in the future. Primary iron and steel products (37), on the other hand, had already achieved comparative advantage by 1973 (i.e. RCA > 1) and it has been maintained since.

The results for the fabricated metal products and machinery industries are far more encouraging. The former attained comparative advantage in 1974. Within the latter, the household electronics and communication equipment subsectors had already become competitive by 1973. The same is true of industrial electrical equipment. The shipbuilding and household electrical equipment subsectors became competitive in 1974 and 1982 respectively. General machinery and motor vehicles had not achieved comparative advantage by 1986, but they have been steadily improving throughout the 1973-86 period. Certainly, more recent data would show an even higher RCA for the motor vehicles subsector, since it is now one of Korea's leading exporters. In light of our previous results, it appears that the case for infant industry protection may have been the strongest in the machinery industry.

To sum, the results of the three tests seem to indicate that protection may have been warranted only in some subsectors of the chemical and primary metal industries, but in most of the fabricated metal products and machinery industries. The implication is that policy intervention could have been improved by greater selectivity in the provision of protection within the heavy and chemical industries.

The question is, of course, whether the 'appropriate' subsectors could have been identified ex ante and supported to a greater degree. This may have been rather difficult and the government may have been restricted to formulating policy on a more aggregated level. In assessing infant industry protection, therefore, it may be more appropriate to consider the net balance of supporting some winners and some losers.

In assessing protection, it is important to realise that the rapid growth of the Korean economy has not been limited to the 1960s and 1970s. Real GDP increased at an average rate of 8.6 percent over 1980-87 (the population growth rate was only 1.4 percent), compared to 6.1 percent for the low-income countries, 2.8 percent for the middle-income countries and 2.6 percent for the high-income countries (World Development Report, 1989). As in the two previous decades, this growth was largely export-led: over the same period, Korean exports increased at 14.3 percent, compared to only 3.4 percent, 5.5 percent and 3.3 percent for the three income categories respectively (also see World Bank, 1987).

Moreover, there has been a change in the composition of Korean exports (see table 4.6). Light manufactures, and in particular, textiles have traditionally accounted for the largest share of exports in Korea (almost 30 percent for textiles alone in 1975). However, the heavy and chemical industries made up a larger share than light industries by 1980, and the fabricated metal products and machinery industries together accounted for more than textiles by 1983.

We suggest, therefore, that infant industry intervention has, on balance, been beneficial and contributory to growth in Korea. It seems that many of the 'infants' have succeeded in attaining the necessary competitiveness and have become new growth industries.

The question remains, of course, what would have happened without the protection, as our three tests do not allow us to isolate its effect; this would require an analysis of a multivariate kind. However, the development

of heavy and chemical industries by nature require large-scale investments with long gestation periods and at the time, it was uncertain whether such risky investments would be undertaken without government support. It seems reasonable to speculate that their development would have been slower and on a much smaller scale without the protection.

Table 4.6. Composition of Korean Exports (in percent).

	1970	1975	1980	1983	1985
Agriculture, Forestry and Fishing	6.6	6.0	3.5	2.9	2.0
Mining	3.2	0.9	0.3	0.2	0.1
Manufacturing	62.2	74.6	73.5	73.6	77.6
Light Industry	49.4	45.6	35.2	29.5	30.0
Textiles and Leather	26.8	29.1	23.9	21.3	21.7
Heavy and Chemical Industry	12.8	29.0	38.3	44.1	47.6
Chemicals and Products	5.4	9.2	9.9	9.9	12.4
Primary Metal Manufacturing	1.5	4.0	8.1	6.9	5.8
(Primary Steel Products)		3.7	6.0	5.7	5.0
Metal Products and Machinery	5.9	15.8	20.3	27.3	29.4
Services	28.0	18.5	22.7	23.3	20.3

Source: Bank of Korea.

4. Concluding Remarks.

The policy drive for the development of heavy and chemical industries in Korea over the 1970s was motivated, in part, by the declining possibilities for continued export growth in light manufactures. It seems that the government intended to nurture some 'infants' to 'maturity', so providing the economy with new sources of growth.

The purpose of this chapter has been to assess whether the infants have been successful in reaching maturity, i.e. competitiveness. This was done in three ways: the first two involved the testing for the presence of rapid productivity growth necessary for the satisfaction of the Mill-Bastable test. The third did not test for a condition specifically necessary for the satisfaction of the Mill-Bastable test; however, we considered the trend in the Balassa index as we expected it to increase with improving competitiveness, which is a necessary condition.

The three tests appear to give quite consistent results. The protection of the chemical and primary metal industries seems to have been only partially justified on infant industry grounds. This, of course, does not rule out its justification on other grounds, such as national defence. Infant industry considerations seem to have been more important for the fabricated metal products and machinery industries. All three tests suggest that these industries have shown many of the attributes necessary for the justification of infant industry intervention.

It is difficult to speculate on what would have happened without the protection and support. However, our findings here strongly suggest that intervention has, on balance, been instrumental in the nurturing of new export industries and has therefore made a significant contribution to economic growth.

Finally, the heavy and chemical industries and the infant industry argument are given further consideration in the following chapter, but using shadow prices (as opposed to market prices) in assessing competitiveness. TFP growth is measured at market prices and therefore may not reflect changes in unit social costs. The RCA index can be affected by factors other than a country's inherent competitiveness -- for a country such as Korea, government incentives may have influenced an industry's tendency to export. Also, it may be sufficient for the 'infant' to just be able to substitute imports to justify protection; it may not be necessary that it performs well on the world market as well. Thus, an analysis based on shadow prices may provide a useful alternative method for testing the empirical relevance of the infant industry argument.

Chapter Five.

Evaluation of Korean Industrial Policy Using Shadow Prices.

1. Introduction.

A prominant view of the Korean economic miracle is that it happened, because the Korean government effectively abstained from intervention. This appears to be endorsed in some shape or form by leading economists (e.g. Bhagwati, 1978, and Krueger, 1978), by influential international institutions (e.g. World Bank; World Development Report, 1987), and by widely-read publications (e.g. The Economist; 23-29 September, 1989). In chapter two, we attempted to show that such a simple diagnosis of the Korean economic miracle is (to put it mildly) somewhat misleading. We agree that the outward-oriented strategy seems to have been important. But the claim that government intervention was effectively 'self-neutralizing' and therefore not contributory to rapid growth may be tantamount to wishful thinking.

To argue that government intervention contributed to the Korean economic miracle, we must of course do more than show that policy incentives have been non-neutral and effective; we must also show that they have been well-directed, i.e. at those sectors with the greatest potential for economic development. This was done in part in chapter four, where we assessed the justification for the heavy and chemical industrial drive under infant industry grounds. There, we found signs of some sectors, particularly in the machinery industry, gaining the necessary maturity. However, the evidence was not conclusive and required further support. In particular, we felt it necessary to evaluate policy using prices that more closely reflected social opportunity costs.

The purpose of this chapter, then, is to evaluate Korean industrial policy using our shadow prices from chapter three. Policy incentives by nature change market prices and thus affect the allocation of resources.

By using shadow prices to evaluate such changes, we are able to assess their net impact on social welfare. Importantly, the shadow prices may be applied flexibly to embody strategies which place an emphasis on growth.

This chapter is organised as follows: in section two, we introduce the 'cost-benefit test' and the concept of social profitability. We also compare social profitability with domestic resource cost and revealed comparative advantage; in many ways, we will find it to be a measure of comparative advantage preferable to the other two. In section three, we present the results of our estimation and in section four, we use them to evaluate the various phases of Korean industrial policy, viz. export promotion, heavy and chemical industrial drive and market liberalisation. Concluding remarks follow in section five.

2. Social Profitability.

In chapter three, we discussed why market prices may not adequately reflect social opportunity costs, particularly in developing countries. The reasons were mostly based on market imperfections, e.g. externalities, and on government-induced distortions, e.g. tariffs and quotas. When such divergences are pervasive, we argued that returns from investment at market prices are unlikely to represent net social gains; rather, investment projects should only be accepted if the returns are positive at shadow prices. This is the so-called 'cost-benefit test'.

'Social profitability' is simply an index of the project's net social returns. It is defined as the difference between the shadow value of output and the shadow value of inputs, expressed as a proportion of the shadow value of output. Hence the social profitability of a project producing x_i of good i is

$$\frac{\nu_i x_i - \Sigma_j \nu_j x_{ji}}{\nu_i x_i} ,$$

where ν_i = shadow price of good i,

x_i = output of good i,

and x_{ji} = input of good j into good i.

Alternatively, it may be written as

$$\frac{r_i - \Sigma_j r_j a_{ji}}{r_i} ,$$

where r_i = accounting ratio of good i,

and a_{ji} = input coefficient of good j into good i

(accounting ratios are simply shadow prices divided by market prices). Social profitability therefore represents the net impact on social welfare of producing a unit social value of output. It must be positive to satisfy the cost-benefit test.

The reason for employing this measure to evaluate industrial policy is as follows: the purpose of industrial policy is essentially to manipulate output levels in directions which improve social welfare. Policy incentives by nature create divergences between market and social prices. By using shadow prices, social profitability measures the impact of output changes on social welfare 'net' of distortions (government-induced or otherwise). Furthermore, the shadow prices may be defined, so as to incorporate an emphasis on either growth or income equality using whatever weights may be desired.

Social profitability by industry is estimated using the shadow prices from chapter three. To avoid repetition, we will rely on our earlier discussion and mention only the salient points here. The shadow price of a good by definition embodies the full equilibrium effects of its incremental availability, and its estimation therefore requires a model of the economy. Given that such a model is unavailable (at least not one which is both plausible and convenient), short-cuts are usually adopted. Our shadow prices were estimated using the Little/Mirrlees (1974) guidelines: i) border prices were used for traded goods; ii) shadow prices of non-traded goods were equated to the sum of the input costs, evaluated at shadow

prices, i.e. social marginal costs; iii) returns to factors of production were adjusted to embody society's attitude towards inequality; and iv) uncommitted foreign exchange in the hands of the government was chosen as the numeraire, or the unit of account.

The application of the Little/Mirrlees method requires that all goods be classified as either imported, exported or non-traded at the margin; essentially, we need to identify how the additional demand for a good is eventually met. In practice, this provides a few problems; for example, a binding quota dictates that a good be classified as non-traded, even if imports of it are substantial. Moreover, the estimation of economy-wide shadow prices requires the use of input-output data and classification at this level of aggregation can be problematic. A good may then consist of many sub-goods, belonging to more than one type of classification. To take account of these possibilities, we estimated shadow prices (and social profitability) under two alternative sets of classifications; the second represents the more restrictive import regime and the alternative traded classification (see chapter 3, section II.2.1 for details).

Furthermore, alternative sets of shadow prices were estimated for different assumptions concerning a) the tightness of the labour market, b) the relative values attached to incomes accruing to different groups and c) the emphasis on growth, implicit in the intergenerational inequality judgements (more on this shortly).

Shadow prices and social profitability were estimated for the years 1975 and 1983. Apart from the availability of input-output data, these years were chosen, because they provide convenient stops on the Korean path to development. The promotion of exports in light manufactures reached a peak in the mid 1970s and the heavy and chemical industrial drive picked up steam about then. By 1983, this drive was essentially over and the policy of market liberalisation was adopted. Thus, our results should allow us to comment on the desirability of the various policies pursued in Korea since

the start of the 'big-push' in 1962.

It is important to be clear about the interpretation of social profitability and how shadow prices may be applied to embody policy emphasis on matters such as growth and income inequality. The Little/Mirrlees shadow prices essentially represent values or costs at world prices, and social profitability may be thought of (in simple terms) as measuring value added at world prices. However, social preferences over growth and income inequality can be taken into account via the relative weights attached to the incomes of different groups (including the government).

Policy emphasis on either growth or income equality may be thought of in terms of the trade-offs in consumption. An emphasis on growth implies that relatively greater value is placed on future consumption than on current consumption. Similarly, an emphasis on income equality means that society values consumption by the poor more than consumption by the rich. The variation in emphasis can be captured by attaching different relative weights to incomes of different groups and this will influence the shadow wage rate and the social cost of profits.

In our earlier discussion, the Little/Mirrlees accounting ratio for labour was expressed as

$$r_1 = SCF * \{ 1 - \mu(1-m/w) \},$$

where μ = social value of income accruing to the worker, relative to the numeraire,

w = the urban wage,

m = marginal product of labour, and

SCF = the standard conversion factor.

The numeraire, i.e. government income, may be thought of as the value of the best available use of funds; if the government is optimising, then the value of its income to society should be equalised across all uses, including its current consumption and investment. μ is the value of

additional income accruing to the worker relative to this, and we would expect it to be higher, the more socially deserving the worker. More specifically, it will be higher, the poorer the worker and the less able the government in supporting his income through direct subsidies. However, μ will be lower, the greater the value of savings and future consumption.

The accounting ratio for monopoly profit is

$$r_\pi = \alpha(1-\lambda),$$

where r_π = social cost of a unit monopoly profit,

α = one minus the tax rate on corporate income, and

λ = social value of income acruing to shareholders, relative to the numeraire.

If the government is adverse to income inequality, then we would expect λ to be relatively low, i.e. additional consumption by profit earners would have relatively little social value. However, this income group is an important source of savings (because the marginal propensity to save increases with income) and we would expect λ to be higher, the greater the social value of future consumption. In sum, λ is likely to be higher (and so r_π lower), the greater the emphasis on growth (and the smaller the emphasis on income equality).

In our estimation, $\{ 1 - \mu(1-m/w) \}$ and r_π were determined exogenously, to reflect market conditions and social preferences, i.e. the values of m/w, α, μ and λ. To allow a wide range of possibilities, we tried values of 1, 0.85, 0.75 and 0.67 for $\{.\}$, and 0.6 and 0.4 for r_π. However, some pairings of $\{.\}$ and r_π may be more relevant than others.

Consider the conditions in 1975. Estimates around this time give m/w in the region of two-thirds (see Hong, 1981), implying that in the expression for r_1, $\{.\} = 1-0.33\mu$. The corporate tax rate was between twenty and thirty percent, implying an α of about three-quarters. The marginal savings rate (s) appears to have been around a quarter (see Government of Korea, 1985; we will assume that s was close to zero for

poorer income groups). To simplify, let us express λ as

$$\gamma(1-s) + \delta s,$$

where γ = the value of additional consumption by profit earners relative to the numeraire, and

δ = the value of additional savings by profit earners relative to the numeraire.

Then, r_π was approximately equal to

$$0.75 * [\ 1 - 0.75\gamma - 0.25\delta\ ].$$

It remains for us to value δ, γ and μ to capture an emphasis on either growth or income equality. For our purposes, we may concentrate on the 'combinations' presented in table 5.1.

Table 5.1. (1975).

Combination	δ	γ	μ	$\{.\}$	r_π
1	0.8	0.4	0.4	0.85	0.4
2	0.8	0.4	0.8	0.75	0.4
3	0.8	0.0	0.4	0.85	0.6
4	0.8	0.0	0.8	0.75	0.6

In all four combinations, a relatively high value of 0.8 is given to δ to reflect a policy emphasis on investment and growth. In combination one, current consumption is given a relatively low value of 0.4, irrespective of the consumer, i.e. little emphasis is placed on current income inequality. The implied values for $\{.\}$ and r_π are 0.85 and 0.4 respectively. An increase in the value of μ to 0.8 in combination two may be interpreted as an increase in concern for the consumption of the poor. In this case, consumption by the poor is valued equally with current savings, both preferable to consumption by the rich. In combinations three and four, a much greater emphasis is placed on income equality -- γ is given a zero value.

Thus social profitability calculations for 1975, using the values 0.85 and 0.75 for $\{.\}$ and 0.4 for r_π, may be considered to represent the net impact on social welfare of producing a unit value of social output, when a

strong emphasis is placed on growth. The other two pairings for {.} and r_π may be seen to reflect a much greater emphasis on income distribution.

The values for {.} and r_π in 1983 implied by the four combinations are presented in table 5.2. Here, m/w is assumed to be about 0.8, because the labour market conditions became much tighter over the latter half of the 1970s (see Lindauer, 1984).

Table 5.2. (1983).

Combination	δ	γ	μ	{.}	r_π
1	0.8	0.4	0.4	1.00	0.4
2	0.8	0.4	0.8	0.85	0.4
3	0.8	0.0	0.4	1.00	0.6
4	0.8	0.0	0.8	0.85	0.6

For our purposes here, we will concentrate on the social profitability results vis-à-vis the four combinations for 1975 and 1983.

Before we proceed to the results, let us compare social profitability with Bruno's Domestic Resource Cost (Bruno, 1972). Both measures are based on the principle that a project should be undertaken only "if its net marginal benefit is positive; that is, the difference between real marginal social benefits and costs (valued at opportunity cost) is positive" (Bruno, p18). Using his notation, a project j should be accepted only if

$$B_j = \Sigma_i\, a_{ij}p_i + \Sigma_s\, f_{sj}v_s > 0,$$

where B_j = net social benefit of the project j,

p_i = shadow price of commodity i,

a_{ij} = input (or output) of commodity i into j,

v_s = shadow price of factor s,

and f_{sj} = input of factor s into j.

If shadow prices are defined correctly, this is simply the cost-benefit test. More specifically, if shadow prices of primary factors reflect relative income values and those of commodities reflect the source of the marginal supply, then DRC is equivalent to social profitability. But, DRC calculations often take inadequate account of relative income effects and

further, the methodology is somewhat questionable, as we explain below.

Rather than finding out whether B_j is positive or negative, Bruno chooses foreign exchange to be a primary factor and calculates the cost in domestic resources of saving a net unit foreign exchange. Setting $B_j = 0$,

$$v_j = - \frac{(\Sigma_{s=2} f_{sj}v_s + \Sigma_i a_{ij}p_i)}{f_{1j}}$$

where v_j = domestic resource cost per unit foreign exchange saved in project j,

f_{1j} = marginal revenue minus marginal import requirement per unit j, in foreign exchange,

p_i = shadow price of non-traded goods, and

a_{ij} = input of non-traded goods.

"If, as is usually the case, the domestic inputs require imports in their own production both directly and indirectly, then one can show the equivalence of the (above) expression with one in which all domestic inputs are expressed in terms of direct and indirect primary factors of production (in a Leontief input-output sense)" (Bruno, p21). Thus,

$$v'_j = \frac{- \Sigma_{s=2} f'_{sj} v_s}{f'_{1j}}$$

where ' indicates that both the direct and indirect inputs are accounted for. This is then compared with a shadow exchange rate, and the project is chosen if v_j (or v'_j) is smaller.

The problem with the DRC measure is in the assumption that the social cost of inputs can be broken down into imports and factors of production. Initially, the inputs are separated into direct imports, factors and domestically supplied intermediate inputs. Then to derive v'_j, the domestic component is again separated into imports and factors, using Leontief's matrix inversion (this is possible if the input-output matrices are available for both domestically-produced and imported intermediate inputs). So, the social cost of a domestically produced input is equal to the sum of the direct and indirect inputs of imports and primary factors, required in its own production. This is similar to the social marginal

cost rule. However, this method ignores the possibility of the domestic supply coming from reduced exports; if this is the case, then the social cost is the world price, which may or may not equal the social marginal cost, viz. the social value of imports and primary inputs.

Bruno claims that "the DRC criterion is an explicit expression of the comparative advantage principle in international trade. A country has comparative advantage in activity j vis-à-vis the rest of the world if and only if d_j (or d'_j) < d_0" (Bruno, 1972, p22). In light of the above discussion, social profitability can offer a better index for comparative advantage than DRC. Certainly, it takes more explicitly into account the arguments underlying the DRC.

In any case, it presents a more suitable measure than Balassa's Revealed Comparative Advantage (RCA). This is defined formally for a country k and good i as

$$RCA_i = (E_{i,k}/E_k) \;/\; (E_{i,world}/E_{world}),$$

where $E_{i,k}$ = exports of good i by country k,

and E_k = total exports by country k.

The RCA represents a country's share in world exports of a given product, relative to its share in total world exports. This measure has two problems, arising from the fact that it is not explicitly related to social preferences. A good may be exported in large quantities, even if the country does not possess comparative advantage in it, if significant policy incentives are extended to its production (this is not unlikely for a country such as Korea). Furthermore, the RCA does not capture the case, where domestic production is sufficiently competitive to replace imports, but as yet unable to export. However, the RCA does have the practical advantage of being easily measured.

In the next section, we present a brief description of our results and discuss how they should be properly put to use.

3. The Results.

The results are presented in full in the appendix to this chapter. Those pertaining to the four combinations in tables 5.1 and 5.2 are shown in tables 5.3 to 5.6.

The social profitability (SP) of a commodity depends partly on its classification. The SP of non-traded goods is by definition equal to zero; this is because the shadow price of non-traded goods is defined as the marginal cost at shadow prices and in our model, the marginal and average costs are equal. So, when a good changes from traded to non-traded, its social profitability may be dramatically affected. However, the shadow prices may still be used to consider policy issues such as the relaxation of import quotas, if this is the reason for the non-tradedness, viz. if social marginal cost is larger than the import price, then import substitution may be socially detrimental. The SP may also be affected if classification is changed from exported to imported, or vice versa. Fortunately, the sign of the SP is unaffected by this change in most cases. For 1975, only the SP of metallic ores (8) changes sign. For 1983, only synthetic resins and rubber (29) and some electronic components (46) are affected.

For 1975, two alternative values for the accounting rate of interest (ARI) were used and the choice of ARI has an important effect on the results (the ARI is the rate of discount of the numeraire; see chapter three for more details). Earlier, we suggested that the interest rate on foreign loans may provide a useful proxy, providing the supply of foreign funds is fairly unrestricted. By adding the rate of currency depreciation to the nominal interest rate abroad (LIBOR) and subtracting the rate of inflation, we estimated the ARI to be -19 percent. This was due, in part, to the flooding of the world capital market by petro-dollars and the rapid inflation. However, we also noted that Korea was experiencing a shortage of funds over most of the 1970s and that it was unlikely that the

opportunity cost of capital was so low in such a rapidly-expanding economy. We therefore chose an alternative (and more realistic) ARI of +10 percent, taking into consideration other existing estimates, e.g. Lal (1978) and Hong (1981) estimated it to be around 15 percent. For 1983, the real cost of foreign loans was a more reasonable 8.75 percent.

Table 5.3. Social Profitability, Classification 1, 1975 (ARI = 10%).

		(.)=0.85 ARP=0.4	(.)=0.75 ARP=0.4
1	Cereals	0.177	0.232
3	Industrial Crops	0.124	0.179
5	Forestry Products	0.121	0.179
6	Fishery Products	-0.024	0.015
7	Coal Mining	0.014	0.080
8	Metallic Ores	0.088	0.131
9	Nonmetallic Minerals	0.198	0.238
10	Meat,Dairy & Fruits	0.005	0.036
11	Seafood Processing	-0.025	-0.006
14	Other Food Preparations	-0.049	-0.034
17	Fiber Yarn	-0.167	-0.153
18	Textile Fabrics	-0.129	-0.111
19	Fabricated Textile Products	0.045	0.066
20	Leather & Leather Products	-0.089	-0.069
21	Lumber & Plywood	-0.128	-0.110
22	Wood Products & Furniture	-0.384	-0.351
23	Pulp & Paper	-0.032	-0.015
25	Basic Organic Chemicals	-0.047	-0.036
26	Basic Inorganic Chemicals	-0.138	-0.124
27	Chemical Fertilizers	-0.289	-0.274
28	Drugs & Cosmetics	-0.079	-0.053
29	Synthetic Resins & Rubber	-0.051	-0.037
30	Other Chemicals	-0.112	-0.094
31	Petroleum Products	0.085	0.088
33	Rubber Products	-0.040	-0.019
34	Nonmetallic Mineral Products	-0.175	-0.149
35	Iron & Steel Manufacturing	-0.112	-0.103
36	Primary Iron & Steel Products	-0.119	-0.111
37	Primary Nonferrous Metal Manufacturing	-0.170	-0.155
38	Fabricated Metal Products	-0.153	-0.131
39	General Industrial Machinery	-0.089	-0.067
40	Household Electrical Appliances	0.063	0.076
41	Industrial Electrical Appliances	-0.005	0.013
42	Electronic & Communication Equipment	0.048	0.064
43	Shipbuilding	-0.035	-0.017
44	Motor Vehicles	-0.273	-0.245
45	Other Transport Equipment	-0.031	-0.010
46	Measuring,Medical & Optical Instruments	0.005	0.023
47	Miscellaneous Manufacturing	0.087	0.107

Table 5.3. contd.

		(.)=0.85 ARP=0.6	(.)=0.75 ARP=0.6
1	Cereals	0.032	0.091
3	Industrial Crops	0.001	0.061
5	Forestry Products	-0.034	0.028
6	Fishery Products	-0.176	-0.132
7	Coal Mining	-0.093	-0.021
8	Metallic Ores	-0.038	0.008
9	Nonmetallic Minerals	0.058	0.101
10	Meat,Dairy & Fruits	-0.121	-0.087
11	Seafood Processing	-0.122	-0.101
14	Other Food Preparations	-0.139	-0.123
17	Fiber Yarn	-0.266	-0.250
18	Textile Fabrics	-0.251	-0.232
19	Fabricated Textile Products	-0.058	-0.034
20	Leather & Leather Products	-0.221	-0.198
21	Lumber & Plywood	-0.250	-0.231
22	Wood Products & Furniture	-0.618	-0.581
23	Pulp & Paper	-0.128	-0.109
25	Basic Organic Chemicals	-0.133	-0.122
26	Basic Inorganic Chemicals	-0.252	-0.236
27	Chemical Fertilizers	-0.375	-0.360
28	Drugs & Cosmetics	-0.216	-0.188
29	Synthetic Resins & Rubber	-0.141	-0.126
30	Other Chemicals	-0.219	-0.200
31	Petroleum Products	0.056	0.060
33	Rubber Products	-0.141	-0.118
34	Nonmetallic Mineral Products	-0.358	-0.329
35	Iron & Steel Manufacturing	-0.192	-0.182
36	Primary Iron & Steel Products	-0.192	-0.183
37	Primary Nonferrous Metal Manufacturing	-0.292	-0.276
38	Fabricated Metal Products	-0.301	-0.276
39	General Industrial Machinery	-0.217	-0.193
40	Household Electrical Appliances	-0.013	0.001
41	Industrial Electrical Appliances	-0.095	-0.076
42	Electronic & Communication Equipment	-0.033	-0.016
43	Shipbuilding	-0.153	-0.133
44	Motor Vehicles	-0.407	-0.377
45	Other Transport Equipment	-0.138	-0.115
46	Measuring,Medical & Optical Instruments	-0.069	-0.049
47	Miscellaneous Manufacturing	-0.045	-0.024

Note: Social profitability is defined as the difference between the shadow value of output and the shadow value of inputs, expressed as a proportion of the shadow value of output. (.) = $1 - \mu(1-m/w)$, where μ is the social value of income accruing to the worker relative to the numeraire (government income), m is the marginal product of labour, and w is the wage. ARP is the accounting ratio for monopoly profits. See table 5.1 for the interpretations with respect to policy emphasis.

Table 5.4. Social Profitability, Classification 2, 1975 (ARI=10%).

		(.)=0.85 ARP=0.4	(.)=0.75 ARP=0.4
3	Industrial Crops	0.103	0.167
5	Forestry Products	0.113	0.177
6	Fishery Products	-0.014	0.033
7	Coal Mining	0.008	0.083
8	Metallic Ores	-0.065	-0.005
9	Nonmetallic Minerals	0.193	0.240
10	Meat,Dairy & Fruits	0.015	0.057
11	Seafood Processing	-0.026	-0.003
14	Other Food Preparations	-0.015	0.020
17	Fiber Yarn	-0.172	-0.153
18	Textile Fabrics	-0.137	-0.113
19	Fabricated Textile Products	0.044	0.068
20	Leather & Leather Products	-0.095	-0.070
21	Lumber & Plywood	-0.133	-0.111
22	Wood Products & Furniture	-0.400	-0.358
23	Pulp & Paper	-0.039	-0.016
29	Synthetic Resins & Rubber	-0.068	-0.041
33	Rubber Products	-0.058	-0.030
34	Nonmetallic Mineral Products	-0.171	-0.138
36	Primary Iron & Steel Products	-0.272	-0.248
38	Fabricated Metal Products	-0.190	-0.163
41	Industrial Electrical Appliances	-0.092	-0.061
42	Electronic & Communication Equipment	0.063	0.081
43	Shipbuilding	-0.197	-0.166
46	Measuring,Medical & Optical Instruments	0.008	0.033
47	Miscellaneous Manufacturing	0.069	0.095

		(.)=0.85 ARP=0.6	(.)=0.75 ARP=0.6
3	Industrial Crops	-0.064	0.008
5	Forestry Products	-0.077	-0.004
6	Fishery Products	-0.208	-0.154
7	Coal Mining	-0.144	-0.060
8	Metallic Ores	-0.274	-0.206
9	Nonmetallic Minerals	0.018	0.070
10	Meat,Dairy & Fruits	-0.155	-0.107
11	Seafood Processing	-0.142	-0.116
14	Other Food Preparations	-0.171	-0.133
17	Fiber Yarn	-0.288	-0.267
18	Textile Fabrics	-0.292	-0.266
19	Fabricated Textile Products	-0.079	-0.050
20	Leather & Leather Products	-0.251	-0.223
21	Lumber & Plywood	-0.283	-0.257
22	Wood Products & Furniture	-0.683	-0.634
23	Pulp & Paper	-0.161	-0.135
29	Synthetic Resins & Rubber	-0.260	-0.229
33	Rubber Products	-0.204	-0.171
34	Nonmetallic Mineral Products	-0.402	-0.362
36	Primary Iron & Steel Products	-0.476	-0.448
38	Fabricated Metal Products	-0.348	-0.318
41	Industrial Electrical Appliances	-0.281	-0.245
42	Electronic & Communication Equipment	-0.029	-0.009
43	Shipbuilding	-0.391	-0.356
46	Measuring,Medical & Optical Instruments	-0.115	-0.086
47	Miscellaneous Manufacturing	-0.100	-0.070

Table 5.5. Social Profitability, Classification 1, 1983.

		(.)=1 ARP=0.4	(.)=0.85 ARP=0.4
1	Cereals	0.130	0.226
3	Industrial Crops	0.054	0.154
5	Forestry Products	0.121	0.217
6	Fishery Products	0.135	0.197
7	Coal Mining	0.077	0.152
8	Metallic Ores	0.063	0.130
9	Nonmetallic Minerals	0.143	0.234
10	Meat,Dairy & Fruits	0.007	0.067
11	Seafood Processing	0.086	0.116
14	Sugar	0.176	0.196
19	Fiber Yarn	0.064	0.098
20	Textile Fabrics	0.036	0.074
21	Fabricated Textile Products	0.096	0.136
22	Leather & Leather Products	0.083	0.121
23	Lumber & Wood Products	0.087	0.116
24	Pulp & Paper	0.026	0.056
26	Basic Chemicals	-0.053	-0.026
27	Chemical Fertilizers	0.157	0.181
28	Drugs & Cosmetics	0.101	0.145
29	Synthetic Resins & Rubber	-0.071	-0.037
31	Other Chemicals	-0.036	0.000
32	Petroleum Products	0.082	0.087
34	Rubber Products	0.116	0.165
35	Nonmetallic Mineral Products	0.058	0.101
36	Iron & Steel Manufacturing	-0.030	-0.013
37	Primary Iron & Steel Products	0.006	0.028
38	Primary Nonferrous Metal Manufacturing	-0.103	-0.074
39	Fabricated Metal Products	0.073	0.114
40	General Industrial Machinery	0.015	0.056
41	Household Electrical Appliances	0.246	0.273
42	Industrial Electrical Appliances	0.041	0.077
43	Household Electronic Appliances	0.246	0.271
44	Electronic Appliances	0.041	0.066
45	Semi-conductors & Integrated Circuits	0.044	0.076
46	Other Electronic Components	-0.041	-0.004
47	Communication Equipment	0.139	0.178
48	Shipbuilding	0.061	0.107
49	Motor Vehicles	0.207	0.232
50	Motor Vehicle Parts	-0.107	-0.061
51	Other Transport Equipment	0.034	0.066
52	Measuring,Medical & Optical Instruments	0.028	0.072
53	Miscellaneous Manufacturing	0.183	0.223

Note: Social profitability is defined as the difference between the shadow value of output and the shadow value of inputs, expressed as a proportion of the shadow value of output. $(.) = 1 - \mu(1-m/w)$, where μ is the social value of income accruing to the worker relative to the numeraire (government income), m is the marginal product of labour, and w is the wage. ARP is the accounting ratio for monopoly profits. See table 5.2 for the interpretations with respect to policy emphasis.

Table 5.5. contd.

		(.)=1 ARP=0.6	(.)=0.85 ARP=0.6
1	Cereals	0.082	0.177
3	Industrial Crops	0.033	0.133
5	Forestry Products	0.068	0.164
6	Fishery Products	0.101	0.163
7	Coal Mining	0.043	0.118
8	Metallic Ores	0.035	0.103
9	Nonmetallic Minerals	0.102	0.193
10	Meat,Dairy & Fruits	-0.013	0.047
11	Seafood Processing	0.072	0.103
14	Sugar	0.166	0.185
19	Fiber Yarn	0.054	0.088
20	Textile Fabrics	0.035	0.072
21	Fabricated Textile Products	0.082	0.123
22	Leather & Leather Products	0.078	0.117
23	Lumber & Wood Products	0.084	0.113
24	Pulp & Paper	0.020	0.049
26	Basic Chemicals	-0.064	-0.037
27	Chemical Fertilizers	0.158	0.182
28	Drugs & Cosmetics	0.071	0.115
29	Synthetic Resins & Rubber	-0.089	-0.055
31	Other Chemicals	-0.056	-0.020
32	Petroleum Products	0.075	0.081
34	Rubber Products	0.113	0.162
35	Nonmetallic Mineral Products	0.050	0.093
36	Iron & Steel Manufacturing	-0.041	-0.024
37	Primary Iron & Steel Products	-0.004	0.018
38	Primary Nonferrous Metal Manufacturing	-0.110	-0.080
39	Fabricated Metal Products	0.065	0.106
40	General Industrial Machinery	0.006	0.047
41	Household Electrical Appliances	0.233	0.260
42	Industrial Electrical Appliances	0.024	0.060
43	Household Electronic Appliances	0.227	0.253
44	Electronic Appliances	0.028	0.053
45	Semi-conductors & Integrated Circuits	0.026	0.058
46	Other Electronic Components	-0.060	-0.023
47	Communication Equipment	0.117	0.156
48	Shipbuilding	0.049	0.095
49	Motor Vehicles	0.196	0.221
50	Motor Vehicle Parts	-0.124	-0.079
51	Other Transport Equipment	0.035	0.067
52	Measuring,Medical & Optical Instruments	0.011	0.054
53	Miscellaneous Manufacturing	0.149	0.190

Table 5.6. Social Profitability, Classification 2, 1983.

		(.)=1 ARP=0.4	(.)=0.85 ARP=0.4
3	Industrial Crops	0.048	0.163
5	Forestry Products	0.116	0.224
6	Fishery Products	0.128	0.201
7	Coal Mining	0.066	0.155
8	Metallic Ores	0.048	0.132
9	Nonmetallic Minerals	0.135	0.239
10	Meat,Dairy & Fruits	0.010	0.094
11	Seafood Processing	0.082	0.118
14	Sugar	0.176	0.205
19	Fiber Yarn	0.042	0.093
20	Textile Fabrics	0.029	0.075
21	Fabricated Textile Products	0.087	0.134
22	Leather & Leather Products	0.071	0.117
23	Lumber & Wood Products	0.076	0.113
24	Pulp & Paper	0.015	0.053
27	Chemical Fertilizers	0.121	0.167
29	Synthetic Resins & Rubber	0.091	0.138
32	Petroleum Products	0.081	0.087
34	Rubber Products	0.088	0.148
35	Nonmetallic Mineral Products	0.048	0.101
37	Primary Iron & Steel Products	-0.029	0.018
39	Fabricated Metal Products	0.055	0.109
41	Household Electrical Appliances	0.201	0.236
42	Industrial Electrical Appliances	0.061	0.114
43	Household Electronic Appliances	0.161	0.189
44	Electronic Appliances	0.059	0.088
45	Semi-conductors & Integrated Circuits	0.070	0.108
46	Other Electronic Components	0.067	0.111
47	Communication Equipment	0.119	0.165
48	Shipbuilding	0.050	0.113
49	Motor Vehicles	0.159	0.217
52	Measuring,Medical & Optical Instruments	0.101	0.150
53	Miscellaneous Manufacturing	0.154	0.205

Table 5.6. contd.

		(.)=1 ARP=0.6	(.)=0.85 ARP=0.6
3	Industrial Crops	0.020	0.136
5	Forestry Products	0.058	0.166
6	Fishery Products	0.090	0.163
7	Coal Mining	0.027	0.117
8	Metallic Ores	0.014	0.099
9	Nonmetallic Minerals	0.088	0.194
10	Meat,Dairy & Fruits	-0.021	0.064
11	Seafood Processing	0.066	0.102
14	Sugar	0.161	0.191
19	Fiber Yarn	0.025	0.077
20	Textile Fabrics	0.025	0.071
21	Fabricated Textile Products	0.071	0.118
22	Leather & Leather Products	0.063	0.110
23	Lumber & Wood Products	0.070	0.107
24	Pulp & Paper	0.005	0.043
27	Chemical Fertilizers	0.115	0.160
29	Synthetic Resins & Rubber	0.066	0.113
32	Petroleum Products	0.074	0.080
34	Rubber Products	0.081	0.142
35	Nonmetallic Mineral Products	0.036	0.090
37	Primary Iron & Steel Products	-0.051	-0.004
39	Fabricated Metal Products	0.043	0.097
41	Household Electrical Appliances	0.187	0.222
42	Industrial Electrical Appliances	0.039	0.092
43	Household Electronic Appliances	0.143	0.171
44	Electronic Appliances	0.044	0.073
45	Semi-conductors & Integrated Circuits	0.050	0.088
46	Other Electronic Components	0.045	0.089
47	Communication Equipment	0.094	0.140
48	Shipbuilding	0.032	0.095
49	Motor Vehicles	0.137	0.195
52	Measuring,Medical & Optical Instruments	0.076	0.127
53	Miscellaneous Manufacturing	0.116	0.168

When the ARI is -19 percent for 1975, all traded commodities are socially profitable, except chemical fertilisers (see appendix tables A5.3 and A5.4). This is not surprising, if the social opportunity cost of capital is so negative. When the ARI is +10 percent, the social profitability of many commodities becomes negative, particularly those which are capital-intensive, e.g. general machinery, shipbuilding and motor vehicles (see table 3.6 for capital-output ratios and table 3.7 for interest rate estimations). In our judgement, 10 percent appears to be a more realistic value for the ARI, taking into account the shortage of funds and the rapid growth in Korea over the mid 1970s.

Social profitability is also affected by our assumptions on the value of the accounting ratio for monopoly profit and that of $\{ 1 - \mu(1-m/w) \}$, i.e. the relative weights attached to incomes of different groups relative to the numeraire. The assumption on the former has greater effect on those commodities which generate more monopoly profit and is of particular importance for 1975 (the real market rate of interest was also significantly negative, adding to monopoly profits). The assumption on the latter affects those commodities, which are labour-intensive.

Given that the assumptions may affect the outcome of the estimation, it is clear that they must be made in a sensible manner. We have tried, as much as possible, to base our assumptions on reliable information. Where we were less certain, we used a realistic range of assumptions, allowing for some different possibilities. In particular, we tried a number of 'combinations' to capture variations in social value judgements. Namely, we attached different weights to incomes of different groups, so that the test of social profitability embodies an emphasis on either growth or income equality.

The 1983 results are fairly robust; indeed, the variation in assumptions only changes the sign of social profitability for a few commodities. For 1975, we are inclined to put more weight on the results

derived using 10 percent for the ARI in assessing industrial policy.

4. Evaluation of Industrial Policy.

In this section we consider whether policy incentives have been well-directed, in the sense that they were extended to those sectors with the greatest potential for 'economic development'. 'Economic development' will be understood here as rising income per capita and improving income distribution. Often, 'development' is simply identified with 'growth', which in turn is just associated with income per capita. However, no sensible government can ignore income distribution altogether; indeed, some sharing of the fruits of growth is essential for political stability, which in turn is necessary for steady growth. We will therefore interpret the Korean development strategy as one with an emphasis on growth, i.e. the combinations one and two may be more applicable.

We consider in turn i) export promotion, ii) development of heavy and chemical industries and iii) market liberalisation. To avoid repetition, we will rely to some extent on our earlier discussion in chapters two and three.

4.1. Promotion of Exports in Light Manufactures (1962-73).

The 'big-push' for development began in Korea with the First Five-Year Economic and Social Development Plan (1962-66). In the aftermath of the Japanese occupation (1910-45) and the Korean War (1950-53), there was a real need to rebuild the economy and to raise the standard of living of the Korean people. To expedite this process, the government (under Park Chung Hee) adopted an export-led growth strategy, based on labour-intensive light manufactures.

The government offered a powerful package of financial and fiscal incentives to exporters of goods such as textiles, footwear, plywood and wigs. Policy incentives consisted of lower-interest loans, tax exemptions and reductions, greater access to restricted imports and more. The effectiveness of these incentives were discussed in detail in chapter two; it suffices here to say that they were powerful and biased in favour of exports of light manufactures over the 1960s and some of the 1970s.

By far the most important export sector was textiles; it made up the largest share of Korean exports even up to 1985 (it accounted for nearly 30 percent of total exports in 1975; Bank of Korea). Our results suggest that the promotion of textiles was socially beneficial. In 1983, the social profitability of this sector was positive for each of the four combinations. That is, increases in output of textiles were desirable both from the point of view of growth and income distribution. In 1975, the SP of the subsector 'fabricated textiles products' (19) was positive for combinations one and two, but not for three and four. The implication is that output increases for this subsector were desirable from a growth perspective, but not from that of income equality (note here that fabricated textiles products made up some two-thirds of textiles exports in 1975; Bank of Korea).

The SP of the other textiles subsectors (fibre yarn and textiles fabrics) was negative for all four combinations in 1975. This may be because they are relatively capital-intensive, unlike fabricated textiles products (see table 3.6), i.e. social capital costs may have been larger. Furthermore, they received much greater subsidies in 1975 than in 1983 (see Kim, 1987). Thus their exports may have been encouraged despite negative SP. The positive SP for 1983, with less subsidies, suggests that these sectors have improved in social efficiency over time.

A similar story seems to apply to plywood and rubber products (including rubber footwear). For all four combinations, they are socially

profitable in 1983, but not in 1975. As we have already noted, the 1983 results are much more robust and they suggest that the promotion of these commodities was socially beneficial. In any event, they were of minor importance compared to the textiles sector (the two sectors made up only 3.4 percent and 3.5 percent of total exports respectively in 1975; Bank of Korea).

Lastly, the promotion of miscellaneous manufactures, and wigs in particular, appears to have been desirable. This sector was socially profitable in both 1975 (for combinations one and two) and in 1983 (for all combinations). It also made up 3.6 percent of total exports in 1975 and 3.7 percent in 1983 (Bank of Korea).

Overall, our results indicate that the promotion of light manufactured exports has been socially desirable, both in terms of growth and income distribution (though perhaps not so much from the latter perspective during the mid 1970s). Moreover, the 1983 results indicate that a positive SP is maintained even if we assume no surplus labour (m/w=1), viz. further increases in output would still be socially desirable.

4.2. Heavy and Chemical Industry Promotion (1973-79).

In the early 1970's, the government decided that "while Korea's past growth has been led by rapid expansion of labor intensive exports, in the future, emphasis must be directed towards skilled labor intensive industries in order to maintain continuous growth and international competitiveness...industries such as electronics, machinery and shipbuilding must be promoted" (Fourth Plan, p11). Again, a formidable package of financial and fiscal incentives was offered to the heavy and chemical industries (see chapter two for details).

In terms of economics, the government perceived reduced possibilities for continued export growth in light manufactures because of: rising real wages, increasing competition from other developing countries with lower labour costs and rising protectionism in the developed countries against

light manufactured imports. Strategically, US-China relations improved in the early 1970s, prompting fears of a possible withdrawal of US troops from Korea. The government felt that an industrial base was needed for defence purposes. Leaving strategic considerations aside, the government's view appears to have been that a second generation of export-leaders was needed for continued growth and that in time, the heavy and chemical industries could play such a role, i.e. the infant industry argument.

We may use our results to see if the promotion of heavy and chemical industries could be justified under infant industry grounds. The protection of infants is only justified if the present social value of benefits exceeds (or equals) the present social value of costs. This is the Mill-Bastable test. A necessary (but not sufficient) condition is that at some point in time, the social value of output must exceed the social value of inputs, i.e. social profitability must be positive. We now consider the promotion of chemical, primary metal, and machinery industries in turn.

4.2.1. The Chemical Industry.

Perhaps the most notable result concerning this sector is that social profitability of petroleum products is positive for all four combinations in both years. That is, increases in output by the oil-refining industry were desirable vis-à-vis growth and income equality. This is surprising, given that Korea is not naturally endowed with petroleum. Certainly, it is not recognised as one of the products in which Korea has comparative advantage; Balassa's RCA index is significantly smaller than one over 1972-1986 (see chapter four).

The positive social profitability is mainly due to two factors: one, the effective rate of tariff on imports of petroleum products is kept relatively low, to help domestic industries downstream maintain competitiveness. Thus the accounting ratio is relatively high (0.912 for 1975 and 0.934 for 1983). Two, it appears that the capital-output ratio

(in value terms) is relatively low, probably because of economies of scale (see Kim et al., 1988 and table 3.6). Both these factors are conducive to positive SP.

Petroleum products appear to be a case, where the domestic industry has become sufficiently efficient to make replacing imports socially desirable (at least to the extent of import substitution attained in 1975 and 1983). Although it has not become an important export industry, its protection on infant industry grounds may still have been justified. This result is important, as this sub-sector made up some 40 percent of the chemical industry output in both 1975 and 1983.

Two sub-sectors, namely chemical fertilisers and drugs and cosmetics, appear to have changed from negative to positive social profitability between 1975 and 1983 (for all four combinations). The former made up only 4 percent of the sector's output, but the latter contributed 9 percent in 1983. Also for these sub-sectors, protection and promotion may have been warranted.

It is difficult, however, to justify intervention on infant industry grounds for basic chemicals, synthetic resins and rubber, and 'other chemicals'. For them, social profitability was negative for all combinations and for both years. This is important, given that the three sub-sectors made up 40 percent of chemical output in 1975, and nearly 30 percent in 1983.

Furthermore, this may have important policy implications concerning the fine chemicals industry. Recently, the government has placed high priority on the development of this industry (see Sixth Plan, p55), which includes dyestuffs, paints, and soaps belonging to the 'other chemicals' sub-sector. Given its performance in the past, a review of this new policy may be warranted.

The results, then, suggest that whilst some policies towards the chemical industry may have been well-directed, others were not. This is

broadly consistent with the findings of chapter four. Our RCA calculations showed that only rubber products and chemical fertilisers had attained an RCA index greater than one by 1983. Social profitability results suggest that drugs and cosmetics, and petroleum products may also have become comparatively efficient by 1983. However, it seems that policy intervention may not have been justified in many cases, at least on infant industry grounds.

4.2.2. The Primary Metal Products Industry.

This sector consists of i) iron and steel manufacturing, ii) primary iron and steel products and iii) primary nonferrous metal manufacturing. For i) and iii), the results are not encouraging; they were not socially profitable in either year for any of the combinations. It seems that output increases in these subsectors were not socially desirable, either from the point of view of growth or income distribution.

Primary iron and steel products (ii), on the other hand, appear to have become socially profitable by 1983, at least for combinations one and two, i.e. if there is a strong emphasis on growth. It is important to note here, that this subsector has become an important exporter, and accounts for the majority of exports by the primary metal products industry (see table 4.6). Furthermore, its RCA has been well above one since the mid 1970s (see table 4.5). Thus, it seems that infant industry intervention may have been justified in this case, though not for the other two.

4.2.3. The Fabricated Metal Products and Machinery Industries.

These two industries were found to be highly successful cases of 'infants' reaching 'maturity' in chapter four, and the social profitability results are consistent with this finding. Already by 1975, electronics and household electrical equipment industries appear to have become socially profitable (in combinations one and two). The same is true of the measuring and other instruments industry. By 1983, the only subsectors remaining socially unprofitable were 'other electronic components' and

motor vehicle parts. That is, by 1983, increases in production by these two industries had on the whole become desirable vis-à-vis both growth and income distribution. This is important, as these industries were intended (by the government and the private sector alike) to become the leading foreign exchange earners of the future. Our results suggest that policy intervention may well have been justified here.

To sum, it seems that policy intervention has been well-directed with respect to the fabricated metal products and machinery industries, and to some extent with respect to the chemical and primary metal products industries. This is consistent with our findings in chapter four.

A sub-sector within the machinery industry, which the government has recently been promoting rather vigorously, is that of parts and components (mainly for the electronics, automobile and general machinery industries). Social profitability of some component sub-sectors were estimated separately for 1983. With respect to electronic components, semi-conductors and integrated circuits already show positive social profitability. However, other electronic components do not as yet. Motor vehicle parts are also socially non-profitable in 1983. Nevertheless, the experience of infants in the machinery industry over the past suggests that the parts industry may also attain maturity in the near future. Let us now turn to the issue of market liberalisation.

4.3. Market Liberalisation.

In the early 1980s, there was a drastic change in the government's attitude towards intervention:

"At the beginning stages of economic development, the government may correctly take primary responsibility for planning, setting of investment priority, and allocating of investment resources in order to accelerate the development process. But as the economy increases in complexity, government control must be greatly reduced in those areas in which the private sector can succeed on its own ability. In such areas, the

government should create the conditions for fair competition and focus on the functions of coordination and supervision in an effort to prevent adverse effects of market competition. This shift is an important step toward increased efficiency of the economy as a whole." (p98, Sixth Plan, 1987-91).

Accordingly, the government set all interest rates at ten percent, eliminating the policy loan, and encouraged "the autonomy of the financial institutions to improve allocative efficiency of funds through use of market forces" (Sixth Plan, p27).

On this issue we will only add, that market incentives can sometimes direct resources to socially non-profitable uses. In such cases, some government intervention may still be needed. To illustrate, some industries where market and social profitability seem to diverge are listed in table 5.7 (although admittedly the estimates for monopoly profits are rather crude; see chapter three, section II.2.5 for details).

Table 5.7. Profitability at Market and Shadow Prices for Selected Industries in 1983.

	Private Profitability	Social Profitability
Fibre Yarn	-	+
Fabricated Textile Products	-	+
Leather & Products	-	+
Lumber & Wood Products	-	+
Other Chemicals	+	-
Iron & Steel Manufacturing	+	-
Fabricated Metal Products	-	+
Other Electronic Components	+	-
Motor Vehicle Parts	+	-
Other Transport Equipment	-	+

Source: Table 3.9 for private profitability and tables 5.5 and 5.6 for social profitability.

5. Concluding Remarks.

The purpose of this chapter has been to study the impact of industrial policy on social welfare in Korea. Such a study follows naturally from our analysis in chapter two, where we disputed the claim that industrial policy in Korea has been successful due to it being, in some sense, 'neutral'. A currently prominent opinion on the Korean economic miracle is that it happened, because policy incentives were effectively self-neutralizing and so something approximating free markets was allowed to prevail. In chapter two, we provided evidence which suggests that this may be stretching the truth somewhat. Having shown that policy incentives were not necessarily neutral, our aim here was to see whether they were directed to those sectors with the greatest potential for economic development. On the whole, our results indicate that government intervention has indeed been contributory to the Korean economic miracle and not because it was neutral.

To evaluate the impact of policy on economic development, we estimated social profitability for each industry using the shadow prices derived in chapter three. We allowed for some variation in the emphasis on growth and income equality by attaching different weights to incomes of different groups (including the government).

We considered the social desirability of the various policy phases in turn: promotion of exports in light manufactures, the development of heavy and chemical industries and lastly market liberalisation. We found the export promotion in light manufactures to be conducive to both growth and improvement in income distribution.

With respect to the heavy and chemical industries, policy seems to have been somewhat less well-directed vis-à-vis the chemical and primary metal products industries. However, the promotion of the fabricated metal products and machinery industries appears to have been justified under infant industry grounds. As we noted in chapter four, it seems that industrial policy could have been improved by exercising greater

'selectivity' in providing policy incentives. However, this may not have been a practical option. On balance, in view of the fact that the fabricated metal products and machinery industries (together with the primary iron and steel products subsector) have become the new growth-leaders, it seems that policy has been contributory to Korea's economic development.

Finally, our intention has not been to claim that market forces had nothing to do with the Korean economic miracle; rather it was to show that (non-neutral) policy intervention may have made a significant contribution. To claim that market forces were unimportant would be just as unacceptable as the one which we set out to dispute.

Chapter Six.

Bilateral Trade Problems in Korea: Origins and Policy Implications.

1. Introduction.

Managing trade balances with the US and Japan has become an important policy concern in recent years (Sixth Five-Year Plan, 1986). On the one hand, the US has been applying increasing pressure on the government to control the growing trade surplus with that country. On the other hand, Korea itself has become increasingly uncomfortable with the size of the trade deficit with Japan. Whatever its justification, the Korean government has recently undertaken policy action to restrict exports to the US and to substitute imports from Japan.

The focus on trade balances vis-à-vis the US and Japan gives rise to two interesting questions: i) why did they become so imbalanced? and ii) how should they be handled by policy? At a preliminary level, it is possible to argue that the trade imbalances are simply by-products of growth: Korean growth has largely been export-led, concentrating mainly on the US market, and Japan has been the dominant source of the required intermediate inputs (see Direction of Trade Statistics, IMF, and Korea Foreign Trade Association, 1987). These origins suggest that voluntary export restraints (VERs) vis-à-vis the US and 'localisation' of imports from Japan provide possible policy prescriptions.

However, a closer look at the first question may be required as a basis for an analysis of the second. The purpose of this chapter is to examine the bilateral trade problems at a more disaggregated level. Specifically, we analyse the relationship between bilateral trade balances and output growth using an adapted version of the Little/Mirrlees (1974) method for planning and project appraisal.

The numeraire in Little/Mirrlees is foreign exchange; by suitably adjusting the shadow prices for labour and monopoly profits, social

profitability (from chapter five) can reflect net savings in foreign exchange resulting from output changes. Furthermore, the shadow (and now foreign exchange) price of a good may be seen as being made up of many bilateral components, thus allowing us to estimate net foreign exchange savings with respect to different trade partners.

This chapter is organised as follows: a brief background to the bilateral trade problems is presented in section two. In section three, we describe our method for estimating the relationship between output changes and bilateral trade. The results of our estimation are discussed in the context of Korean growth in section four. In light of our findings here, we consider how best to approach the task of managing bilateral trade in section five. Concluding remarks follow in section six.

2. Background to the Bilateral Trade Problems.

In this section, we briefly review why trade balances with the US and Japan have become important issues of policy. Let us first consider the US-Korea problem. The US government has recently come under increasing pressure to control the size of the overall US trade deficit, which increased from $36 billion in 1982 to $148 billion in 1986 (Bank of Korea). Unable (or unwilling) to reduce its budget deficit, it has turned to trade policy for this task. More specifically, the US government has taken a hard line against countries which have large trade surpluses with the US, e.g. Japan and Korea (Korea is the seventh largest supplier of its imports and the source of its fifth largest trade deficit amounting to some US $10 billion in 1987).

In particular, the US has threatened to reduce access to its market for these 'surplus' countries unless cooperation was forthcoming in reducing its overall trade deficit. The main tool is the Section 301 of the Trade Act of 1974, which gives authority to the US president to retaliate against foreign trade practices that are deemed to have an "unjustifiable,

unreasonable or discriminatory" effect on US trade. All presidents have been quite reluctant to use this authority except in narrowly defined cases for fear of setting broad precedents that would expand the scope of the provision. However, the Reagan administration adopted a more aggressive approach to Section 301 as part of its shift since 1985 to a more interventionist approach to trade and exchange rate policies (see Schott, 1989).

This threat requires government intervention for two important reasons: i) the US provides by far the largest market for Korean exports (some 40 percent in 1987) and access to this market is crucial for continued growth of the Korean economy; ii) the US is an important political and military ally. Thus, the Korean government has been very sensitive to US protectionist pressures.

Cooperation has come mainly in the form of voluntary export restraints (VERs). For instance, in 1985, Korea and the US agreed to keep Korea's share of total US consumption of major steel products to 1.9 percent until 1989. Recently, however, there has been a rise in unilateral or non-negotiated VERs, i.e. export restraints adopted by Korea without formal negotiations with the US. In 1987, VCRs, microwave ovens and colour TVs became subject to 'voluntary' VERs.

Let us now turn to the Japan-Korea problem. The concern here is not with the size of the bilateral trade deficit per se; Korea has been enjoying an overall trade surplus since 1986. Rather, the government is worried about the extent to which Korean exports depend on Japan for vital inputs. Japan has comparative advantage in many sophisticated intermediate inputs, e.g. machinery and components, and Korea relies heavily on Japan for their supply (see Korea Foreign Trade Association, 1987, for details). The dependency may be due to the need for spare parts or servicing, or the inability to produce domestically at competitive prices (for given quality). This concern is aggravated by the historical animosity between

the two countries (Japan occupied Korea over the period 1910-45).

Government action has come mainly in the form of 'localisation'. 'Localisation' or import substitution has been a continuing thread through the Korean development strategy over the past three decades (see chapter two). In the 1970s, the government encouraged the growth of heavy and chemical industries through a host of financial and fiscal incentives. Recently, the focus of localisation has been on high-tech inputs, mainly parts and components; the government announced a list of over 700 items 'suitable' for localisation and all but 64 of them involved parts and components for the machinery, automobile, shipbuilding and electronics industries. Furthermore, a foreign currency loan fund of some $2.5 billion was created for this purpose, with the interest rate only 1.5 percent above LIBOR. With the expected appreciation of the Korean currency, this must provide a powerful incentive. It is important to note here, that on purely economic grounds, import-substitution is justified only if infant industry arguments apply.

To summarise, an important policy problem in the recent past has been that of trade management vis-à-vis the US and Japan. Policy response has mainly been in the form of VERs (or 'voluntary' VERs) and localisation (see the Sixth Five-Year Plan, 1986, p48 and 49).

3. A Method for Analysing Bilateral Trade Effects of Output Growth.

In this section, we present a method which may be used to analyse the relationship between net savings in foreign exchange with respect to any particular country and output growth. This method should allow us to study the effect of Korea's export-led growth on bilateral trade balances vis-à-vis the US and Japan.

Our procedure is a simple adaptation of the Little/Mirrlees (1974) method based on shadow prices and social profitability. To avoid repetition, we will rely on our earlier discussion in chapters three and

five, and mention only the salient points here. The numeraire in Little/Mirrlees is foreign exchange. By suitably choosing shadow prices for labour and monopoly profits, social profitability may be adjusted to reflect net savings in foreign exchange from additional output.

Consider first the effect of labour income on foreign exchange. The opportunity cost of labour in terms of foreign exchange is its contribution to foreign exchange in its alternative employment i.e. marginal product (m) converted by the standard conversion factor (SCF; this is an 'average' accounting ratio which converts market values into world values). Then there is the cost of additional consumption, the wage (w) minus m, again converted by the SCF. The total opportunity cost of labour income in terms of foreign exchange is then SCF multiplied by w = m+w-m.

The opportunity cost of monopoly profits in terms of foreign exchange is equal to SCF multiplied by the amount received by the shareholder, assuming it is spent.

When the shadow price of labour and the social cost of monopoly profits are chosen in this way, then the shadow prices of commodities represent opportunity costs in terms of foreign exchange. For example, the shadow price of a non-traded good would now be the sum of the input costs, evaluated in foreign exchange. As before, the shadow prices of traded goods are based on their world prices. Therefore, social profitability from chapter five would now be the net savings in foreign exchange resulting from producing an additional unit value at world prices.

A further adjustment is required to obtain the net foreign exchange savings vis-à-vis a particular country. In the Little/Mirrlees model, additional demand is assumed to be ('as if') satisfied eventually by either increased imports, reduced exports or increased domestic production (the possibility of reduced consumption elsewhere is ignored for practical purposes; see chapter three). Trade is assumed to be undertaken with a single partner, i.e. the rest of the world. We are, however, concerned

with bilateral trading relationships as well. If additional demand is satisfied by increased imports (or decreased exports), then the source (or intended destination) is also of interest. It is likely that the additional demand would involve more than one source or destination, particularly with aggregated goods. At any given time, there would be a tendency for each commodity to be imported from or exported to different countries. This tendency would depend on market forces and government policy.

Then, the shadow price of a good (now representing its foreign exchange opportunity cost) may be seen as being made up of many bilateral components, the relative size of each depending on the tendency for the good to be imported from or exported to different countries. Consider the case when additional demand is met by imports. The net impact of this on the bilateral trade balance with a country is the share which is imported from that country at the margin. For good i and country J (for Japan), we have:

(1) $$s_i^J \nu_i,$$

where s_i^J = the foreign exchange opportunity cost vis-à-vis country J per unit value of good i also in foreign exchange (in this case equal to J's share in imports of good i),

and ν_i = shadow price of good i = c.i.f. price.

If the demand is met by reduced exports, then the foreign exchange cost vis-à-vis J is

(2) $$s_i^J \nu_i = \text{share}_i^J p_i^{fob} - s_t^J \nu_t x_{ti},$$

where share_i^J = share of good i exported to J,

p_i^{fob} = f.o.b. price of good i,

ν_t = shadow price of trade and transport,

and x_{ti} = input of good t per unit good i.

For non-traded goods, we have:

(3) $$s_i^J \nu_i = \Sigma_m s_m^J \nu_m x_{mi} + \Sigma_x s_x^J \nu_x x_{xi} + \Sigma_n s_n^J \nu_n x_{ni} + \Sigma_f s_f^J \nu_f x_{fi} ,$$

where subscripts m, x and n denote imported, exported and non-traded goods respectively, and f denotes factors of production. The ν's are calculated as before (see chapter three). Then equations (2) and (3) provide simultaneous equations for s_i^J for exported and non-traded goods.

The specifics of estimation are for the most part the same as those for 1983 in chapter three. Two alternative sets of commodity classification were used, input-output data (1983) were used to represent input requirements for non-traded goods, and so on. Apart from those concerning the shadow price of labour and monopoly profits, the only other difference is that trade shares were used to approximate 'tendencies' in bilateral trade at the margin. Using three-digit and five-digit SITC trade data, the shares of each good exported to and imported from the US and Japan were calculated. Thus, for instance, if a good i were classified as imported at the margin, the shares of US and Japan in total imports of good i would be used to approximate s_i^{US} and s_i^J (see table 6.1). Moreover, we used 'average' shares (for the periods 1982-84 and 1985-86) to avoid anomalies of particular years.

The equation for the net savings in foreign exchange vis-à-vis country C from producing a unit value at world prices (SP^C) is

$$SP_i^C = \frac{s_i^C r_i - \Sigma_j s_j^C r_j a_{ji}}{r_i}$$

where a_{ji} = input coefficient of j into i and

r_i = accounting ratio for i, when shadow prices equal foreign exchange opportunity costs.

Note that since $\Sigma_c s_i^C = 1$,

$$\Sigma_c SP_i^C = \frac{r_i - \Sigma_j r_j a_{ji}}{r_i} ,$$

which is the expression for social profitability given in chapter five.

Table 6.1. Selected Shares for USA and Japan in Korean Trade.

Classification 1: 1982-84.

Imports

		USA	Japan
1	Cereals	0.883	0.003
3	Industrial Crops	0.567	0.067
5	Forestry Products	0.000	0.000
7	Coal Mining	0.185	0.040
8	Metallic Ores	0.270	0.022
9	Nonmetallic Minerals	0.018	0.008
10	Meat,Dairy & Fruits	0.075	0.008
14	Sugar	0.001	0.001
24	Pulp & Paper	0.522	0.134
26	Basic Chemicals	0.295	0.345
28	Drugs & Cosmetics	0.203	0.347
29	Synthetic Resins & Rubber	0.212	0.437
31	Other Chemicals	0.147	0.357
32	Petroleum Products	0.333	0.102
36	Iron & Steel Manufacturing	0.020	0.191
38	Primary Nonferrous Metal Manufacturing	0.082	0.251
40	General Industrial Machinery	0.277	0.489
42	Industrial Electrical Appliances	0.380	0.422
44	Electronic Appliances	0.422	0.423
45	Semi-conductors & Integrated Circuits	0.436	0.357
46	Other Electronic Components	0.436	0.357
47	Communication Equipment	0.467	0.315
50	Motor Vehicle Parts	0.024	0.799
51	Other Transport Equipment	0.566	0.088
52	Measuring,Medical & Optical Instruments	0.230	0.589

Exports

6	Fishery Products	0.137	0.721
11	Seafood Processing	0.137	0.721
19	Fiber Yarn	0.012	0.324
20	Textile Fabrics	0.140	0.100
21	Fabricated Textile Products	0.206	0.059
22	Leather & Leather Products	0.469	0.129
23	Lumber & Wood Products	0.236	0.146
27	Chemical Fertilizers	0.003	0.051
34	Rubber Products	0.622	0.065
35	Nonmetallic Mineral Products	0.168	0.173
37	Primary Iron & Steel Products	0.306	0.239
39	Fabricated Metal Products	0.317	0.030
41	Household Electrical Appliances	0.777	0.065
43	Household Electronic Appliances	0.416	0.103
48	Shipbuilding	0.135	0.023
49	Motor Vehicles	0.162	0.015
53	Miscellaneous Manufacturing	0.604	0.094
	Total Trade	0.283	0.194

Source: Estimated from UN data.
Note: The figures are averages for the period 1982-84 and they refer to the shares in total Korean imports or exports respectively.

Table 6.1. contd.

Classification 1: 1985-6.

Imports

		USA	Japan
1	Cereals	0.540	0.001
3	Industrial Crops	0.359	0.096
5	Forestry Products	0.000	0.000
7	Coal Mining	0.172	0.011
8	Metallic Ores	0.337	0.027
9	Nonmetallic Minerals	0.020	0.009
10	Meat,Dairy & Fruits	0.197	0.017
14	Sugar	0.003	0.002
24	Pulp & Paper	0.536	0.112
26	Basic Chemicals	0.254	0.343
28	Drugs & Cosmetics	0.193	0.346
29	Synthetic Resins & Rubber	0.191	0.452
31	Other Chemicals	0.170	0.323
32	Petroleum Products	0.319	0.179
36	Iron & Steel Manufacturing	0.012	0.338
38	Primary Nonferrous Metal Manufacturing	0.063	0.262
40	General Industrial Machinery	0.196	0.541
42	Industrial Electrical Appliances	0.288	0.501
44	Electronic Appliances	0.422	0.423
45	Semi-conductors & Integrated Circuits	0.436	0.357
46	Other Electronic Components	0.436	0.357
47	Communication Equipment	0.287	0.511
50	Motor Vehicle Parts	0.024	0.799
51	Other Transport Equipment	0.603	0.141
52	Measuring,Medical & Optical Instruments	0.218	0.574

Exports

6	Fishery Products	0.146	0.753
11	Seafood Processing	0.146	0.753
19	Fiber Yarn	0.020	0.246
20	Textile Fabrics	0.166	0.083
21	Fabricated Textile Products	0.243	0.064
22	Leather & Leather Products	0.495	0.152
23	Lumber & Wood Products	0.288	0.302
27	Chemical Fertilizers	0.000	0.069
34	Rubber Products	0.652	0.062
35	Nonmetallic Mineral Products	0.264	0.317
37	Primary Iron & Steel Products	0.296	0.258
39	Fabricated Metal Products	0.443	0.032
41	Household Electrical Appliances	0.660	0.023
43	Household Electronic Appliances	0.531	0.078
48	Shipbuilding	0.126	0.017
49	Motor Vehicles	0.520	0.009
53	Miscellaneous Manufacturing	0.631	0.096
	Total Trade	0.297	0.221

Table 6.1. contd.
Classification 2: 1982-4.

Imports

		USA	Japan
3	Industrial Crops	0.567	0.067
5	Forestry Products	0.000	0.000
7	Coal Mining	0.185	0.040
8	Metallic Ores	0.270	0.022
9	Nonmetallic Minerals	0.018	0.008
10	Meat,Dairy & Fruits	0.075	0.008
14	Sugar	0.001	0.001
24	Pulp & Paper	0.522	0.134
32	Petroleum Products	0.333	0.102

Exports

6	Fishery Products	0.137	0.721
11	Seafood Processing	0.137	0.721
19	Fiber Yarn	0.012	0.324
20	Textile Fabrics	0.140	0.100
21	Fabricated Textile Products	0.206	0.059
22	Leather & Leather Products	0.469	0.129
23	Lumber & Wood Products	0.236	0.146
27	Chemical Fertilizers	0.003	0.051
29	Synthetic Resins & Rubber	0.130	0.155
34	Rubber Products	0.622	0.065
35	Nonmetallic Mineral Products	0.168	0.173
37	Primary Iron & Steel Products	0.306	0.239
39	Fabricated Metal Products	0.317	0.030
41	Household Electrical Appliances	0.777	0.065
42	Industrial Electrical Appliances	0.473	0.150
43	Household Electronic Appliances	0.416	0.103
44	Electronic Appliances	0.769	0.007
45	Semi-conductors & Integrated Circuits	0.541	0.122
46	Other Electronic Components	0.541	0.122
47	Communication Equipment	0.612	0.039
48	Shipbuilding	0.135	0.023
49	Motor Vehicles	0.162	0.015
52	Measuring,Medical & Optical Instruments	0.338	0.160
53	Miscellaneous Manufacturing	0.604	0.094

Table 6.1. contd.
Classification 2: 1985-6.

		USA	Japan
Imports			
3	Industrial Crops	0.359	0.096
5	Forestry Products	0.000	0.000
7	Coal Mining	0.172	0.011
8	Metallic Ores	0.337	0.027
9	Nonmetallic Minerals	0.020	0.009
10	Meat,Dairy & Fruits	0.197	0.017
14	Sugar	0.003	0.002
24	Pulp & Paper	0.536	0.112
32	Petroleum Products	0.319	0.179
Exports			
6	Fishery Products	0.146	0.753
11	Seafood Processing	0.146	0.753
19	Fiber Yarn	0.020	0.246
20	Textile Fabrics	0.166	0.083
21	Fabricated Textile Products	0.243	0.064
22	Leather & Leather Products	0.495	0.152
23	Lumber & Wood Products	0.288	0.302
27	Chemical Fertilizers	0.000	0.069
29	Synthetic Resins & Rubber	0.188	0.200
34	Rubber Products	0.652	0.062
35	Nonmetallic Mineral Products	0.264	0.317
37	Primary Iron & Steel Products	0.296	0.258
39	Fabricated Metal Products	0.443	0.032
41	Household Electrical Appliances	0.660	0.023
42	Industrial Electrical Appliances	0.448	0.158
43	Household Electronic Appliances	0.531	0.078
44	Electronic Appliances	0.769	0.007
45	Semi-conductors & Integrated Circuits	0.541	0.122
46	Other Electronic Components	0.541	0.122
47	Communication Equipment	0.555	0.050
48	Shipbuilding	0.126	0.017
49	Motor Vehicles	0.520	0.009
52	Measuring,Medical & Optical Instruments	0.408	0.202
53	Miscellaneous Manufacturing	0.631	0.096

4. The Origins of the Bilateral Trade Imbalances.

In this section, we consider the origins of the bilateral trade imbalances in light of our results presented in table 6.2. Before we proceed, however, let us note some of their characteristics.

The results in table 6.2 represent the net effect on the trade balance, vis-à-vis the rest of the world (SP^{ROW}), the US (SP^{US}) and Japan (SP^{J}) respectively, of producing an additional unit value at world prices. In general, for a traded good i and country C, the SP_i^C is higher a) the greater C's share in Korea's imports (or exports) of i and b) the smaller its share in i's major traded and non-traded inputs. The SP_i^C for non-traded goods is by definition equal to zero; the opportunity cost vis-à-vis C of producing a unit of non-traded good i is equal to the sum of the input costs with respect to C, i.e. $s_i^C r_i = \Sigma_j s_j^C r_j a_{ji}$ (see equation 3 above).

The trade shares for some goods have changed significantly between the 1982-84 and 1985-86 periods and their SPs are affected accordingly; in some cases, even the sign is changed. For example, the Korean automobile industry has recently made great inroads into the US market and the US share in total Korean automobile exports increased from only 16 percent over 1982-84 to a massive 52 percent for 1985-86. As a result, the SP^{US} increased from -0.02 to +0.35. The implication is that the importance of partners in trade may change over time - either due to market forces or government policy - and such changes, as they occur, should be taken into account.

Commodity classification can also affect the SP. Take the case of semi-conductors and integrated circuits (subsector 45) which may be classified as either imported or exported; their SP is positive with respect to both the US and Japan when classified as imported, because the two countries represent major sources of imports in these goods. However, when classified as exported, the SP for Japan becomes negative because it

is not a major export market. It is important to be aware of these qualifications when interpreting the results.

Table 6.2. Effects on Trade Balances with the World, USA and Japan.

Classification 1: 1982-4.

	World	USA	Japan
1 Cereals	0.004	0.576	-0.170
3 Industrial Crops	-0.001	0.256	-0.101
5 Forestry Products	-0.016	-0.297	-0.174
6 Fishery Products	0.045	-0.177	0.588
7 Coal Mining	-0.011	-0.117	-0.158
8 Metallic Ores	-0.008	-0.039	-0.183
9 Nonmetallic Minerals	0.037	-0.290	-0.182
10 Meat,Dairy & Fruits	-0.045	-0.292	-0.160
11 Seafood Processing	0.050	-0.077	0.274
14 Sugar	0.149	-0.153	-0.072
19 Fiber Yarn	0.038	-0.313	0.121
20 Textile Fabrics	0.032	-0.006	-0.161
21 Fabricated Textile Products	0.059	0.010	-0.141
22 Leather & Leather Products	0.070	0.161	-0.015
23 Lumber & Wood Products	0.078	0.068	0.036
24 Pulp & Paper	0.009	0.132	-0.033
26 Basic Chemicals	-0.081	-0.032	0.120
27 Chemical Fertilizers	0.160	-0.218	-0.144
28 Drugs & Cosmetics	0.023	-0.076	0.109
29 Synthetic Resins & Rubber	-0.117	-0.106	0.121
31 Other Chemicals	-0.087	-0.192	0.107
32 Petroleum Products	0.065	0.268	0.068
34 Rubber Products	0.108	0.424	-0.105
35 Nonmetallic Mineral Products	0.037	-0.088	0.016
36 Iron & Steel Manufacturing	-0.059	-0.151	0.011
37 Primary Iron & Steel Products	-0.020	0.118	0.030
38 Primary Nonferrous Metal Manuf.	-0.120	-0.173	0.048
39 Fabricated Metal Products	0.052	0.035	-0.200
40 General Industrial Machinery	-0.008	-0.023	0.205
41 Household Electrical Appliances	0.213	0.489	-0.126
42 Industrial Electrical Appliances	-0.003	0.108	0.170
43 Household Electronic Appliances	0.198	0.111	-0.132
44 Electronic Appliances	0.007	0.045	0.124
45 Semiconductors & Integrated Circuits	-0.003	0.067	0.073
46 Other Electronic Components	-0.090	0.101	0.089
47 Communication Equipment	0.082	0.132	0.067
48 Shipbuilding	0.029	-0.166	-0.217
49 Motor Vehicles	0.178	-0.022	-0.350
50 Motor Vehicle Parts	-0.152	-0.257	0.528
51 Other Transport Equipment	0.037	0.204	-0.117
52 Measuring & Other Instruments	-0.018	-0.051	0.241
53 Miscellaneous Manufacturing	0.093	0.361	-0.095

Note: The figures represent the net effect on the trade balance with the world, USA and Japan respectively, of producing a unit value output at world prices. For example, the production of a dollar's worth of basic chemicals implies an additional 3 cents in net imports from the US, but a savings of 12 cents in net imports from Japan.

Table 6.2. contd.
Classification 1: 1985-6.

		USA	Japan
1	Cereals	0.252	-0.206
3	Industrial Crops	0.073	-0.104
5	Forestry Products	-0.287	-0.207
6	Fishery Products	-0.161	0.577
7	Coal Mining	-0.124	-0.229
8	Metallic Ores	0.032	-0.215
9	Nonmetallic Minerals	-0.278	-0.218
10	Meat,Dairy & Fruits	-0.132	-0.180
11	Seafood Processing	-0.069	0.273
14	Sugar	-0.135	-0.087
19	Fiber Yarn	-0.263	0.019
20	Textile Fabrics	0.017	-0.157
21	Fabricated Textile Products	0.046	-0.131
22	Leather & Leather Products	0.165	-0.014
23	Lumber & Wood Products	0.116	0.164
24	Pulp & Paper	0.140	-0.070
26	Basic Chemicals	-0.059	0.076
27	Chemical Fertilizers	-0.208	-0.144
28	Drugs & Cosmetics	-0.080	0.081
29	Synthetic Resins & Rubber	-0.111	0.110
31	Other Chemicals	-0.148	0.054
32	Petroleum Products	0.253	0.136
34	Rubber Products	0.455	-0.127
35	Nonmetallic Mineral Products	0.006	0.122
36	Iron & Steel Manufacturing	-0.161	0.069
37	Primary Iron & Steel Products	0.113	-0.036
38	Primary Nonferrous Metal Manuf.	-0.199	0.031
39	Fabricated Metal Products	0.180	-0.230
40	General Industrial Machinery	-0.082	0.214
41	Household Electrical Appliances	0.390	-0.186
42	Industrial Electrical Appliances	0.032	0.211
43	Household Electronic Appliances	0.233	-0.173
44	Electronic Appliances	0.055	0.098
45	Semiconductors & Integrated Circuits	0.069	0.057
46	Other Electronic Components	0.097	0.046
47	Communication Equipment	-0.032	0.232
48	Shipbuilding	-0.161	-0.258
49	Motor Vehicles	0.349	-0.378
50	Motor Vehicle Parts	-0.251	0.468
51	Other Transport Equipment	0.240	-0.112
52	Measuring & Other Instruments	-0.057	0.206
53	Miscellaneous Manufacturing	0.390	-0.120

Table 6.2. contd.
Classification 2: 1982-4.

		World	USA	Japan
3	Industrial Crops	-0.027	0.285	-0.046
5	Forestry Products	-0.042	-0.279	-0.117
6	Fishery Products	0.022	-0.169	0.649
7	Coal Mining	-0.040	-0.118	-0.084
8	Metallic Ores	-0.044	-0.047	-0.102
9	Nonmetallic Minerals	0.008	-0.282	-0.112
10	Meat,Dairy & Fruits	-0.074	-0.215	-0.116
11	Seafood Processing	0.038	-0.071	0.304
14	Sugar	0.137	-0.129	-0.048
19	Fiber Yarn	-0.003	-0.320	0.205
20	Textile Fabrics	0.016	-0.010	-0.122
21	Fabricated Textile Products	0.041	0.015	-0.103
22	Leather & Leather Products	0.049	0.161	0.026
23	Lumber & Wood Products	0.060	0.066	0.078
24	Pulp & Paper	-0.012	0.126	0.008
27	Chemical Fertilizers	0.104	-0.239	-0.038
29	Synthetic Resins & Rubber	0.022	-0.138	0.036
32	Petroleum Products	0.061	0.267	0.077
34	Rubber Products	0.068	0.422	-0.038
35	Nonmetallic Mineral Products	0.015	-0.094	0.073
37	Primary Iron & Steel Products	-0.090	-0.012	0.103
39	Fabricated Metal Products	0.021	0.019	-0.137
41	Household Electrical Appliances	0.162	0.471	-0.041
42	Industrial Electrical Appliances	-0.001	0.158	0.029
43	Household Electronic Appliances	0.111	0.023	-0.007
44	Electronic Appliances	0.017	0.312	-0.096
45	Semi-conductors & Integrated Circuit	0.014	0.141	0.003
46	Other Electronic Components	0.007	0.215	-0.004
47	Communication Equipment	0.051	0.244	-0.080
48	Shipbuilding	0.002	-0.180	-0.120
49	Motor Vehicles	0.099	-0.122	-0.099
52	Measuring & Other Instruments	0.034	0.032	0.034
53	Miscellaneous Manufacturing	0.049	0.358	-0.028

Table 6.2. contd.
Classification 2: 1985-6.

		USA	Japan
3	Industrial Crops	0.050	-0.049
5	Forestry Products	-0.316	-0.148
6	Fishery Products	-0.192	0.641
7	Coal Mining	-0.166	-0.154
8	Metallic Ores	-0.017	-0.137
9	Nonmetallic Minerals	-0.315	-0.146
10	Meat,Dairy & Fruits	-0.134	-0.139
11	Seafood Processing	-0.084	0.304
14	Sugar	-0.141	-0.065
19	Fiber Yarn	-0.308	0.095
20	Textile Fabrics	-0.007	-0.117
21	Fabricated Textile Products	0.027	-0.093
22	Leather & Leather Products	0.144	0.025
23	Lumber & Wood Products	0.094	0.205
24	Pulp & Paper	0.114	-0.030
27	Chemical Fertilizers	-0.265	-0.056
29	Synthetic Resins & Rubber	-0.117	0.040
32	Petroleum Products	0.248	0.146
34	Rubber Products	0.422	-0.065
35	Nonmetallic Mineral Products	-0.028	0.181
37	Primary Iron & Steel Products	-0.055	0.086
39	Fabricated Metal Products	0.133	-0.168
41	Household Electrical Appliances	0.340	-0.101
42	Industrial Electrical Appliances	0.099	0.005
43	Household Electronic Appliances	0.127	-0.046
44	Electronic Appliances	0.299	-0.114
45	Semi-conductors & Integrated Circuit	0.119	-0.016
46	Other Electronic Components	0.178	-0.042
47	Communication Equipment	0.164	-0.089
48	Shipbuilding	-0.216	-0.156
49	Motor Vehicles	0.205	-0.134
52	Measuring & Other Instruments	0.057	0.041
53	Miscellaneous Manufacturing	0.349	-0.056

Let us now turn to the relationship between output growth and bilateral trade balances. For the following commodities, there is a 'tendency' for the SP_i^J to be positive vis-à-vis the US and negative vis-à-vis Japan:

20 Textile Fabrics
21 Fabricated Textile Products
22 Leather and Leather Products
34 Rubber Products
37 Primary Iron and Steel Products
39 Fabricated Metal Products
41 Household Electrical Equipment
43 Household Electronic Equipment
44 Electronic Appliances
45 Semi-conductors and Integrated Circuits
47 Communication Equipment
49 Motor Vehicles
53 Miscellaneous Manufacturing

The 'positive-negative' result does not hold for all these sectors in all instances; for sectors 44, 45 and 47, the result holds only if they are classified as exported. For motor vehicles, the result only holds if the trade shares for the 1985-86 period are used. These qualifications notwithstanding, there remains a strong tendency for increases in output in these sectors to improve the trade balance vis-à-vis the US and worsen it vis-à-vis Japan.

They are also some of Korea's leading exporters; the thirteen sectors listed above accounted for some two-thirds of Korea's manufacturing exports in 1983. In turn, the manufacturing sector accounted for 72 percent of all exports in the same year (see table 6.3). This finding is consistent with the story that the bilateral trade imbalances are mainly by-products of the successful export-led growth strategy adopted in Korea.

Further support for this story may be found in chapter five. There, we estimated social profitability for each industrial sector, representing the net impact on social welfare of producing an additional unit social value. Taking into account the policy emphasis on growth, we found that output increases in these sectors would be socially beneficial (see tables 5.5 and 5.6).

Table 6.3. Shares in Manufacturing Exports, 1983.

19	Fiber Yarn	0.028
20	Textile Fabrics	0.067
21	Fabricated Textile Products	0.154
22	Leather & Leather Products	0.047
23	Lumber & Wood Products	0.010
24	Pulp & Paper	0.006
25	Printing & Publishing	0.001
26	Basic Chemicals	0.011
27	Chemical Fertilizers	0.010
28	Drugs & Cosmetics	0.002
29	Synthetic Resins & Rubber	0.020
30	Chemical Fibers	0.001
31	Other Chemicals	0.003
32	Petroleum Products	0.034
33	Coal Products	0.001
34	Rubber Products	0.056
35	Nonmetallic Mineral Products	0.020
36	Iron & Steel Manufacturing	0.009
37	Primary Iron & Steel Products	0.079
38	Primary Nonferrous Metal Manufacturing	0.008
39	Fabricated Metal Products	0.067
40	General Industrial Machinery	0.018
41	Household Electrical Appliances	0.008
42	Industrial Electrical Appliances	0.018
43	Household Electronic Appliances	0.052
44	Electronic Appliances	0.011
45	Semi-conductors & Integrated Circuits	0.041
46	Other Electronic Components	0.014
47	Communication Equipment	0.013
48	Shipbuilding	0.112
49	Motor Vehicles	0.008
50	Motor Vehicle Parts	0.000
51	Other Transport Equipment	0.003
52	Measuring,Medical & Optical Instruments	0.013
53	Miscellaneous Manufacturing	0.054
	Manufacturing	1.000

Source: Bank of Korea.

The implication is that the bilateral trade imbalances are merely side-effects of the way in which Korea has achieved its phenomenal growth. Korea seems to have concentrated its development efforts in those sectors which have 'comparative advantage' (in the sense that social costs of production are less than the social value of output) and they have tended to export more to the US and import more from Japan.

Indeed, the imbalances may not necessarily pose any serious problems for the policymaker. If it were possible for the US to regain control of the trade account using some other means such as reducing the budget deficit, then the bilateral trade surplus would be entirely acceptable. Furthermore, under less volatile political circumstances, the trade deficit with Japan perhaps might not cause so much concern; on purely economic grounds, 'localisation' may only be justified on infant industry arguments.

Nevertheless, the threat from the US is a real one, as is the want for a reduction in dependence on Japan. Voluntary export restraints may provide the appropriate solution as far as the 'positive-negative' result holds, viz. a reduction of exports would now reduce the surplus vis-à-vis the US as well as the deficit vis-à-vis Japan. However, there remains an element of dilemma, since this policy may be detrimental to economic growth and development.

We suggest, therefore, that a more careful approach to VERs and indeed localisation may be needed, in order to see to the bilateral trade problems whilst incurring the minimum costs. Our methodology may be further extended to ascertain which sectors may be more suitable for VERs or localisation.

5. Identifying Sectors Suitable for VERs and Localisation.

The aim of the Korean trade policy at present appears to be one of maximising net foreign exchange earnings, while controlling the trade surplus with the US and the deficit with Japan. This is evident from the following statement:

"To reduce its large external debt, Korea has no alternative but to sustain surpluses in the balance of payments. Korea suffers huge deficits in its trade with Japan, while registering trade surplus with the United States. Such a skewed trade structure will make it difficult for Korea successively (to) maintain balance of payments surpluses without causing trade frictions. The government will therefore make special efforts to adjust Korea's trade balances with its trade partners, in particular reducing the bilateral deficit with Japan and holding the surplus with the United States to an appropriate level" (The Sixth Plan, 1986, p48).

This policy strategy may be incorporated in our method by attaching different weights to foreign exchange, depending on how it affects the trade balances with the US and Japan. In normal social profitability calculations, all foreign exchange earnings (and costs) are treated equally. However, the yen may be treated as having greater value and the dollar less value than other foreign exchange (to simplify, let us assume that all transactions with the US are in dollars and all those with Japan are in yen).

Consider reducing exports of a particular good to the US. This implies the loss of foreign exchange equal to the export price of the good. However, the foreign exchange costs of its production are saved. The cost savings minus the loss in earnings gives the net effect on the overall balance of trade. However, the loss of earnings (in dollars) has the beneficial effect of reducing the surplus with the US. Similarly, that part of cost savings which increases the surplus with the US incurs an additional cost. Both these considerations can be taken into account by

attaching a smaller weight to dollars than to other currency. Hence, we may measure the social desirability of reducing exports of good i to the US by a unit foreign exchange (SP^{VER}) as

$$\frac{w^{US}\left(\Sigma_j s_j^{US} r_j a_{ji} - r_i\right) + w^{J}\Sigma_j s_j^{J} r_j a_{ji} + w^{ROW}\Sigma_j s_j^{ROW} r_j a_{ji}}{r_i},$$

where w^{US}, w^{J} and w^{ROW} denote weights attached to the dollar, yen and other currencies respectively. Similarly, the social desirability of substituting a unit foreign exchange of good i from Japan (SP^{LOC}) may be written as

$$\frac{w^{J}\left(r_i - \Sigma_j s_j^{J} r_j a_{ji}\right) + w^{US}\Sigma_j s_j^{US} r_j a_{ji} - w^{ROW}\Sigma_j s_j^{ROW} r_j a_{ji}}{r_i}$$

(note that the denominator is unweighted, since SP^{VER} and SP^{LOC} measure the weighted trade effects 'per' unit value (in foreign exchange) of export reduction and import substitution respectively).

Normalising so that $w^{ROW} = 1$, we obtained results for these equations using weights between 1 and 0.9 for the dollar and between 1 and 1.1 for the yen (see tables 6.4 to 6.7).

Table 6.4. Weighted Trade Effects, Classification 1, 1982-84.

Weight of Dollar	1	0.95	0.9
Weight of Yen	1	1	1
Voluntary Export Restraints (VERs) on:			
6 Fishery Products	-0.044	-0.010	0.024
11 Seafood Processing	-0.049	-0.010	0.029
19 Fiber Yarn	-0.037	-0.003	0.030
20 Textile Fabrics	-0.031	0.011	0.053
21 Fabricated Textile Products	-0.058	-0.018	0.023
22 Leather & Leather Products	-0.069	-0.035	-0.002
23 Lumber & Wood Products	-0.077	-0.036	0.005
27 Chemical Fertilizers	-0.156	-0.118	-0.079
34 Rubber Products	-0.106	-0.068	-0.030
35 Nonmetallic Mineral Products	-0.036	0.001	0.039
37 Primary Iron & Steel Products	0.019	0.059	0.099
39 Fabricated Metal Products	-0.051	-0.016	0.020
41 Household Electrical Appliances	-0.207	-0.174	-0.140
43 Household Electronic Appliances	-0.193	-0.160	-0.126
48 Shipbuilding	-0.028	0.006	0.040
49 Motor Vehicles	-0.173	-0.134	-0.094
53 Miscellaneous Manufacturing	-0.091	-0.056	-0.020
Localisation of:			
26 Basic Chemicals	-0.070	-0.056	-0.042
28 Drugs & Cosmetics	0.019	0.031	0.042
29 Synthetic Resins & Rubber	-0.091	-0.078	-0.066
31 Other Chemicals	-0.068	-0.055	-0.042
32 Petroleum Products	0.061	0.064	0.067
36 Iron & Steel Manufacturing	-0.055	-0.047	-0.039
38 Primary Nonferrous Metal Manuf.	-0.106	-0.094	-0.083
40 General Industrial Machinery	-0.007	0.006	0.020
42 Industrial Electrical Appliances	-0.003	0.009	0.021
44 Electronic Appliances	0.006	0.023	0.040
45 Semiconductors & Integrated Circuits	-0.002	0.014	0.031
46 Other Electronic Components	-0.074	-0.060	-0.046
47 Communication Equipment	0.077	0.093	0.108
50 Motor Vehicle Parts	-0.122	-0.111	-0.100
51 Other Transport Equipment	0.035	0.051	0.068
52 Measuring & Other Instruments	-0.015	-0.003	0.009

Note: A range of weights are used for revenues and costs in Dollars (1 to 0.9) and in Yen (1 to 1.1). The voluntary export restraints (VERs) are applied to the USA and localisation refers to substituting imports from Japan. To illustrate, the restriction of exports of fabricated metal products to the US is not socially beneficial, when the dollar is equal to or 5 percent less valuable than other foreign currencies (including the yen), but it is if the dollar is 10 percent less valuable than other currencies.

Table 6.4. contd.

Dollar		1	0.95	0.9
Yen		1.05	1.05	1.05
VERs on:				
6	Fishery Products	-0.036	-0.001	0.033
11	Seafood Processing	-0.026	0.013	0.053
19	Fiber Yarn	-0.027	0.007	0.040
20	Textile Fabrics	-0.019	0.023	0.065
21	Fabricated Textile Products	-0.049	-0.009	0.032
22	Leather & Leather Products	-0.062	-0.029	0.005
23	Lumber & Wood Products	-0.072	-0.031	0.011
27	Chemical Fertilizers	-0.147	-0.108	-0.070
34	Rubber Products	-0.098	-0.060	-0.022
35	Nonmetallic Mineral Products	-0.028	0.009	0.046
37	Primary Iron & Steel Products	0.030	0.069	0.109
39	Fabricated Metal Products	-0.041	-0.005	0.030
41	Household Electrical Appliances	-0.198	-0.164	-0.131
43	Household Electronic Appliances	-0.182	-0.148	-0.115
48	Shipbuilding	-0.016	0.018	0.052
49	Motor Vehicles	-0.156	-0.116	-0.076
53	Miscellaneous Manufacturing	-0.083	-0.047	-0.012
Localisation of:				
26	Basic Chemicals	-0.036	-0.022	-0.008
28	Drugs & Cosmetics	0.051	0.062	0.074
29	Synthetic Resins & Rubber	-0.064	-0.052	-0.040
31	Other Chemicals	-0.039	-0.026	-0.012
32	Petroleum Products	0.106	0.109	0.112
36	Iron & Steel Manufacturing	-0.017	-0.009	-0.001
38	Primary Nonferrous Metal Manuf.	-0.071	-0.059	-0.048
40	General Industrial Machinery	0.025	0.038	0.052
42	Industrial Electrical Appliances	0.030	0.043	0.055
44	Electronic Appliances	0.038	0.055	0.072
45	Semiconductors & Integrated Circuits	0.030	0.046	0.062
46	Other Electronic Components	-0.044	-0.030	-0.016
47	Communication Equipment	0.112	0.128	0.144
50	Motor Vehicle Parts	-0.093	-0.082	-0.070
51	Other Transport Equipment	0.072	0.088	0.105
52	Measuring & Other Instruments	0.013	0.025	0.037

Table 6.4. contd.

Dollar		1	0.95	0.9
Yen		1.1	1.1	1.1
VERs on:				
6	Fishery Products	-0.027	0.008	0.042
11	Seafood Processing	-0.002	0.037	0.076
19	Fiber Yarn	-0.017	0.017	0.050
20	Textile Fabrics	-0.006	0.036	0.078
21	Fabricated Textile Products	-0.040	0.000	0.041
22	Leather & Leather Products	-0.055	-0.022	0.011
23	Lumber & Wood Products	-0.067	-0.025	0.016
27	Chemical Fertilizers	-0.138	-0.099	-0.061
34	Rubber Products	-0.090	-0.052	-0.014
35	Nonmetallic Mineral Products	-0.021	0.017	0.054
37	Primary Iron & Steel Products	0.040	0.079	0.119
39	Fabricated Metal Products	-0.030	0.005	0.040
41	Household Electrical Appliances	-0.189	-0.155	-0.122
43	Household Electronic Appliances	-0.171	-0.137	-0.103
48	Shipbuilding	-0.005	0.029	0.063
49	Motor Vehicles	-0.138	-0.098	-0.059
53	Miscellaneous Manufacturing	-0.074	-0.039	-0.003
Localisation of:				
26	Basic Chemicals	-0.003	0.011	0.025
28	Drugs & Cosmetics	0.082	0.094	0.105
29	Synthetic Resins & Rubber	-0.038	-0.026	-0.013
31	Other Chemicals	-0.010	0.004	0.017
32	Petroleum Products	0.151	0.154	0.157
36	Iron & Steel Manufacturing	0.022	0.030	0.038
38	Primary Nonferrous Metal Manuf.	-0.035	-0.024	-0.013
40	General Industrial Machinery	0.057	0.070	0.084
42	Industrial Electrical Appliances	0.064	0.076	0.088
44	Electronic Appliances	0.070	0.087	0.104
45	Semiconductors & Integrated Circuits	0.062	0.078	0.094
46	Other Electronic Components	-0.014	0.000	0.014
47	Communication Equipment	0.147	0.163	0.179
50	Motor Vehicle Parts	-0.064	-0.052	-0.041
51	Other Transport Equipment	0.109	0.126	0.142
52	Measuring & Other Instruments	0.041	0.053	0.065

Table 6.5. Weighted Trade Effects, Classification 1, 1985-6,

Dollar		1	0.95	0.9
Yen		1	1	1
VERs on:				
6	Fishery Products	-0.044	-0.010	0.025
11	Seafood Processing	-0.049	-0.010	0.029
19	Fiber Yarn	-0.037	-0.001	0.034
20	Textile Fabrics	-0.031	0.011	0.052
21	Fabricated Textile Products	-0.058	-0.018	0.022
22	Leather & Leather Products	-0.069	-0.037	-0.005
23	Lumber & Wood Products	-0.077	-0.036	0.005
27	Chemical Fertilizers	-0.156	-0.117	-0.078
34	Rubber Products	-0.106	-0.068	-0.030
35	Nonmetallic Mineral Products	-0.036	0.001	0.037
37	Primary Iron & Steel Products	0.019	0.059	0.099
39	Fabricated Metal Products	-0.051	-0.016	0.020
41	Household Electrical Appliances	-0.207	-0.172	-0.137
43	Household Electronic Appliances	-0.193	-0.160	-0.126
48	Shipbuilding	-0.028	0.007	0.042
49	Motor Vehicles	-0.173	-0.133	-0.093
53	Miscellaneous Manufacturing	-0.091	-0.056	-0.021
Localisation of:				
26	Basic Chemicals	-0.070	-0.056	-0.043
28	Drugs & Cosmetics	0.019	0.031	0.042
29	Synthetic Resins & Rubber	-0.091	-0.079	-0.067
31	Other Chemicals	-0.068	-0.056	-0.043
32	Petroleum Products	0.061	0.064	0.067
36	Iron & Steel Manufacturing	-0.055	-0.047	-0.039
38	Primary Nonferrous Metal Manufacturi	-0.106	-0.094	-0.083
40	General Industrial Machinery	-0.007	0.005	0.018
42	Industrial Electrical Appliances	-0.003	0.008	0.020
44	Electronic Appliances	0.006	0.023	0.039
45	Semi-conductors & Integrated Circuit	-0.002	0.014	0.030
46	Other Electronic Components	-0.074	-0.060	-0.046
47	Communication Equipment	0.077	0.092	0.107
50	Motor Vehicle Parts	-0.122	-0.111	-0.100
51	Other Transport Equipment	0.035	0.051	0.068
52	Measuring,Medical & Optical Instrume	-0.015	-0.003	0.008

Table 6.5. contd.

Dolla		1	0.95	0.9
Yen		1.05	1.05	1.05
VERs on:				
6	Fishery Products	-0.033	0.001	0.036
11	Seafood Processing	-0.024	0.015	0.054
19	Fiber Yarn	-0.025	0.010	0.045
20	Textile Fabrics	-0.020	0.022	0.064
21	Fabricated Textile Products	-0.049	-0.009	0.030
22	Leather & Leather Products	-0.061	-0.029	0.003
23	Lumber & Wood Products	-0.070	-0.029	0.012
27	Chemical Fertilizers	-0.146	-0.107	-0.068
34	Rubber Products	-0.097	-0.059	-0.021
35	Nonmetallic Mineral Products	-0.026	0.011	0.047
37	Primary Iron & Steel Products	0.034	0.074	0.113
39	Fabricated Metal Products	-0.039	-0.004	0.032
41	Household Electrical Appliances	-0.198	-0.163	-0.128
43	Household Electronic Appliances	-0.181	-0.148	-0.114
48	Shipbuilding	-0.014	0.020	0.055
49	Motor Vehicles	-0.155	-0.114	-0.074
53	Miscellaneous Manufacturing	-0.082	-0.046	-0.011
Localisation of:				
26	Basic Chemicals	-0.038	-0.025	-0.011
28	Drugs & Cosmetics	0.050	0.061	0.072
29	Synthetic Resins & Rubber	-0.065	-0.054	-0.042
31	Other Chemicals	-0.040	-0.027	-0.015
32	Petroleum Products	0.105	0.108	0.111
36	Iron & Steel Manufacturing	-0.021	-0.013	-0.005
38	Primary Nonferrous Metal Manufacturi	-0.072	-0.060	-0.049
40	General Industrial Machinery	0.023	0.035	0.048
42	Industrial Electrical Appliances	0.029	0.040	0.052
44	Electronic Appliances	0.037	0.053	0.070
45	Semi-conductors & Integrated Circuit	0.029	0.045	0.062
46	Other Electronic Components	-0.046	-0.032	-0.018
47	Communication Equipment	0.111	0.126	0.141
50	Motor Vehicle Parts	-0.095	-0.084	-0.073
51	Other Transport Equipment	0.069	0.086	0.103
52	Measuring,Medical & Optical Instrume	0.012	0.024	0.036

Table 6.5. contd.

Dollar		1	0.95	0.9
Yen		1.1	1.1	1.1
VERS on:				
6	Fishery Products	-0.023	0.012	0.047
11	Seafood Processing	0.001	0.040	0.079
19	Fiber Yarn	-0.014	0.021	0.056
20	Textile Fabrics	-0.009	0.033	0.075
21	Fabricated Textile Products	-0.041	-0.001	0.039
22	Leather & Leather Products	-0.053	-0.021	0.011
23	Lumber & Wood Products	-0.063	-0.022	0.019
27	Chemical Fertilizers	-0.136	-0.097	-0.058
34	Rubber Products	-0.089	-0.051	-0.013
35	Nonmetallic Mineral Products	-0.016	0.021	0.057
37	Primary Iron & Steel Products	0.048	0.088	0.128
39	Fabricated Metal Products	-0.028	0.008	0.043
41	Household Electrical Appliances	-0.188	-0.153	-0.118
43	Household Electronic Appliances	-0.170	-0.136	-0.102
48	Shipbuilding	-0.001	0.034	0.068
49	Motor Vehicles	-0.136	-0.096	-0.055
53	Miscellaneous Manufacturing	-0.072	-0.036	-0.001
Localisation of:				
26	Basic Chemicals	-0.007	0.007	0.020
28	Drugs & Cosmetics	0.080	0.091	0.102
29	Synthetic Resins & Rubber	-0.040	-0.028	-0.016
31	Other Chemicals	-0.011	0.001	0.014
32	Petroleum Products	0.150	0.153	0.156
36	Iron & Steel Manufacturing	0.013	0.022	0.030
38	Primary Nonferrous Metal Manufacturi	-0.038	-0.026	-0.015
40	General Industrial Machinery	0.053	0.066	0.078
42	Industrial Electrical Appliances	0.060	0.072	0.083
44	Electronic Appliances	0.067	0.084	0.100
45	Semi-conductors & Integrated Circuit	0.060	0.076	0.093
46	Other Electronic Components	-0.017	-0.003	0.011
47	Communication Equipment	0.145	0.160	0.174
50	Motor Vehicle Parts	-0.068	-0.057	-0.046
51	Other Transport Equipment	0.104	0.121	0.138
52	Measuring,Medical & Optical Instrume	0.039	0.051	0.063

Table 6.6. Weighted Trade Effects, Classification 2, 1982-84.

	Dollar	1	0.95	0.9
	Yen	1	1	1
VERs on:				
6	Fishery Products	-0.022	0.013	0.047
11	Seafood Processing	-0.037	0.002	0.041
19	Fiber Yarn	0.003	0.036	0.068
20	Textile Fabrics	-0.016	0.026	0.068
21	Fabricated Textile Products	-0.040	0.000	0.040
22	Leather & Leather Products	-0.048	-0.014	0.019
23	Lumber & Wood Products	-0.058	-0.017	0.023
27	Chemical Fertilizers	-0.101	-0.063	-0.026
29	Synthetic Resins & Rubber	-0.022	0.015	0.051
34	Rubber Products	-0.067	-0.029	0.009
35	Nonmetallic Mineral Products	-0.015	0.022	0.059
37	Primary Iron & Steel Products	0.087	0.121	0.154
39	Fabricated Metal Products	-0.020	0.014	0.048
41	Household Electrical Appliances	-0.157	-0.124	-0.092
42	Industrial Electrical Appliances	0.001	0.034	0.067
43	Household Electronic Appliances	-0.108	-0.079	-0.050
44	Electronic Appliances	-0.017	0.008	0.034
45	Semiconductors & Integrated Circuits	-0.013	0.015	0.044
46	Other Electronic Components	-0.007	0.025	0.057
47	Communication Equipment	-0.050	-0.020	0.010
48	Shipbuilding	-0.002	0.032	0.065
49	Motor Vehicles	-0.096	-0.061	-0.027
52	Measuring & Other Instruments	-0.033	0.001	0.035
53	Miscellaneous Manufacturing	-0.048	-0.013	0.022
	Dollar	1	0.95	0.9
	Yen	1.05	1.05	1.05
VERs on:				
6	Fishery Products	-0.016	0.019	0.053
11	Seafood Processing	-0.015	0.025	0.064
19	Fiber Yarn	0.009	0.042	0.074
20	Textile Fabrics	-0.005	0.037	0.078
21	Fabricated Textile Products	-0.033	0.008	0.048
22	Leather & Leather Products	-0.043	-0.009	0.024
23	Lumber & Wood Products	-0.055	-0.014	0.027
27	Chemical Fertilizers	-0.097	-0.059	-0.022
29	Synthetic Resins & Rubber	-0.016	0.021	0.057
34	Rubber Products	-0.062	-0.024	0.014
35	Nonmetallic Mineral Products	-0.010	0.027	0.064
37	Primary Iron & Steel Products	0.094	0.128	0.161
39	Fabricated Metal Products	-0.013	0.022	0.056
41	Household Electrical Appliances	-0.152	-0.119	-0.087
42	Industrial Electrical Appliances	0.007	0.040	0.073
43	Household Electronic Appliances	-0.103	-0.074	-0.044
44	Electronic Appliances	-0.012	0.013	0.038
45	Semiconductors & Integrated Circuits	-0.007	0.021	0.050
46	Other Electronic Components	-0.001	0.031	0.063
47	Communication Equipment	-0.044	-0.014	0.016
48	Shipbuilding	0.005	0.039	0.072
49	Motor Vehicles	-0.091	-0.056	-0.021
52	Measuring & Other Instruments	-0.027	0.007	0.041
53	Miscellaneous Manufacturing	-0.042	-0.007	0.028

Table 6.6. contd.

	Dollar	1	0.95	0.9
	Yen	1.1	1.1	1.1
VERS on:				
6	Fishery Products	-0.010	0.025	0.059
11	Seafood Processing	0.008	0.047	0.086
19	Fiber Yarn	0.015	0.048	0.080
20	Textile Fabrics	0.006	0.047	0.089
21	Fabricated Textile Products	-0.025	0.015	0.055
22	Leather & Leather Products	-0.037	-0.004	0.029
23	Lumber & Wood Products	-0.051	-0.011	0.030
27	Chemical Fertilizers	-0.093	-0.055	-0.017
29	Synthetic Resins & Rubber	-0.010	0.027	0.063
34	Rubber Products	-0.057	-0.019	0.018
35	Nonmetallic Mineral Products	-0.005	0.032	0.069
37	Primary Iron & Steel Products	0.101	0.134	0.168
39	Fabricated Metal Products	-0.005	0.029	0.064
41	Household Electrical Appliances	-0.147	-0.114	-0.082
42	Industrial Electrical Appliances	0.013	0.046	0.079
43	Household Electronic Appliances	-0.098	-0.068	-0.039
44	Electronic Appliances	-0.007	0.018	0.043
45	Semiconductors & Integrated Circuits	-0.002	0.027	0.056
46	Other Electronic Components	0.005	0.037	0.070
47	Communication Equipment	-0.039	-0.009	0.021
48	Shipbuilding	0.012	0.046	0.079
49	Motor Vehicles	-0.085	-0.050	-0.016
52	Measuring & Other Instruments	-0.020	0.014	0.047
53	Miscellaneous Manufacturing	-0.036	-0.001	0.034

Note: In classification 2, the commodities categorised as imported in classification 1 are treated as either non-traded or exported at the margin.

Table 6.7. Weighted Trade Effects, Classification 2, 1985-6.

	Dollar	1	0.95	0.9
	Yen	1	1	1
VERs on:				
6	Fishery Products	-0.022	0.011	0.044
11	Seafood Processing	-0.037	0.001	0.039
19	Fiber Yarn	0.003	0.036	0.069
20	Textile Fabrics	-0.016	0.025	0.065
21	Fabricated Textile Products	-0.040	-0.001	0.038
22	Leather & Leather Products	-0.048	-0.017	0.015
23	Lumber & Wood Products	-0.058	-0.019	0.021
27	Chemical Fertilizers	-0.101	-0.065	-0.028
29	Synthetic Resins & Rubber	-0.022	0.013	0.047
34	Rubber Products	-0.067	-0.030	0.006
35	Nonmetallic Mineral Products	-0.015	0.020	0.055
37	Primary Iron & Steel Products	0.087	0.119	0.151
39	Fabricated Metal Products	-0.020	0.013	0.046
41	Household Electrical Appliances	-0.157	-0.125	-0.092
42	Industrial Electrical Appliances	0.001	0.033	0.064
43	Household Electronic Appliances	-0.108	-0.080	-0.051
44	Electronic Appliances	-0.017	0.008	0.032
45	Semiconductors & Integrated Circuits	-0.013	0.014	0.042
46	Other Electronic Components	-0.007	0.023	0.054
47	Communication Equipment	-0.050	-0.021	0.009
48	Shipbuilding	-0.002	0.030	0.062
49	Motor Vehicles	-0.096	-0.063	-0.030
52	Measuring & Other Instruments	-0.033	-0.002	0.030
53	Miscellaneous Manufacturing	-0.048	-0.014	0.019
	Dollar	1	0.95	0.9
	Yen	1.05	1.05	1.05
VERs on:				
6	Fishery Products	-0.014	0.019	0.052
11	Seafood Processing	-0.013	0.025	0.064
19	Fiber Yarn	0.010	0.043	0.076
20	Textile Fabrics	-0.006	0.034	0.075
21	Fabricated Textile Products	-0.033	0.006	0.045
22	Leather & Leather Products	-0.041	-0.010	0.021
23	Lumber & Wood Products	-0.053	-0.013	0.026
27	Chemical Fertilizers	-0.095	-0.059	-0.022
29	Synthetic Resins & Rubber	-0.014	0.021	0.055
34	Rubber Products	-0.061	-0.025	0.012
35	Nonmetallic Mineral Products	-0.008	0.027	0.063
37	Primary Iron & Steel Products	0.096	0.128	0.159
39	Fabricated Metal Products	-0.011	0.022	0.055
41	Household Electrical Appliances	-0.152	-0.119	-0.087
42	Industrial Electrical Appliances	0.009	0.040	0.071
43	Household Electronic Appliances	-0.102	-0.074	-0.045
44	Electronic Appliances	-0.011	0.013	0.038
45	Semiconductors & Integrated Circuits	-0.007	0.021	0.049
46	Other Electronic Components	0.001	0.031	0.062
47	Communication Equipment	-0.043	-0.014	0.015
48	Shipbuilding	0.007	0.039	0.071
49	Motor Vehicles	-0.089	-0.056	-0.023
52	Measuring & Other Instruments	-0.025	0.007	0.038
53	Miscellaneous Manufacturing	-0.041	-0.007	0.026

Table 6.7. contd.

	Dollar	1	0.95	0.9
	Yen	1.1	1.1	1.1
VERs on:				
6	Fishery Products	-0.006	0.027	0.060
11	Seafood Processing	0.011	0.049	0.088
19	Fiber Yarn	0.018	0.051	0.084
20	Textile Fabrics	0.003	0.044	0.085
21	Fabricated Textile Products	-0.026	0.013	0.052
22	Leather & Leather Products	-0.035	-0.004	0.027
23	Lumber & Wood Products	-0.048	-0.008	0.032
27	Chemical Fertilizers	-0.089	-0.053	-0.016
29	Synthetic Resins & Rubber	-0.006	0.029	0.063
34	Rubber Products	-0.055	-0.019	0.018
35	Nonmetallic Mineral Products	-0.000	0.035	0.070
37	Primary Iron & Steel Products	0.105	0.136	0.168
39	Fabricated Metal Products	-0.002	0.031	0.064
41	Household Electrical Appliances	-0.146	-0.113	-0.081
42	Industrial Electrical Appliances	0.016	0.047	0.079
43	Household Electronic Appliances	-0.097	-0.068	-0.040
44	Electronic Appliances	-0.006	0.019	0.044
45	Semiconductors & Integrated Circuits	0.000	0.028	0.055
46	Other Electronic Components	0.009	0.039	0.070
47	Communication Equipment	-0.037	-0.008	0.021
48	Shipbuilding	0.015	0.047	0.079
49	Motor Vehicles	-0.082	-0.049	-0.016
52	Measuring & Other Instruments	-0.017	0.015	0.046
53	Miscellaneous Manufacturing	-0.034	-0.000	0.033

Keeping in mind that a reduction in exports to the US is socially desirable only if the sign of SP^{VER} is positive, the results suggest that VERs may incur the least cost, if applied to the textiles industry (sectors 19, 20 and 21) and the metal industry (sectors 37 and 39). We noted earlier that VERs already apply to major steel products vis-à-vis the US (see section two). Furthermore, exports of textiles products to the US are subject to the Multi Fiber Agreement. Our results suggest that restricting exports of these goods may be preferable to restricting other goods. In addition, the shipbuilding and nonmetallic mineral products industries seem to be more suitable for VERs. However, VERs on household electrical and electronic equipment appears to be rather costly; their SP^{VER}s are negative in all cases under consideration. This is important, since export restraints have been placed on such goods as VCRs, colour TVs and microwave ovens in recent years. Motor vehicles and miscellaneous manufactures also appear to be highly unsuitable for VERs.

Localisation is also socially beneficial only if SP^{LOC} is positive. The results indicate that many of the chemical sectors are not suitable for localisation. The same may be said for the primary metal products industries. However the localisation of the machinery sector, including general and electrical machinery, electronics, and measuring, medical and optical instruments, may be more appropriate. Within this sector, the parts and components subsectors show negative SP^{LOC}. However, we should bear in mind here that infant industry arguments may apply; indeed, in chapters four and five, we found the machinery industry to show many signs of acquiring the necessary maturity.

6. Concluding Remarks.

The main purpose of this chapter has been to study in some depth the relationship between the bilateral trade imbalances and growth; our intention was to learn how they came about and how they should be handled from the policy perspective.

To study the relationship, we adapted the methodology employed earlier in chapters three and five, based on shadow prices and social profitability. Specifically, we adjusted the shadow prices of labour and profits, so that all shadow prices reflected opportunity costs in terms of foreign exchange. Moreover, trade shares were used to break down these prices into the dollar, yen and other currency components. Hence, we were able to estimate the effect of output changes on bilateral trade balances. We found the current imbalances vis-à-vis the US and Japan to be side-effects of Korea's phenomenal export-led growth. The implication from this was that the restriction of exports could be rather detrimental to growth and that a more selective approach to export restraints (and import substitution) was needed.

The social profitability measure was adapted still further to incorporate the strategy of maintaining an overall trade surplus, while reducing the bilateral imbalances; our intention was to identify those sectors more suitable for VERs and localisation. Specifically, different weights were attached to foreign exchange, depending on how it affected the trade balances with the US and Japan. We found that the textiles and metal products industries may be more suitable for VERs vis-à-vis the US. However, it appears that the household electrical and electronic equipment industries, together with the motor vehicle industry, are not the ideal candidates for VERs. Localisation seems to be more appropriate for the machinery industries rather than the chemical and primary metal manufacturing industries.

Chapter Seven.

Conclusion.

The identification of the appropriate role for government is a crucial element in the formulation of economic policy for developing countries. During the 1940s and 1950s, the balance of opinion rested firmly in favour of substantial intervention, particularly in the investment process. A major component of the interventionist regime was a trade policy based on protection and import substitution. India provides an important example of this combination of planning and protection.

A central argument which was offered in favour of state intervention was that markets in developing countries did not function well. The market failed, it was suggested, in substantial and important ways. These 'market failures' included non-existence of some markets, imperfect markets, externalities and non-availability of lump-sum taxes and transfers.

The balance of opinion shifted over the 1960s and 1970s, in what Little (1982) describes as the "neoclassical resurgence". Arguments for this shift were based, in part, on the rapid growth of certain countries which followed apparently more laissez-faire policies; the outstanding growth performance of the so-called 'four dragons' -- Hong Kong, Singapore, South Korea and Taiwan -- was particularly influential.

The 'planned' economies experienced much slower growth during the 1950s and 1960s, and many possible difficulties with government intervention became evident. 'Market failures' were then contrasted with 'government failures'. For example, it was argued that it was difficult for the government to replicate the system of discipline and incentive in the market which promotes the efficient allocation of resources. It was also suggested, for example, that planning would be much more rigid than private decisionmaking, as it would involve complex bureaucratic processes.

The "neoclassical resurgence" has given rise to the wholesale rejection of planning and import substitution by the economics profession. This position appears to be endorsed in some shape or form by leading international institutions (e.g. World Bank; World Development Report, 1987) and by widely-read publications (e.g. The Economist; 23-29, September, 1989).

Understandably, much of the debate between the proponents of free markets and intervention has been focused on the 'four dragons'. Korea and the other three 'dragons' are often quoted by the neoclassicals as examples of rapid growth achieved under a laissez-faire or 'neutral' policy regime. The Korean example has been particularly important because the others, being small island economies, are often dismissed as 'special cases'.

A central purpose of this thesis has been to show that government intervention may not have been 'self-neutralising' and that planning may have made a significant contribution to Korea's rapid growth. Planning and import substitution have unfortunately been rejected in the same breath, despite the fact that they are logically distinct. With Korea, we hope to have shown, that planning can be both effective and beneficial under an export strategy.

In addition, we have provided a set of useful planning tools (shadow prices), and showed how they can be applied to the assessment of policy statements and the interpretation of economic history. Furthermore, we showed how they can be developed and extended to new problems.

From a broader perspective, by showing that government intervention in Korea may have been far more distortionary than some participants in the "neoclassical resurgence" might allow, we hoped to redress, in some sense, the balance in the interpretation of the Korean experience and thus the conclusions which may be drawn from it.

In chapter two, we reviewed in some detail the policies pursued by the Korean government since the start of the 'big-push' in 1962. There, we found that policy incentives have been powerful and not necessarily 'neutral'. That is, incentives have not been offered evenly to production for home and export markets.

We then set out to see whether these incentives were 'well-directed' in the sense that they were provided to those industries with the greatest potential for economic development. A finding that they were 'well-directed' would add support to the argument that policy has been contributory.

This was done in two ways, the first involving the use of shadow prices and the concept of social profitability. If shadow prices are defined as the social opportunity costs of goods, then a change in the allocation of resources can be socially beneficial only if profits evaluated using shadow prices are positive. For our purposes, an emphasis on growth was captured through a social welfare function with appropriate weights on certain incomes. Thus, the test of social profitability incorporated the growth emphasis.

The shadow prices were calculated for 1975 and 1983 using the Little/Mirrlees (1974) guidelines. These prices should provide a valuable policy tool, both for project evaluation and for policymaking in general. We hope, therefore, that they are important and useful in their own right.

For our part, they were used to calculate social profitability in Korea. This measure allowed us to ascertain the social desirability of the changes in resource allocation induced by the policy incentives, 'net' of distortions (government-induced or otherwise). We assessed, in turn, the different phases of industrial policy in Korea since the early 1960s. On the whole, the promotion of exports in light manufactures appears to have been beneficial, both from the point of view of growth and income distribution.

Social profitability calculations for 1975 and 1983 allowed us to see how the gap between the social value of output and the social costs of production has changed during the heavy and chemical industrial drive. Thus, we were able to analyse, whether the promotion of heavy and chemical industries could have been justified on infant industry grounds; a necessary (but not sufficient) condition is that social benefit exceeds social costs, at least at some point in time, i.e. social profitability is positive. On balance, we found that the promotion of these industries has been conducive to growth; many of them have become socially profitable by 1983. Policy seems to have been particularly well-directed with respect to the fabricated metal products and machinery industries.

The relevance of the infant industry argument for Korean heavy and chemical industries was examined further using productivity-related tests. A necessary (but not sufficient) condition for the justification of infant industry intervention is that total factor productivity should increase faster for the 'infants' either relative to other less-protected industries, or relative to the mature counterparts abroad. In addition, we examined whether any of these 'infants' have yet become competitive, using Balassa's Revealed Comparative Advantage. The results of these tests are fairly consistent with those of the social profitability analysis. The promotion of heavy and chemical industries seems, on the whole, to have been contributory to the establishment of a second generation of export leaders and to growth over the past ten to fifteen years.

To summarise, it appears that state intervention may have played a much greater (and non-neutral) role in the Korean "economic miracle" than credited by the neoclassicals. This finding may be noteworthy, given that Korea is used by the neoclassicals as an important example of rapid growth achieved under an essentially laissez-faire regime (a neutral incentive regime is argued to be essentially the same as one of free trade; see Bhagwati, 1978, p207-8).

Our immediate aim has been to clarify the role played by the government in Korea's rapid growth and development. From a broader perspective, our intention has been to, in some sense, redress the balance in the debate between the supporters of free markets and intervention. In its present mood, the economics profession seems to be biased against intervention.

To illustrate how the methodology used in this study may be applied for other purposes, shadow prices and social profitability were adapted to analyse the current policy problem of bilateral trade imbalances. It seems that the trade surplus with the US and the deficit with Japan are mainly by-products of the export-led growth pursued by Korea over the past three decades. Given that social profitability is associated with exports and exports are concentrated on the US, it seems that voluntary export restraints vis-à-vis the US may involve significant social costs while reducing the two trade imbalances. Our analysis suggests that some 'selectivity' in the policies of export restraint and 'localisation' may be needed in order to treat the bilateral trade problems at the minimum of social cost.

Turning to further research, we suggest that more studies of this type are necessary for the identification of the appropriate role for government in the economic development of less developed countries. In particular, 'country studies' for Singapore and Taiwan would be valuable, as they also appear to have experienced significant government intervention. The point is that cross-country studies, which have become popular in the debate between free marketeers and interventionists, do not allow more than a superficial look at the countries in question. They must be supported by individual country studies, in order to avoid making unjustifiable general prescriptions for growth.

The question remains why some governments are more successful than others in promoting growth and development. The reason does not appear to be so much that the government is powerful in the high-growth developing countries; it is powerful in many developing countries. The answer seems to lie in the systematic involvement of the state in the economic sphere, its cooperation with industry, and the competence with which it pursues planned economic development. We hope to have shed some light on this matter, but much work remains to be done.

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Appendix to Chapter 3.

Table A3.1. Share of Exports and Imports in Output and Supply, 1975.

		X/(O+M)	M/(O+M)	X/O
1	Cereals	0.000	0.183	0.000
2	Fruits & Vegetables	0.005	0.015	0.005
3	Industrial Crops	0.146	0.468	0.275
4	Livestock	0.005	0.055	0.005
5	Forestry Products	0.013	0.503	0.026
6	Fishery Products	0.372	0.015	0.377
7	Coal Mining	0.000	0.155	0.000
8	Metallic Ores	0.319	0.363	0.501
9	Nonmetallic Minerals	0.014	0.889	0.124
10	Meat,Dairy & Fruits	0.092	0.126	0.105
11	Seafood Processing	0.572	0.015	0.581
12	Polished Grains	0.000	0.000	0.000
13	Flour & Cereal Preparations	0.000	0.017	0.000
14	Other Food Preparations	0.089	0.194	0.111
15	Beverages	0.027	0.013	0.027
16	Tobacco Products	0.001	0.000	0.001
17	Fiber Yarn	0.158	0.028	0.162
18	Textile Fabrics	0.268	0.133	0.308
19	Fabricated Textile Products	0.511	0.025	0.524
20	Leather & Leather Products	0.375	0.149	0.441
21	Lumber & Plywood	0.429	0.006	0.432
22	Wood Products & Furniture	0.215	0.010	0.217
23	Pulp & Paper	0.043	0.232	0.056
24	Printing & Publishing	0.061	0.042	0.063
25	Basic Organic Chemicals	0.039	0.578	0.093
26	Basic Inorganic Chemicals	0.031	0.218	0.039
27	Chemical Fertilizers	0.000	0.356	0.000
28	Drugs & Cosmetics	0.018	0.088	0.019
29	Synthetic Resins & Rubber	0.123	0.163	0.147
30	Other Chemicals	0.019	0.348	0.029
31	Petroleum Products	0.057	0.094	0.063
32	Coal Products	0.001	0.056	0.002
33	Rubber Products	0.523	0.021	0.534
34	Nonmetallic Mineral Products	0.125	0.063	0.133
35	Iron & Steel Manufacturing	0.010	0.262	0.013
36	Primary Iron & Steel Products	0.176	0.258	0.238
37	Primary Nonferrous Metal Manuf.	0.038	0.383	0.062
38	Fabricated Metal Products	0.249	0.143	0.291

Table A3.1. contd.

39	General Industrial Machinery	0.029	0.702	0.098
40	Household Electrical Appliances	0.025	0.082	0.027
41	Industrial Electrical Appliances	0.102	0.363	0.160
42	Electronic & Communication Equipment	0.345	0.319	0.506
43	Shipbuilding	0.241	0.427	0.421
44	Motor Vehicles	0.006	0.232	0.008
45	Other Transport Equipment	0.082	0.655	0.237
46	Measuring and OtherInstruments	0.276	0.469	0.520
47	Miscellaneous Manufacturing	0.538	0.075	0.582
48	Building Construction & Maintenance	0.000	0.001	0.000
49	Public Works	0.011	0.000	0.011
50	Electric Power & Gas	0.003	0.001	0.003
51	Water & Sewer Services	0.002	0.003	0.002
52	Wholesale & Retail Trade	0.094	0.004	0.094
53	Restaurants & Hotels	0.074	0.009	0.075
54	Transportation & Warehousing	0.231	0.036	0.240
55	Communications	0.036	0.006	0.036
56	Finance & Insurance	0.025	0.042	0.026
57	Real Estate & Rental	0.006	0.002	0.006
58	Public Administration & Defense	0.000	0.000	0.000
59	Social Services	0.000	0.001	0.000
60	Other Services	0.011	0.006	0.011
61	Office Supplies	0.005	0.002	0.005
62	Business Consumption	0.006	0.027	0.006
63	Unclassifiable	0.283	0.236	0.370

Note: X = exports and M = imports. O = output and O+M = total supply.

Table A3.2. Share of Exports and Imports in Output and Supply, 1983.

		X/(O+M)	M/(O+M)	X/O
1	Cereals	0.000	0.173	0.000
2	Fruits & Vegetables	0.007	0.013	0.007
3	Industrial Crops	0.112	0.450	0.204
4	Livestock	0.001	0.047	0.001
5	Forestry Products	0.047	0.464	0.088
6	Fishery Products	0.284	0.036	0.294
7	Coal Mining	0.000	0.479	0.000
8	Metallic Ores	0.016	0.844	0.103
9	Nonmetallic Minerals	0.005	0.916	0.060
10	Meat,Dairy & Fruits	0.016	0.155	0.019
11	Seafood Processing	0.204	0.007	0.206
12	Polished Grains	0.000	0.010	0.000
13	Flour & Cereal Preparations	0.000	0.014	0.000
14	Sugar	0.098	0.330	0.146
15	Backery & Confectionery	0.017	0.001	0.017
16	Other Food Preparations	0.027	0.089	0.029
17	Beverages	0.006	0.030	0.006
18	Tobacco Products	0.008	0.000	0.008
19	Fiber Yarn	0.147	0.091	0.161
20	Textile Fabrics	0.372	0.090	0.409
21	Fabricated Textile Products	0.592	0.024	0.606
22	Leather & Leather Products	0.458	0.210	0.580
23	Lumber & Wood Products	0.116	0.053	0.122
24	Pulp & Paper	0.045	0.157	0.053
25	Printing & Publishing	0.013	0.045	0.013
26	Basic Chemicals	0.059	0.375	0.095
27	Chemical Fertilizers	0.204	0.060	0.217
28	Drugs & Cosmetics	0.017	0.063	0.018
29	Synthetic Resins & Rubber	0.124	0.196	0.154
30	Chemical Fibers	0.015	0.072	0.017
31	Other Chemicals	0.032	0.366	0.050
32	Petroleum Products	0.066	0.123	0.076
33	Coal Products	0.014	0.028	0.014
34	Rubber Products	0.619	0.055	0.655
35	Nonmetallic Mineral Products	0.104	0.080	0.113
36	Iron & Steel Manufacturing	0.047	0.146	0.055
37	Primary Iron & Steel Products	0.264	0.135	0.305
38	Primary Nonferrous Metal Manuf.	0.086	0.322	0.127
39	Fabricated Metal Products	0.355	0.110	0.398
40	General Industrial Machinery	0.052	0.420	0.089
41	Household Electrical Appliances	0.162	0.070	0.175
42	Industrial Electrical Appliances	0.139	0.319	0.205
43	Household Electronic Appliances	0.397	0.105	0.444
44	Electronic Appliances	0.258	0.613	0.667
45	Semi-conductors & Integrated Circuit	0.483	0.505	0.977
46	Other Electronic Components	0.174	0.235	0.228
47	Communication Equipment	0.190	0.411	0.323
48	Shipbuilding	0.891	0.206	1.123
49	Motor Vehicles	0.052	0.031	0.054
50	Motor Vehicle Parts	0.049	0.209	0.062
51	Other Transport Equipment	0.050	0.504	0.100
52	Measuring and Other Instruments	0.219	0.497	0.436
53	Miscellaneous Manufacturing	0.490	0.085	0.536

Note: See notes to table A3.1 for details.

Table A3.3. Simultaneous ARs, 1975.
Classification 1, ARI=10%.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
2	Fruits & Vegetables	1.061	0.930
4	Livestock	1.096	0.999
12	Polished Grains	1.070	0.887
13	Flour & Cereal Preparations	1.367	1.258
15	Beverages	0.785	0.689
16	Tobacco Products	0.584	0.515
24	Printing & Publishing	1.195	1.068
32	Coal Products	1.089	1.017
48	Building Construction & Maintenance	0.925	0.860
49	Public Works	0.961	0.886
50	Electric Power & Gas	1.927	1.626
51	Water & Sewer Services	2.252	1.857
52	Wholesale & Retail Trade	0.881	0.684
53	Restaurants & Hotels	0.920	0.749
54	Transportation & Warehousing	1.643	1.397
55	Communications	1.517	1.249
56	Finance & Insurance	0.918	0.781
57	Real Estate & Rental	0.641	0.504
58	Public Administration & Defense	1.486	1.308
59	Social Services	1.371	1.192
60	Other Services	1.277	1.056
61	Office Supplies	1.043	0.980
62	Business Consumption	1.054	0.906
63	Unclassifiable	1.063	0.970
64	AR Labour	0.993	0.922
65	AR Capital	0.916	0.871
6	Fishery Products	0.857	0.873
11	Seafood Processing	0.853	0.867
17	Fiber Yarn	0.858	0.862
18	Textile Fabrics	0.857	0.866
19	Fabricated Textile Products	0.857	0.880
20	Leather & Leather Products	0.856	0.873
21	Lumber & Plywood	0.839	0.857
22	Wood Products & Furniture	0.839	0.857
33	Rubber Products	0.856	0.873
34	Nonmetallic Mineral Products	0.829	0.851
38	Fabricated Metal Products	0.829	0.853
42	Electronic & Communication Equipment	0.857	0.867
47	Miscellaneous Manufacturing	0.854	0.878
	SCF	0.993	0.922

Table A3.3 contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
2	Fruits & Vegetables	0.968	0.844
4	Livestock	1.046	0.952
12	Polished Grains	1.016	0.837
13	Flour & Cereal Preparations	1.353	1.245
15	Beverages	0.763	0.668
16	Tobacco Products	0.572	0.503
24	Printing & Publishing	1.147	1.023
32	Coal Products	1.069	0.998
48	Building Construction & Maintenance	0.882	0.820
49	Public Works	0.913	0.842
50	Electric Power & Gas	1.893	1.595
51	Water & Sewer Services	2.200	1.808
52	Wholesale & Retail Trade	0.851	0.656
53	Restaurants & Hotels	0.873	0.704
54	Transportation & Warehousing	1.592	1.350
55	Communications	1.448	1.186
56	Finance & Insurance	0.839	0.707
57	Real Estate & Rental	0.626	0.490
58	Public Administration & Defense	1.314	1.148
59	Social Services	1.265	1.093
60	Other Services	1.220	1.002
61	Office Supplies	1.034	0.972
62	Business Consumption	1.021	0.876
63	Unclassifiable	1.028	0.938
64	AR Labour	0.824	0.765
65	AR Capital	0.892	0.848
6	Fishery Products	0.859	0.875
11	Seafood Processing	0.855	0.869
17	Fiber Yarn	0.859	0.863
18	Textile Fabrics	0.859	0.867
19	Fabricated Textile Products	0.861	0.883
20	Leather & Leather Products	0.859	0.876
21	Lumber & Plywood	0.842	0.860
22	Wood Products & Furniture	0.842	0.860
33	Rubber Products	0.859	0.875
34	Nonmetallic Mineral Products	0.833	0.854
38	Fabricated Metal Products	0.833	0.857
42	Electronic & Communication Equipment	0.859	0.869
47	Miscellaneous Manufacturing	0.857	0.881
	SCF	0.970	0.900

Table A3.3 contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
2	Fruits & Vegetables	0.909	0.789
4	Livestock	1.013	0.922
12	Polished Grains	0.982	0.806
13	Flour & Cereal Preparations	1.344	1.237
15	Beverages	0.748	0.655
16	Tobacco Products	0.564	0.496
24	Printing & Publishing	1.116	0.995
32	Coal Products	1.056	0.986
48	Building Construction & Maintenance	0.854	0.794
49	Public Works	0.883	0.814
50	Electric Power & Gas	1.872	1.575
51	Water & Sewer Services	2.166	1.777
52	Wholesale & Retail Trade	0.831	0.638
53	Restaurants & Hotels	0.842	0.676
54	Transportation & Warehousing	1.560	1.320
55	Communications	1.404	1.145
56	Finance & Insurance	0.789	0.660
57	Real Estate & Rental	0.617	0.481
58	Public Administration & Defense	1.204	1.046
59	Social Services	1.197	1.030
60	Other Services	1.183	0.968
61	Office Supplies	1.028	0.966
62	Business Consumption	1.000	0.856
63	Unclassifiable	1.005	0.917
64	AR Labour	0.716	0.664
65	AR Capital	0.876	0.834
6	Fishery Products	0.861	0.877
11	Seafood Processing	0.857	0.871
17	Fiber Yarn	0.859	0.863
18	Textile Fabrics	0.860	0.868
19	Fabricated Textile Products	0.863	0.885
20	Leather & Leather Products	0.860	0.877
21	Lumber & Plywood	0.844	0.862
22	Wood Products & Furniture	0.844	0.862
33	Rubber Products	0.861	0.877
34	Nonmetallic Mineral Products	0.836	0.857
38	Fabricated Metal Products	0.836	0.860
42	Electronic & Communication Equipment	0.860	0.870
47	Miscellaneous Manufacturing	0.860	0.883
	SCF	0.954	0.886

Table A3.3 contd.

		(.)=0.67 ARP=0.6	(.)=0.67 ARP=0.4
2	Fruits & Vegetables	0.860	0.744
4	Livestock	0.987	0.897
12	Polished Grains	0.955	0.780
13	Flour & Cereal Preparations	1.337	1.230
15	Beverages	0.736	0.644
16	Tobacco Products	0.557	0.490
24	Printing & Publishing	1.091	0.972
32	Coal Products	1.046	0.977
48	Building Construction & Maintenance	0.832	0.773
49	Public Works	0.858	0.791
50	Electric Power & Gas	1.854	1.559
51	Water & Sewer Services	2.139	1.752
52	Wholesale & Retail Trade	0.816	0.623
53	Restaurants & Hotels	0.818	0.653
54	Transportation & Warehousing	1.534	1.295
55	Communications	1.369	1.112
56	Finance & Insurance	0.748	0.622
57	Real Estate & Rental	0.609	0.474
58	Public Administration & Defense	1.114	0.963
59	Social Services	1.142	0.979
60	Other Services	1.153	0.940
61	Office Supplies	1.023	0.962
62	Business Consumption	0.983	0.840
63	Unclassifiable	0.987	0.900
64	AR Labour	0.628	0.583
65	AR Capital	0.863	0.822
6	Fishery Products	0.862	0.878
11	Seafood Processing	0.858	0.872
17	Fiber Yarn	0.860	0.864
18	Textile Fabrics	0.860	0.869
19	Fabricated Textile Products	0.865	0.887
20	Leather & Leather Products	0.862	0.878
21	Lumber & Plywood	0.846	0.864
22	Wood Products & Furniture	0.846	0.864
33	Rubber Products	0.862	0.878
34	Nonmetallic Mineral Products	0.838	0.858
38	Fabricated Metal Products	0.838	0.862
42	Electronic & Communication Equipment	0.861	0.871
47	Miscellaneous Manufacturing	0.862	0.885
	SCF	0.942	0.875

Table A3.4. Simultaneous ARs, 1975, Classification 2, ARI=10%.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
1	Cereals	1.124	0.926
2	Fruits & Vegetables	1.166	0.978
4	Livestock	1.152	1.001
12	Polished Grains	1.109	0.895
13	Flour & Cereal Preparations	1.508	1.211
15	Beverages	0.829	0.694
16	Tobacco Products	0.603	0.522
24	Printing & Publishing	1.257	1.091
25	Basic Organic Chemicals	1.139	0.980
26	Basic Inorganic Chemicals	1.160	1.012
27	Chemical Fertilizers	1.697	1.464
28	Drugs & Cosmetics	1.092	0.912
30	Other Chemicals	1.119	0.955
31	Petroleum Products	0.876	0.842
32	Coal Products	1.113	1.024
35	Iron & Steel Manufacturing	1.375	1.191
37	Primary Nonferrous Metal Manufacturing	1.353	1.138
39	General Industrial Machinery	1.264	1.079
40	Household Electrical Appliances	0.807	0.713
44	Motor Vehicles	1.295	1.094
45	Other Transport Equipment	1.286	1.102
48	Building Construction & Maintenance	0.951	0.865
49	Public Works	0.985	0.886
50	Electric Power & Gas	1.984	1.622
51	Water & Sewer Services	2.372	1.898
52	Wholesale & Retail Trade	0.908	0.692
53	Restaurants & Hotels	0.953	0.756
54	Transportation & Warehousing	1.726	1.417
55	Communications	1.591	1.275
56	Finance & Insurance	0.961	0.792
57	Real Estate & Rental	0.662	0.511
58	Public Administration & Defense	1.572	1.333
59	Social Services	1.458	1.220
60	Other Services	1.348	1.082
61	Office Supplies	1.065	0.989
62	Business Consumption	1.104	0.917
63	Unclassifiable	1.147	0.985
64	AR Labour	1.053	0.935
65	AR Capital	1.031	0.920
6	Fishery Products	0.854	0.872
8	Metallic Ores	0.848	0.855
11	Seafood Processing	0.850	0.867
17	Fiber Yarn	0.858	0.862
18	Textile Fabrics	0.856	0.866
19	Fabricated Textile Products	0.854	0.879
20	Leather & Leather Products	0.853	0.872
21	Lumber & Plywood	0.835	0.856
22	Wood Products & Furniture	0.835	0.856
29	Synthetic Resins & Rubber	0.855	0.872
33	Rubber Products	0.854	0.872
34	Nonmetallic Mineral Products	0.825	0.849
36	Primary Iron & Steel Products	0.850	0.860
41	Industrial Electrical Appliances	0.856	0.865
43	Shipbuilding	0.859	0.860
46	Measuring,Medical & Optical Instruments	0.856	0.881
47	Miscellaneous Manufacturing	0.850	0.876
	SCF	1.053	0.935

Table A3.4 contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
1	Cereals	1.011	0.826
2	Fruits & Vegetables	1.049	0.874
4	Livestock	1.073	0.932
12	Polished Grains	1.043	0.835
13	Flour & Cereal Preparations	1.388	1.105
15	Beverages	0.787	0.657
16	Tobacco Products	0.586	0.507
24	Printing & Publishing	1.194	1.035
25	Basic Organic Chemicals	1.101	0.946
26	Basic Inorganic Chemicals	1.124	0.980
27	Chemical Fertilizers	1.634	1.407
28	Drugs & Cosmetics	1.034	0.860
30	Other Chemicals	1.073	0.914
31	Petroleum Products	0.867	0.834
32	Coal Products	1.086	1.000
35	Iron & Steel Manufacturing	1.335	1.155
37	Primary Nonferrous Metal Manufacturing	1.303	1.093
39	General Industrial Machinery	1.208	1.029
40	Household Electrical Appliances	0.779	0.688
44	Motor Vehicles	1.225	1.032
45	Other Transport Equipment	1.224	1.047
48	Building Construction & Maintenance	0.898	0.817
49	Public Works	0.927	0.834
50	Electric Power & Gas	1.929	1.574
51	Water & Sewer Services	2.292	1.827
52	Wholesale & Retail Trade	0.870	0.658
53	Restaurants & Hotels	0.894	0.704
54	Transportation & Warehousing	1.652	1.352
55	Communications	1.502	1.197
56	Finance & Insurance	0.867	0.708
57	Real Estate & Rental	0.641	0.493
58	Public Administration & Defense	1.369	1.152
59	Social Services	1.326	1.103
60	Other Services	1.273	1.014
61	Office Supplies	1.051	0.976
62	Business Consumption	1.053	0.872
63	Unclassifiable	1.080	0.925
64	AR Labour	0.858	0.762
65	AR Capital	0.984	0.879
6	Fishery Products	0.858	0.875
8	Metallic Ores	0.850	0.856
11	Seafood Processing	0.853	0.869
17	Fiber Yarn	0.858	0.863
18	Textile Fabrics	0.858	0.867
19	Fabricated Textile Products	0.858	0.883
20	Leather & Leather Products	0.857	0.875
21	Lumber & Plywood	0.839	0.860
22	Wood Products & Furniture	0.839	0.860
29	Synthetic Resins & Rubber	0.858	0.875
33	Rubber Products	0.857	0.875
34	Nonmetallic Mineral Products	0.830	0.854
36	Primary Iron & Steel Products	0.852	0.862
41	Industrial Electrical Appliances	0.858	0.866
43	Shipbuilding	0.859	0.861
46	Measuring,Medical & Optical Instruments	0.860	0.884
47	Miscellaneous Manufacturing	0.855	0.881
	SCF	1.010	0.896

Table A3.4 contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
1	Cereals	0.941	0.764
2	Fruits & Vegetables	0.976	0.809
4	Livestock	1.025	0.889
12	Polished Grains	1.001	0.799
13	Flour & Cereal Preparations	1.313	1.039
15	Beverages	0.761	0.634
16	Tobacco Products	0.576	0.497
24	Printing & Publishing	1.154	1.000
25	Basic Organic Chemicals	1.077	0.925
26	Basic Inorganic Chemicals	1.102	0.960
27	Chemical Fertilizers	1.594	1.372
28	Drugs & Cosmetics	0.998	0.828
30	Other Chemicals	1.044	0.889
31	Petroleum Products	0.862	0.829
32	Coal Products	1.070	0.985
35	Iron & Steel Manufacturing	1.309	1.132
37	Primary Nonferrous Metal Manufacturing	1.272	1.066
39	General Industrial Machinery	1.173	0.998
40	Household Electrical Appliances	0.762	0.672
44	Motor Vehicles	1.182	0.994
45	Other Transport Equipment	1.185	1.013
48	Building Construction & Maintenance	0.865	0.788
49	Public Works	0.890	0.802
50	Electric Power & Gas	1.896	1.544
51	Water & Sewer Services	2.242	1.783
52	Wholesale & Retail Trade	0.846	0.637
53	Restaurants & Hotels	0.858	0.672
54	Transportation & Warehousing	1.606	1.311
55	Communications	1.447	1.148
56	Finance & Insurance	0.808	0.656
57	Real Estate & Rental	0.629	0.482
58	Public Administration & Defense	1.243	1.040
59	Social Services	1.244	1.031
60	Other Services	1.225	0.973
61	Office Supplies	1.042	0.969
62	Business Consumption	1.022	0.844
63	Unclassifiable	1.038	0.888
64	AR Labour	0.737	0.654
65	AR Capital	0.955	0.853
6	Fishery Products	0.860	0.877
8	Metallic Ores	0.851	0.857
11	Seafood Processing	0.855	0.871
17	Fiber Yarn	0.859	0.863
18	Textile Fabrics	0.859	0.868
19	Fabricated Textile Products	0.861	0.885
20	Leather & Leather Products	0.859	0.877
21	Lumber & Plywood	0.842	0.863
22	Wood Products & Furniture	0.842	0.863
29	Synthetic Resins & Rubber	0.860	0.877
33	Rubber Products	0.859	0.877
34	Nonmetallic Mineral Products	0.833	0.857
36	Primary Iron & Steel Products	0.854	0.863
41	Industrial Electrical Appliances	0.859	0.867
43	Shipbuilding	0.859	0.861
46	Measuring,Medical & Optical Instruments	0.863	0.887
47	Miscellaneous Manufacturing	0.858	0.883
	SCF	0.982	0.872

Table A3.4 contd.

		(.)=0.67 ARP=0.6	(.)=0.67 ARP=0.4
1	Cereals	0.885	0.714
2	Fruits & Vegetables	0.918	0.758
4	Livestock	0.986	0.855
12	Polished Grains	0.968	0.769
13	Flour & Cereal Preparations	1.254	0.986
15	Beverages	0.741	0.616
16	Tobacco Products	0.567	0.490
24	Printing & Publishing	1.123	0.973
25	Basic Organic Chemicals	1.058	0.908
26	Basic Inorganic Chemicals	1.084	0.944
27	Chemical Fertilizers	1.563	1.345
28	Drugs & Cosmetics	0.970	0.803
30	Other Chemicals	1.022	0.869
31	Petroleum Products	0.857	0.825
32	Coal Products	1.056	0.973
35	Iron & Steel Manufacturing	1.289	1.114
37	Primary Nonferrous Metal Manufacturing	1.248	1.044
39	General Industrial Machinery	1.146	0.974
40	Household Electrical Appliances	0.748	0.660
44	Motor Vehicles	1.148	0.964
45	Other Transport Equipment	1.155	0.985
48	Building Construction & Maintenance	0.839	0.765
49	Public Works	0.862	0.777
50	Electric Power & Gas	1.869	1.520
51	Water & Sewer Services	2.203	1.748
52	Wholesale & Retail Trade	0.827	0.621
53	Restaurants & Hotels	0.829	0.646
54	Transportation & Warehousing	1.570	1.279
55	Communications	1.404	1.109
56	Finance & Insurance	0.762	0.615
57	Real Estate & Rental	0.619	0.473
58	Public Administration & Defense	1.143	0.952
59	Social Services	1.179	0.973
60	Other Services	1.188	0.939
61	Office Supplies	1.035	0.963
62	Business Consumption	0.997	0.822
63	Unclassifiable	1.005	0.859
64	AR Labour	0.641	0.568
65	AR Capital	0.932	0.832
6	Fishery Products	0.861	0.878
8	Metallic Ores	0.851	0.858
11	Seafood Processing	0.857	0.872
17	Fiber Yarn	0.859	0.864
18	Textile Fabrics	0.860	0.869
19	Fabricated Textile Products	0.863	0.887
20	Leather & Leather Products	0.861	0.879
21	Lumber & Plywood	0.844	0.864
22	Wood Products & Furniture	0.844	0.864
29	Synthetic Resins & Rubber	0.861	0.878
33	Rubber Products	0.861	0.878
34	Nonmetallic Mineral Products	0.836	0.859
36	Primary Iron & Steel Products	0.854	0.864
41	Industrial Electrical Appliances	0.859	0.868
43	Shipbuilding	0.860	0.861
46	Measuring,Medical & Optical Instruments	0.865	0.889
47	Miscellaneous Manufacturing	0.860	0.886
	SCF	0.961	0.853

Table A3.5. Simultaneous ARs, 1975.
Classification 1, ARI = -19%.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
2	Fruits & Vegetables	0.736	0.621
4	Livestock	0.804	0.721
12	Polished Grains	0.665	0.502
13	Flour & Cereal Preparations	1.187	1.087
15	Beverages	0.531	0.448
16	Tobacco Products	0.389	0.329
24	Printing & Publishing	0.671	0.571
32	Coal Products	0.852	0.791
48	Building Construction & Maintenance	0.777	0.719
49	Public Works	0.781	0.715
50	Electric Power & Gas	0.713	0.473
51	Water & Sewer Services	0.676	0.359
52	Wholesale & Retail Trade	0.613	0.429
53	Restaurants & Hotels	0.613	0.457
54	Transportation & Warehousing	0.647	0.450
55	Communications	0.558	0.338
56	Finance & Insurance	0.653	0.529
57	Real Estate & Rental	0.527	0.396
58	Public Administration & Defense	0.687	0.549
59	Social Services	0.671	0.527
60	Other Services	0.568	0.382
61	Office Supplies	0.802	0.751
62	Business Consumption	0.617	0.491
63	Unclassifiable	0.775	0.697
64	AR Labour	0.791	0.730
65	AR Capital	0.820	0.780
6	Fishery Products	0.882	0.897
11	Seafood Processing	0.879	0.893
17	Fiber Yarn	0.867	0.870
18	Textile Fabrics	0.872	0.880
19	Fabricated Textile Products	0.890	0.911
20	Leather & Leather Products	0.883	0.899
21	Lumber & Plywood	0.883	0.899
22	Wood Products & Furniture	0.883	0.899
33	Rubber Products	0.882	0.897
34	Nonmetallic Mineral Products	0.885	0.904
38	Fabricated Metal Products	0.889	0.911
42	Electronic & Communication Equipment	0.875	0.884
47	Miscellaneous Manufacturing	0.892	0.913
	SCF	0.791	0.730

Note: Accounting ratio (AR) is defined as the ratio of the shadow price over the market price.

Table A3.5 contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
2	Fruits & Vegetables	0.668	0.559
4	Livestock	0.769	0.689
12	Polished Grains	0.631	0.471
13	Flour & Cereal Preparations	1.179	1.080
15	Beverages	0.518	0.436
16	Tobacco Products	0.383	0.324
24	Printing & Publishing	0.644	0.545
32	Coal Products	0.841	0.781
48	Building Construction & Maintenance	0.745	0.690
49	Public Works	0.747	0.684
50	Electric Power & Gas	0.712	0.472
51	Water & Sewer Services	0.668	0.352
52	Wholesale & Retail Trade	0.594	0.412
53	Restaurants & Hotels	0.582	0.427
54	Transportation & Warehousing	0.627	0.432
55	Communications	0.523	0.306
56	Finance & Insurance	0.596	0.475
57	Real Estate & Rental	0.518	0.387
58	Public Administration & Defense	0.567	0.438
59	Social Services	0.601	0.462
60	Other Services	0.537	0.353
61	Office Supplies	0.799	0.749
62	Business Consumption	0.600	0.475
63	Unclassifiable	0.753	0.676
64	AR Labour	0.660	0.609
65	AR Capital	0.803	0.763
6	Fishery Products	0.884	0.898
11	Seafood Processing	0.881	0.894
17	Fiber Yarn	0.867	0.871
18	Textile Fabrics	0.873	0.881
19	Fabricated Textile Products	0.892	0.913
20	Leather & Leather Products	0.885	0.900
21	Lumber & Plywood	0.884	0.900
22	Wood Products & Furniture	0.884	0.900
33	Rubber Products	0.884	0.899
34	Nonmetallic Mineral Products	0.887	0.905
38	Fabricated Metal Products	0.891	0.913
42	Electronic & Communication Equipment	0.876	0.885
47	Miscellaneous Manufacturing	0.894	0.916
	SCF	0.776	0.716

Table A3.5 contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
2	Fruits & Vegetables	0.625	0.519
4	Livestock	0.747	0.668
12	Polished Grains	0.609	0.451
13	Flour & Cereal Preparations	1.174	1.075
15	Beverages	0.510	0.429
16	Tobacco Products	0.379	0.320
24	Printing & Publishing	0.626	0.529
32	Coal Products	0.833	0.775
48	Building Construction & Maintenance	0.725	0.671
49	Public Works	0.725	0.663
50	Electric Power & Gas	0.712	0.471
51	Water & Sewer Services	0.663	0.347
52	Wholesale & Retail Trade	0.582	0.401
53	Restaurants & Hotels	0.561	0.409
54	Transportation & Warehousing	0.615	0.421
55	Communications	0.501	0.285
56	Finance & Insurance	0.558	0.441
57	Real Estate & Rental	0.511	0.381
58	Public Administration & Defense	0.489	0.366
59	Social Services	0.556	0.421
60	Other Services	0.517	0.335
61	Office Supplies	0.798	0.747
62	Business Consumption	0.589	0.465
63	Unclassifiable	0.739	0.663
64	AR Labour	0.575	0.531
65	AR Capital	0.792	0.753
6	Fishery Products	0.885	0.899
11	Seafood Processing	0.882	0.895
17	Fiber Yarn	0.867	0.871
18	Textile Fabrics	0.874	0.881
19	Fabricated Textile Products	0.894	0.914
20	Leather & Leather Products	0.886	0.901
21	Lumber & Plywood	0.885	0.901
22	Wood Products & Furniture	0.885	0.901
33	Rubber Products	0.885	0.900
34	Nonmetallic Mineral Products	0.888	0.906
38	Fabricated Metal Products	0.893	0.914
42	Electronic & Communication Equipment	0.876	0.885
47	Miscellaneous Manufacturing	0.895	0.917
	SCF	0.767	0.708

Table A3.5 contd.

		(.)=0.67 ARP=0.6	(.)=0.67 ARP=0.4
2	Fruits & Vegetables	0.590	0.486
4	Livestock	0.729	0.652
12	Polished Grains	0.591	0.434
13	Flour & Cereal Preparations	1.170	1.071
15	Beverages	0.504	0.423
16	Tobacco Products	0.376	0.318
24	Printing & Publishing	0.612	0.516
32	Coal Products	0.828	0.769
48	Building Construction & Maintenance	0.708	0.655
49	Public Works	0.707	0.647
50	Electric Power & Gas	0.711	0.471
51	Water & Sewer Services	0.659	0.343
52	Wholesale & Retail Trade	0.573	0.392
53	Restaurants & Hotels	0.545	0.393
54	Transportation & Warehousing	0.605	0.411
55	Communications	0.483	0.269
56	Finance & Insurance	0.528	0.413
57	Real Estate & Rental	0.506	0.377
58	Public Administration & Defense	0.425	0.307
59	Social Services	0.519	0.387
60	Other Services	0.501	0.320
61	Office Supplies	0.797	0.746
62	Business Consumption	0.580	0.457
63	Unclassifiable	0.727	0.653
64	AR Labour	0.506	0.467
65	AR Capital	0.782	0.744
6	Fishery Products	0.885	0.900
11	Seafood Processing	0.882	0.895
17	Fiber Yarn	0.868	0.871
18	Textile Fabrics	0.874	0.882
19	Fabricated Textile Products	0.895	0.915
20	Leather & Leather Products	0.886	0.902
21	Lumber & Plywood	0.886	0.902
22	Wood Products & Furniture	0.886	0.902
33	Rubber Products	0.886	0.900
34	Nonmetallic Mineral Products	0.889	0.907
38	Fabricated Metal Products	0.894	0.915
42	Electronic & Communication Equipment	0.877	0.886
47	Miscellaneous Manufacturing	0.896	0.918
	SCF	0.759	0.701

Table A3.6. Simultaneous ARs, 1975, Classification 2, ARI = -19%.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
1	Cereals	0.697	0.546
2	Fruits & Vegetables	0.712	0.572
4	Livestock	0.758	0.650
12	Polished Grains	0.655	0.489
13	Flour & Cereal Preparations	0.933	0.698
15	Beverages	0.501	0.401
16	Tobacco Products	0.391	0.332
24	Printing & Publishing	0.674	0.571
25	Basic Organic Chemicals	0.664	0.556
26	Basic Inorganic Chemicals	0.717	0.617
27	Chemical Fertilizers	0.968	0.812
28	Drugs & Cosmetics	0.625	0.495
30	Other Chemicals	0.669	0.553
31	Petroleum Products	0.789	0.763
32	Coal Products	0.847	0.786
35	Iron & Steel Manufacturing	0.756	0.638
37	Primary Nonferrous Metal Manufacturing	0.686	0.543
39	General Industrial Machinery	0.664	0.543
40	Household Electrical Appliances	0.474	0.415
44	Motor Vehicles	0.610	0.483
45	Other Transport Equipment	0.669	0.552
48	Building Construction & Maintenance	0.757	0.692
49	Public Works	0.754	0.680
50	Electric Power & Gas	0.716	0.490
51	Water & Sewer Services	0.717	0.421
52	Wholesale & Retail Trade	0.613	0.429
53	Restaurants & Hotels	0.607	0.447
54	Transportation & Warehousing	0.645	0.453
55	Communications	0.587	0.380
56	Finance & Insurance	0.635	0.501
57	Real Estate & Rental	0.519	0.384
58	Public Administration & Defense	0.681	0.537
59	Social Services	0.664	0.511
60	Other Services	0.580	0.396
61	Office Supplies	0.809	0.760
62	Business Consumption	0.605	0.471
63	Unclassifiable	0.710	0.595
64	AR Labour	0.745	0.659
65	AR Capital	0.735	0.656
6	Fishery Products	0.882	0.897
8	Metallic Ores	0.868	0.872
11	Seafood Processing	0.879	0.893
17	Fiber Yarn	0.867	0.870
18	Textile Fabrics	0.872	0.880
19	Fabricated Textile Products	0.890	0.911
20	Leather & Leather Products	0.883	0.899
21	Lumber & Plywood	0.883	0.899
22	Wood Products & Furniture	0.883	0.899
29	Synthetic Resins & Rubber	0.881	0.896
33	Rubber Products	0.882	0.897
34	Nonmetallic Mineral Products	0.885	0.904
36	Primary Iron & Steel Products	0.872	0.879
41	Industrial Electrical Appliances	0.872	0.879
43	Shipbuilding	0.863	0.864
46	Measuring,Medical & Optical Instruments	0.891	0.912
47	Miscellaneous Manufacturing	0.891	0.913
	SCF	0.745	0.659

Table A3.6 contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
1	Cereals	0.630	0.486
2	Fruits & Vegetables	0.642	0.511
4	Livestock	0.715	0.612
12	Polished Grains	0.622	0.459
13	Flour & Cereal Preparations	0.866	0.638
15	Beverages	0.482	0.384
16	Tobacco Products	0.386	0.328
24	Printing & Publishing	0.648	0.548
25	Basic Organic Chemicals	0.652	0.545
26	Basic Inorganic Chemicals	0.706	0.606
27	Chemical Fertilizers	0.946	0.793
28	Drugs & Cosmetics	0.599	0.472
30	Other Chemicals	0.651	0.537
31	Petroleum Products	0.785	0.760
32	Coal Products	0.836	0.776
35	Iron & Steel Manufacturing	0.747	0.630
37	Primary Nonferrous Metal Manufacturing	0.672	0.530
39	General Industrial Machinery	0.644	0.525
40	Household Electrical Appliances	0.465	0.407
44	Motor Vehicles	0.583	0.458
45	Other Transport Equipment	0.645	0.530
48	Building Construction & Maintenance	0.726	0.663
49	Public Works	0.720	0.650
50	Electric Power & Gas	0.718	0.492
51	Water & Sewer Services	0.714	0.418
52	Wholesale & Retail Trade	0.595	0.413
53	Restaurants & Hotels	0.576	0.420
54	Transportation & Warehousing	0.627	0.437
55	Communications	0.557	0.353
56	Finance & Insurance	0.578	0.450
57	Real Estate & Rental	0.509	0.375
58	Public Administration & Defense	0.565	0.434
59	Social Services	0.595	0.451
60	Other Services	0.551	0.370
61	Office Supplies	0.807	0.759
62	Business Consumption	0.585	0.454
63	Unclassifiable	0.676	0.565
64	AR Labour	0.615	0.544
65	AR Capital	0.711	0.635
6	Fishery Products	0.884	0.898
8	Metallic Ores	0.868	0.873
11	Seafood Processing	0.881	0.894
17	Fiber Yarn	0.867	0.871
18	Textile Fabrics	0.873	0.881
19	Fabricated Textile Products	0.892	0.913
20	Leather & Leather Products	0.885	0.900
21	Lumber & Plywood	0.884	0.900
22	Wood Products & Furniture	0.884	0.900
29	Synthetic Resins & Rubber	0.883	0.897
33	Rubber Products	0.884	0.899
34	Nonmetallic Mineral Products	0.887	0.905
36	Primary Iron & Steel Products	0.872	0.880
41	Industrial Electrical Appliances	0.872	0.879
43	Shipbuilding	0.863	0.864
46	Measuring,Medical & Optical Instruments	0.893	0.913
47	Miscellaneous Manufacturing	0.894	0.915
	SCF	0.723	0.641

Table A3.6 contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
1	Cereals	0.588	0.449
2	Fruits & Vegetables	0.598	0.472
4	Livestock	0.688	0.588
12	Polished Grains	0.601	0.441
13	Flour & Cereal Preparations	0.823	0.601
15	Beverages	0.470	0.373
16	Tobacco Products	0.383	0.325
24	Printing & Publishing	0.631	0.533
25	Basic Organic Chemicals	0.644	0.539
26	Basic Inorganic Chemicals	0.698	0.600
27	Chemical Fertilizers	0.932	0.781
28	Drugs & Cosmetics	0.582	0.457
30	Other Chemicals	0.639	0.527
31	Petroleum Products	0.783	0.758
32	Coal Products	0.830	0.770
35	Iron & Steel Manufacturing	0.742	0.625
37	Primary Nonferrous Metal Manufacturing	0.664	0.522
39	General Industrial Machinery	0.630	0.513
40	Household Electrical Appliances	0.459	0.402
44	Motor Vehicles	0.565	0.443
45	Other Transport Equipment	0.629	0.516
48	Building Construction & Maintenance	0.705	0.646
49	Public Works	0.698	0.631
50	Electric Power & Gas	0.720	0.494
51	Water & Sewer Services	0.712	0.416
52	Wholesale & Retail Trade	0.584	0.403
53	Restaurants & Hotels	0.556	0.403
54	Transportation & Warehousing	0.616	0.427
55	Communications	0.537	0.336
56	Finance & Insurance	0.542	0.418
57	Real Estate & Rental	0.502	0.369
58	Public Administration & Defense	0.491	0.369
59	Social Services	0.552	0.412
60	Other Services	0.532	0.354
61	Office Supplies	0.806	0.758
62	Business Consumption	0.572	0.442
63	Unclassifiable	0.654	0.546
64	AR Labour	0.532	0.471
65	AR Capital	0.696	0.622
6	Fishery Products	0.884	0.899
8	Metallic Ores	0.868	0.873
11	Seafood Processing	0.882	0.895
17	Fiber Yarn	0.867	0.871
18	Textile Fabrics	0.874	0.881
19	Fabricated Textile Products	0.893	0.914
20	Leather & Leather Products	0.886	0.901
21	Lumber & Plywood	0.885	0.901
22	Wood Products & Furniture	0.885	0.901
29	Synthetic Resins & Rubber	0.884	0.898
33	Rubber Products	0.885	0.899
34	Nonmetallic Mineral Products	0.888	0.906
36	Primary Iron & Steel Products	0.873	0.880
41	Industrial Electrical Appliances	0.873	0.880
43	Shipbuilding	0.863	0.864
46	Measuring,Medical & Optical Instruments	0.894	0.915
47	Miscellaneous Manufacturing	0.895	0.917
	SCF	0.710	0.629

Table A3.6 contd.

		(.)=0.67 ARP=0.6	(.)=0.67 ARP=0.4
1	Cereals	0.554	0.418
2	Fruits & Vegetables	0.563	0.440
4	Livestock	0.666	0.568
12	Polished Grains	0.584	0.426
13	Flour & Cereal Preparations	0.789	0.570
15	Beverages	0.460	0.364
16	Tobacco Products	0.380	0.322
24	Printing & Publishing	0.618	0.521
25	Basic Organic Chemicals	0.638	0.533
26	Basic Inorganic Chemicals	0.693	0.595
27	Chemical Fertilizers	0.921	0.771
28	Drugs & Cosmetics	0.569	0.445
30	Other Chemicals	0.630	0.519
31	Petroleum Products	0.781	0.756
32	Coal Products	0.824	0.765
35	Iron & Steel Manufacturing	0.737	0.621
37	Primary Nonferrous Metal Manufacturing	0.656	0.516
39	General Industrial Machinery	0.620	0.504
40	Household Electrical Appliances	0.454	0.397
44	Motor Vehicles	0.551	0.431
45	Other Transport Equipment	0.617	0.505
48	Building Construction & Maintenance	0.689	0.631
49	Public Works	0.681	0.615
50	Electric Power & Gas	0.721	0.495
51	Water & Sewer Services	0.710	0.414
52	Wholesale & Retail Trade	0.575	0.395
53	Restaurants & Hotels	0.541	0.389
54	Transportation & Warehousing	0.607	0.419
55	Communications	0.522	0.322
56	Finance & Insurance	0.513	0.392
57	Real Estate & Rental	0.497	0.365
58	Public Administration & Defense	0.431	0.316
59	Social Services	0.517	0.381
60	Other Services	0.517	0.341
61	Office Supplies	0.805	0.757
62	Business Consumption	0.562	0.433
63	Unclassifiable	0.637	0.530
64	AR Labour	0.466	0.413
65	AR Capital	0.684	0.611
6	Fishery Products	0.885	0.900
8	Metallic Ores	0.869	0.873
11	Seafood Processing	0.882	0.895
17	Fiber Yarn	0.868	0.871
18	Textile Fabrics	0.874	0.882
19	Fabricated Textile Products	0.894	0.915
20	Leather & Leather Products	0.886	0.902
21	Lumber & Plywood	0.886	0.902
22	Wood Products & Furniture	0.886	0.902
29	Synthetic Resins & Rubber	0.884	0.898
33	Rubber Products	0.885	0.900
34	Nonmetallic Mineral Products	0.889	0.907
36	Primary Iron & Steel Products	0.873	0.880
41	Industrial Electrical Appliances	0.873	0.880
43	Shipbuilding	0.863	0.864
46	Measuring,Medical & Optical Instruments	0.895	0.915
47	Miscellaneous Manufacturing	0.896	0.917
	SCF	0.699	0.619

Table A3.7. Simultaneous ARs, 1983.
Classification 1.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
2	Fruits & Vegetables	0.899	0.878
4	Livestock	0.875	0.857
12	Polished Grains	0.932	0.937
13	Flour & Cereal Preparations	0.927	0.928
15	Backery & Confectionery	0.796	0.785
16	Other Food Preparations	0.828	0.819
17	Beverages	0.485	0.484
18	Tobacco Products	0.261	0.270
25	Printing & Publishing	0.851	0.856
30	Chemical Fibers	0.882	0.851
33	Coal Products	0.944	0.945
54	Building Construction & Maintenance	0.834	0.812
55	Public Works	0.845	0.827
56	Electric Power Services	1.367	1.293
57	Gas,Steam & Hot Water Services	1.444	1.421
58	Water & Sewer Services	1.549	1.458
59	Wholesale & Retail Trade	0.766	0.687
60	Restaurants & Hotels	0.790	0.756
61	Transportation & Warehousing	0.980	1.056
62	Communications	0.858	0.928
63	Finance & Insurance	0.868	0.842
64	Real Estate & Rental	0.612	0.508
65	Public Administration & Defense	1.544	1.772
66	Education & Research	0.999	1.030
67	Medical Services	0.942	0.944
68	Social Services	0.923	0.944
69	Other Services	0.852	0.822
70	Office Supplies	0.916	0.916
71	Business Consumption	0.762	0.753
72	Unclassifiable	0.857	0.857
73	AR Labour	0.920	0.921
74	AR Capital	0.863	0.847
6	Fishery Products	0.989	0.995
11	Seafood Processing	0.985	0.989
19	Fiber Yarn	0.974	0.975
20	Textile Fabrics	0.979	0.982
21	Fabricated Textile Products	0.996	1.006
22	Leather & Leather Products	0.989	0.996
23	Lumber & Wood Products	0.984	0.987
27	Chemical Fertilizers	0.970	0.967
34	Rubber Products	0.989	0.995
35	Nonmetallic Mineral Products	0.984	0.986
37	Primary Iron & Steel Products	0.977	0.979
39	Fabricated Metal Products	0.988	0.991
41	Household Electrical Appliances	0.979	0.981
43	Household Electronic Appliances	0.981	0.985
48	Shipbuilding	0.971	0.971
49	Motor Vehicles	0.971	0.971
53	Miscellaneous Manufacturing	0.997	1.006
	SCF	0.920	0.921

Table A3.7 contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
2	Fruits & Vegetables	0.805	0.784
4	Livestock	0.815	0.798
12	Polished Grains	0.927	0.933
13	Flour & Cereal Preparations	0.909	0.910
15	Backery & Confectionery	0.761	0.750
16	Other Food Preparations	0.805	0.796
17	Beverages	0.458	0.456
18	Tobacco Products	0.252	0.261
25	Printing & Publishing	0.798	0.804
30	Chemical Fibers	0.861	0.830
33	Coal Products	0.925	0.926
54	Building Construction & Maintenance	0.790	0.768
55	Public Works	0.797	0.778
56	Electric Power Services	1.327	1.253
57	Gas,Steam & Hot Water Services	1.409	1.385
58	Water & Sewer Services	1.490	1.399
59	Wholesale & Retail Trade	0.721	0.642
60	Restaurants & Hotels	0.734	0.700
61	Transportation & Warehousing	0.910	0.986
62	Communications	0.782	0.851
63	Finance & Insurance	0.762	0.736
64	Real Estate & Rental	0.590	0.487
65	Public Administration & Defense	1.408	1.635
66	Education & Research	0.863	0.895
67	Medical Services	0.862	0.864
68	Social Services	0.836	0.857
69	Other Services	0.790	0.761
70	Office Supplies	0.907	0.907
71	Business Consumption	0.726	0.717
72	Unclassifiable	0.810	0.809
73	AR Labour	0.756	0.757
74	AR Capital	0.834	0.818
6	Fishery Products	0.993	0.999
11	Seafood Processing	0.989	0.993
19	Fiber Yarn	0.975	0.976
20	Textile Fabrics	0.982	0.985
21	Fabricated Textile Products	1.002	1.012
22	Leather & Leather Products	0.994	1.000
23	Lumber & Wood Products	0.989	0.992
27	Chemical Fertilizers	0.974	0.970
34	Rubber Products	0.993	0.999
35	Nonmetallic Mineral Products	0.990	0.992
37	Primary Iron & Steel Products	0.980	0.981
39	Fabricated Metal Products	0.995	0.998
41	Household Electrical Appliances	0.981	0.983
43	Household Electronic Appliances	0.984	0.988
48	Shipbuilding	0.972	0.971
49	Motor Vehicles	0.972	0.971
53	Miscellaneous Manufacturing	1.003	1.013
	SCF	0.889	0.890

Table A3.7 contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
2	Fruits & Vegetables	0.746	0.725
4	Livestock	0.778	0.761
12	Polished Grains	0.924	0.930
13	Flour & Cereal Preparations	0.898	0.898
15	Backery & Confectionery	0.739	0.728
16	Other Food Preparations	0.790	0.781
17	Beverages	0.441	0.439
18	Tobacco Products	0.246	0.255
25	Printing & Publishing	0.765	0.770
30	Chemical Fibers	0.848	0.817
33	Coal Products	0.914	0.915
54	Building Construction & Maintenance	0.762	0.741
55	Public Works	0.767	0.748
56	Electric Power Services	1.303	1.228
57	Gas,Steam & Hot Water Services	1.386	1.363
58	Water & Sewer Services	1.453	1.362
59	Wholesale & Retail Trade	0.693	0.614
60	Restaurants & Hotels	0.698	0.665
61	Transportation & Warehousing	0.866	0.942
62	Communications	0.734	0.803
63	Finance & Insurance	0.695	0.669
64	Real Estate & Rental	0.577	0.473
65	Public Administration & Defense	1.322	1.549
66	Education & Research	0.778	0.809
67	Medical Services	0.812	0.813
68	Social Services	0.781	0.802
69	Other Services	0.752	0.722
70	Office Supplies	0.902	0.901
71	Business Consumption	0.704	0.695
72	Unclassifiable	0.780	0.779
73	AR Labour	0.652	0.653
74	AR Capital	0.816	0.800
6	Fishery Products	0.996	1.002
11	Seafood Processing	0.991	0.996
19	Fiber Yarn	0.976	0.977
20	Textile Fabrics	0.983	0.986
21	Fabricated Textile Products	1.006	1.016
22	Leather & Leather Products	0.997	1.003
23	Lumber & Wood Products	0.993	0.995
27	Chemical Fertilizers	0.976	0.972
34	Rubber Products	0.996	1.002
35	Nonmetallic Mineral Products	0.994	0.996
37	Primary Iron & Steel Products	0.981	0.983
39	Fabricated Metal Products	0.999	1.002
41	Household Electrical Appliances	0.982	0.985
43	Household Electronic Appliances	0.986	0.989
48	Shipbuilding	0.972	0.972
49	Motor Vehicles	0.972	0.972
53	Miscellaneous Manufacturing	1.007	1.016
	SCF	0.870	0.871

Table A3.8. Simultaneous ARs, 1983.
Classification 2.

		(.)-1 ARP=0.6	(.)-1 ARP=0.4
1	Cereals	0.866	0.815
2	Fruits & Vegetables	0.911	0.885
4	Livestock	0.871	0.840
12	Polished Grains	0.868	0.825
13	Flour & Cereal Preparations	0.878	0.839
15	Backery & Confectionery	0.804	0.782
16	Other Food Preparations	0.810	0.779
17	Beverages	0.491	0.485
18	Tobacco Products	0.265	0.272
25	Printing & Publishing	0.866	0.866
26	Basic Chemicals	0.945	0.928
28	Drugs & Cosmetics	0.795	0.761
30	Chemical Fibers	0.929	0.890
31	Other Chemicals	0.868	0.843
33	Coal Products	0.948	0.947
36	Iron & Steel Manufacturing	1.025	1.003
38	Primary Nonferrous Metal Manufacturing	1.044	1.031
40	General Industrial Machinery	0.910	0.895
50	Motor Vehicle Parts	0.940	0.918
51	Other Transport Equipment	0.915	0.910
54	Building Construction & Maintenance	0.846	0.821
55	Public Works	0.860	0.839
56	Electric Power Services	1.383	1.305
57	Gas,Steam & Hot Water Services	1.459	1.432
58	Water & Sewer Services	1.576	1.479
59	Wholesale & Retail Trade	0.774	0.692
60	Restaurants & Hotels	0.801	0.764
61	Transportation & Warehousing	0.999	1.069
62	Communications	0.879	0.943
63	Finance & Insurance	0.880	0.848
64	Real Estate & Rental	0.617	0.511
65	Public Administration & Defense	1.586	1.802
66	Education & Research	1.017	1.041
67	Medical Services	0.952	0.943
68	Social Services	0.936	0.948
69	Other Services	0.868	0.833
70	Office Supplies	0.921	0.919
71	Business Consumption	0.762	0.744
72	Unclassifiable	0.874	0.868
73	AR Labour	0.933	0.927
74	AR Capital	0.880	0.860

Table A3.8 contd.

6	Fishery Products	0.988	0.994
11	Seafood Processing	0.984	0.989
19	Fiber Yarn	0.974	0.975
20	Textile Fabrics	0.979	0.982
21	Fabricated Textile Products	0.995	1.005
22	Leather & Leather Products	0.988	0.995
23	Lumber & Wood Products	0.983	0.986
27	Chemical Fertilizers	0.970	0.967
29	Synthetic Resins & Rubber	0.987	0.994
34	Rubber Products	0.988	0.994
35	Nonmetallic Mineral Products	0.983	0.985
37	Primary Iron & Steel Products	0.977	0.978
39	Fabricated Metal Products	0.986	0.990
41	Household Electrical Appliances	0.978	0.981
42	Industrial Electrical Appliances	0.978	0.981
43	Household Electronic Appliances	0.981	0.985
44	Electronic Appliances	0.981	0.985
45	Semi-conductors & Integrated Circuits	0.981	0.985
46	Other Electronic Components	0.981	0.985
47	Communication Equipment	0.981	0.985
48	Shipbuilding	0.971	0.971
49	Motor Vehicles	0.971	0.971
52	Measuring,Medical & Optical Instruments	0.996	1.007
53	Miscellaneous Manufacturing	0.996	1.005
	SCF	0.933	0.927

Table A3.8 contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
1	Cereals	0.763	0.713
2	Fruits & Vegetables	0.803	0.778
4	Livestock	0.781	0.751
12	Polished Grains	0.765	0.723
13	Flour & Cereal Preparations	0.777	0.738
15	Backery & Confectionery	0.744	0.722
16	Other Food Preparations	0.741	0.710
17	Beverages	0.454	0.448
18	Tobacco Products	0.253	0.261
25	Printing & Publishing	0.800	0.801
26	Basic Chemicals	0.904	0.888
28	Drugs & Cosmetics	0.739	0.706
30	Chemical Fibers	0.885	0.846
31	Other Chemicals	0.816	0.791
33	Coal Products	0.925	0.925
36	Iron & Steel Manufacturing	0.985	0.963
38	Primary Nonferrous Metal Manufacturing	0.991	0.979
40	General Industrial Machinery	0.849	0.834
50	Motor Vehicle Parts	0.884	0.862
51	Other Transport Equipment	0.853	0.848
54	Building Construction & Maintenance	0.793	0.769
55	Public Works	0.804	0.782
56	Electric Power Services	1.330	1.252
57	Gas,Steam & Hot Water Services	1.411	1.385
58	Water & Sewer Services	1.495	1.398
59	Wholesale & Retail Trade	0.721	0.639
60	Restaurants & Hotels	0.734	0.697
61	Transportation & Warehousing	0.912	0.983
62	Communications	0.785	0.849
63	Finance & Insurance	0.759	0.729
64	Real Estate & Rental	0.591	0.486
65	Public Administration & Defense	1.406	1.624
66	Education & Research	0.862	0.886
67	Medical Services	0.849	0.840
68	Social Services	0.828	0.841
69	Other Services	0.792	0.758
70	Office Supplies	0.907	0.905
71	Business Consumption	0.706	0.688
72	Unclassifiable	0.812	0.807
73	AR Labour	0.751	0.746
74	AR Capital	0.837	0.818

Table A3.8 contd.

6	Fishery Products	0.993	1.000
11	Seafood Processing	0.989	0.994
19	Fiber Yarn	0.975	0.976
20	Textile Fabrics	0.982	0.985
21	Fabricated Textile Products	1.002	1.012
22	Leather & Leather Products	0.994	1.001
23	Lumber & Wood Products	0.989	0.992
27	Chemical Fertilizers	0.974	0.970
29	Synthetic Resins & Rubber	0.992	0.999
34	Rubber Products	0.993	1.000
35	Nonmetallic Mineral Products	0.990	0.992
37	Primary Iron & Steel Products	0.980	0.981
39	Fabricated Metal Products	0.995	0.998
41	Household Electrical Appliances	0.981	0.983
42	Industrial Electrical Appliances	0.981	0.983
43	Household Electronic Appliances	0.984	0.988
44	Electronic Appliances	0.984	0.988
45	Semi-conductors & Integrated Circuits	0.984	0.988
46	Other Electronic Components	0.984	0.988
47	Communication Equipment	0.984	0.988
48	Shipbuilding	0.972	0.971
49	Motor Vehicles	0.972	0.971
52	Measuring,Medical & Optical Instruments	1.003	1.014
53	Miscellaneous Manufacturing	1.003	1.013
	SCF	0.884	0.878

Table A3.8 contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
1	Cereals	0.700	0.650
2	Fruits & Vegetables	0.738	0.712
4	Livestock	0.726	0.696
12	Polished Grains	0.703	0.661
13	Flour & Cereal Preparations	0.716	0.677
15	Backery & Confectionery	0.708	0.686
16	Other Food Preparations	0.698	0.668
17	Beverages	0.431	0.426
18	Tobacco Products	0.246	0.254
25	Printing & Publishing	0.761	0.761
26	Basic Chemicals	0.879	0.863
28	Drugs & Cosmetics	0.705	0.672
30	Chemical Fibers	0.858	0.819
31	Other Chemicals	0.784	0.759
33	Coal Products	0.911	0.911
36	Iron & Steel Manufacturing	0.961	0.939
38	Primary Nonferrous Metal Manufacturing	0.959	0.947
40	General Industrial Machinery	0.811	0.797
50	Motor Vehicle Parts	0.850	0.829
51	Other Transport Equipment	0.815	0.811
54	Building Construction & Maintenance	0.762	0.738
55	Public Works	0.769	0.748
56	Electric Power Services	1.298	1.220
57	Gas,Steam & Hot Water Services	1.382	1.356
58	Water & Sewer Services	1.446	1.349
59	Wholesale & Retail Trade	0.688	0.607
60	Restaurants & Hotels	0.693	0.657
61	Transportation & Warehousing	0.859	0.930
62	Communications	0.727	0.792
63	Finance & Insurance	0.686	0.656
64	Real Estate & Rental	0.575	0.470
65	Public Administration & Defense	1.297	1.515
66	Education & Research	0.767	0.792
67	Medical Services	0.785	0.778
68	Social Services	0.762	0.776
69	Other Services	0.745	0.711
70	Office Supplies	0.899	0.897
71	Business Consumption	0.671	0.653
72	Unclassifiable	0.774	0.769
73	AR Labour	0.641	0.636
74	AR Capital	0.811	0.791

Table A3.8 contd.

6	Fishery Products	0.996	1.003
11	Seafood Processing	0.992	0.997
19	Fiber Yarn	0.976	0.977
20	Textile Fabrics	0.983	0.986
21	Fabricated Textile Products	1.007	1.017
22	Leather & Leather Products	0.997	1.004
23	Lumber & Wood Products	0.993	0.996
27	Chemical Fertilizers	0.976	0.973
29	Synthetic Resins & Rubber	0.995	1.002
34	Rubber Products	0.996	1.003
35	Nonmetallic Mineral Products	0.995	0.997
37	Primary Iron & Steel Products	0.981	0.983
39	Fabricated Metal Products	1.000	1.003
41	Household Electrical Appliances	0.982	0.985
42	Industrial Electrical Appliances	0.982	0.985
43	Household Electronic Appliances	0.986	0.990
44	Electronic Appliances	0.986	0.990
45	Semi-conductors & Integrated Circuits	0.986	0.990
46	Other Electronic Components	0.986	0.990
47	Communication Equipment	0.986	0.990
48	Shipbuilding	0.972	0.972
49	Motor Vehicles	0.972	0.972
52	Measuring,Medical & Optical Instruments	1.008	1.018
53	Miscellaneous Manufacturing	1.008	1.018
	SCF	0.854	0.848

Appendix to Chapter Five.
Table A5.1. Social Profitability, Classification 1, 1975.
(Accounting Rate of Interest = 10%.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
1	Cereals	-0.060	0.092
3	Industrial Crops	-0.092	0.037
5	Forestry Products	-0.131	0.031
6	Fishery Products	-0.243	-0.085
7	Coal Mining	-0.205	-0.090
8	Metallic Ores	-0.110	0.021
9	Nonmetallic Minerals	-0.009	0.136
10	Meat,Dairy & Fruits	-0.174	-0.044
11	Seafood Processing	-0.156	-0.056
14	Other Food Preparations	-0.164	-0.073
17	Fiber Yarn	-0.290	-0.189
18	Textile Fabrics	-0.282	-0.157
19	Fabricated Textile Products	-0.094	0.012
20	Leather & Leather Products	-0.256	-0.121
21	Lumber & Plywood	-0.280	-0.155
22	Wood Products & Furniture	-0.676	-0.436
23	Pulp & Paper	-0.158	-0.060
25	Basic Organic Chemicals	-0.151	-0.064
26	Basic Inorganic Chemicals	-0.277	-0.161
27	Chemical Fertilizers	-0.399	-0.310
28	Drugs & Cosmetics	-0.260	-0.120
29	Synthetic Resins & Rubber	-0.163	-0.072
30	Other Chemicals	-0.248	-0.139
31	Petroleum Products	0.049	0.078
33	Rubber Products	-0.177	-0.072
34	Nonmetallic Mineral Products	-0.404	-0.215
35	Iron & Steel Manufacturing	-0.207	-0.126
36	Primary Iron & Steel Products	-0.205	-0.131
37	Primary Nonferrous Metal Manufacturing	-0.317	-0.193
38	Fabricated Metal Products	-0.341	-0.188
39	General Industrial Machinery	-0.254	-0.124
40	Household Electrical Appliances	-0.034	0.043
41	Industrial Electrical Appliances	-0.124	-0.032
42	Electronic & Communication Equipment	-0.059	0.024
43	Shipbuilding	-0.184	-0.064
44	Motor Vehicles	-0.454	-0.316
45	Other Transport Equipment	-0.175	-0.066
46	Measuring,Medical & Optical Instruments	-0.100	-0.024
47	Miscellaneous Manufacturing	-0.080	0.057

Note: Social profitability is defined as the difference between the shadow value of output and the shadow value of inputs, expressed as a proportion of the shadow value of output. $(.) = 1 - \mu(1-m/w)$, where μ is the social value of income accruing to the worker relative to the numeraire (government income), m is the marginal product of labour, and w is the wage.

Table A5.1. contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
1	Cereals	0.032	0.177
3	Industrial Crops	0.001	0.124
5	Forestry Products	-0.034	0.121
6	Fishery Products	-0.176	-0.024
7	Coal Mining	-0.093	0.014
8	Metallic Ores	-0.038	0.088
9	Nonmetallic Minerals	0.058	0.198
10	Meat,Dairy & Fruits	-0.121	0.005
11	Seafood Processing	-0.122	-0.025
14	Other Food Preparations	-0.139	-0.049
17	Fiber Yarn	-0.266	-0.167
18	Textile Fabrics	-0.251	-0.129
19	Fabricated Textile Products	-0.058	0.045
20	Leather & Leather Products	-0.221	-0.089
21	Lumber & Plywood	-0.250	-0.128
22	Wood Products & Furniture	-0.618	-0.384
23	Pulp & Paper	-0.128	-0.032
25	Basic Organic Chemicals	-0.133	-0.047
26	Basic Inorganic Chemicals	-0.252	-0.138
27	Chemical Fertilizers	-0.375	-0.289
28	Drugs & Cosmetics	-0.216	-0.079
29	Synthetic Resins & Rubber	-0.141	-0.051
30	Other Chemicals	-0.219	-0.112
31	Petroleum Products	0.056	0.085
33	Rubber Products	-0.141	-0.040
34	Nonmetallic Mineral Products	-0.358	-0.175
35	Iron & Steel Manufacturing	-0.192	-0.112
36	Primary Iron & Steel Products	-0.192	-0.119
37	Primary Nonferrous Metal Manufacturing	-0.292	-0.170
38	Fabricated Metal Products	-0.301	-0.153
39	General Industrial Machinery	-0.217	-0.089
40	Household Electrical Appliances	-0.013	0.063
41	Industrial Electrical Appliances	-0.095	-0.005
42	Electronic & Communication Equipment	-0.033	0.048
43	Shipbuilding	-0.153	-0.035
44	Motor Vehicles	-0.407	-0.273
45	Other Transport Equipment	-0.138	-0.031
46	Measuring,Medical & Optical Instruments	-0.069	0.005
47	Miscellaneous Manufacturing	-0.045	0.087

Table A5.1. contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
1	Cereals	0.091	0.232
3	Industrial Crops	0.061	0.179
5	Forestry Products	0.028	0.179
6	Fishery Products	-0.132	0.015
7	Coal Mining	-0.021	0.080
8	Metallic Ores	0.008	0.131
9	Nonmetallic Minerals	0.101	0.238
10	Meat,Dairy & Fruits	-0.087	0.036
11	Seafood Processing	-0.101	-0.006
14	Other Food Preparations	-0.123	-0.034
17	Fiber Yarn	-0.250	-0.153
18	Textile Fabrics	-0.232	-0.111
19	Fabricated Textile Products	-0.034	0.066
20	Leather & Leather Products	-0.198	-0.069
21	Lumber & Plywood	-0.231	-0.110
22	Wood Products & Furniture	-0.581	-0.351
23	Pulp & Paper	-0.109	-0.015
25	Basic Organic Chemicals	-0.122	-0.036
26	Basic Inorganic Chemicals	-0.236	-0.124
27	Chemical Fertilizers	-0.360	-0.274
28	Drugs & Cosmetics	-0.188	-0.053
29	Synthetic Resins & Rubber	-0.126	-0.037
30	Other Chemicals	-0.200	-0.094
31	Petroleum Products	0.060	0.088
33	Rubber Products	-0.118	-0.019
34	Nonmetallic Mineral Products	-0.329	-0.149
35	Iron & Steel Manufacturing	-0.182	-0.103
36	Primary Iron & Steel Products	-0.183	-0.111
37	Primary Nonferrous Metal Manufacturing	-0.276	-0.155
38	Fabricated Metal Products	-0.276	-0.131
39	General Industrial Machinery	-0.193	-0.067
40	Household Electrical Appliances	0.001	0.076
41	Industrial Electrical Appliances	-0.076	0.013
42	Electronic & Communication Equipment	-0.016	0.064
43	Shipbuilding	-0.133	-0.017
44	Motor Vehicles	-0.377	-0.245
45	Other Transport Equipment	-0.115	-0.010
46	Measuring,Medical & Optical Instruments	-0.049	0.023
47	Miscellaneous Manufacturing	-0.024	0.107

Table A5.1. contd.

		(.)=0.67 ARP=0.6	(.)=0.67 ARP=0.4
1	Cereals	0.139	0.276
3	Industrial Crops	0.109	0.224
5	Forestry Products	0.079	0.226
6	Fishery Products	-0.097	0.047
7	Coal Mining	0.037	0.134
8	Metallic Ores	0.046	0.166
9	Nonmetallic Minerals	0.136	0.270
10	Meat,Dairy & Fruits	-0.060	0.061
11	Seafood Processing	-0.083	0.010
14	Other Food Preparations	-0.110	-0.022
17	Fiber Yarn	-0.238	-0.141
18	Textile Fabrics	-0.216	-0.097
19	Fabricated Textile Products	-0.016	0.082
20	Leather & Leather Products	-0.180	-0.052
21	Lumber & Plywood	-0.215	-0.097
22	Wood Products & Furniture	-0.551	-0.325
23	Pulp & Paper	-0.093	-0.000
25	Basic Organic Chemicals	-0.112	-0.027
26	Basic Inorganic Chemicals	-0.224	-0.112
27	Chemical Fertilizers	-0.348	-0.263
28	Drugs & Cosmetics	-0.165	-0.032
29	Synthetic Resins & Rubber	-0.115	-0.026
30	Other Chemicals	-0.185	-0.080
31	Petroleum Products	0.064	0.092
33	Rubber Products	-0.099	-0.002
34	Nonmetallic Mineral Products	-0.306	-0.128
35	Iron & Steel Manufacturing	-0.174	-0.096
36	Primary Iron & Steel Products	-0.176	-0.105
37	Primary Nonferrous Metal Manufacturing	-0.263	-0.143
38	Fabricated Metal Products	-0.256	-0.113
39	General Industrial Machinery	-0.173	-0.049
40	Household Electrical Appliances	0.012	0.086
41	Industrial Electrical Appliances	-0.060	0.028
42	Electronic & Communication Equipment	-0.003	0.076
43	Shipbuilding	-0.117	-0.002
44	Motor Vehicles	-0.353	-0.223
45	Other Transport Equipment	-0.096	0.008
46	Measuring,Medical & Optical Instruments	-0.033	0.038
47	Miscellaneous Manufacturing	-0.006	0.122

Table A5.2. Social Profitability, Classification 2, 1975.
(ARI=10%)

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
3	Industrial Crops	-0.180	0.000
5	Forestry Products	-0.194	0.009
6	Fishery Products	-0.296	-0.089
7	Coal Mining	-0.281	-0.113
8	Metallic Ores	-0.385	-0.162
9	Nonmetallic Minerals	-0.066	0.119
10	Meat,Dairy & Fruits	-0.232	-0.053
11	Seafood Processing	-0.186	-0.064
14	Other Food Preparations	-0.233	-0.070
17	Fiber Yarn	-0.321	-0.202
18	Textile Fabrics	-0.336	-0.174
19	Fabricated Textile Products	-0.126	0.004
20	Leather & Leather Products	-0.298	-0.135
21	Lumber & Plywood	-0.326	-0.169
22	Wood Products & Furniture	-0.762	-0.467
23	Pulp & Paper	-0.202	-0.075
29	Synthetic Resins & Rubber	-0.312	-0.112
33	Rubber Products	-0.257	-0.104
34	Nonmetallic Mineral Products	-0.466	-0.226
36	Primary Iron & Steel Products	-0.522	-0.312
38	Fabricated Metal Products	-0.397	-0.232
41	Industrial Electrical Appliances	-0.339	-0.143
42	Electronic & Communication Equipment	-0.060	0.035
43	Shipbuilding	-0.448	-0.248
46	Measuring,Medical & Optical Instruments	-0.161	-0.031
47	Miscellaneous Manufacturing	-0.148	0.029

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
3	Industrial Crops	-0.064	0.103
5	Forestry Products	-0.077	0.113
6	Fishery Products	-0.208	-0.014
7	Coal Mining	-0.144	0.008
8	Metallic Ores	-0.274	-0.065
9	Nonmetallic Minerals	0.018	0.193
10	Meat,Dairy & Fruits	-0.155	0.015
11	Seafood Processing	-0.142	-0.026
14	Other Food Preparations	-0.171	-0.015
17	Fiber Yarn	-0.288	-0.172
18	Textile Fabrics	-0.292	-0.137
19	Fabricated Textile Products	-0.079	0.044
20	Leather & Leather Products	-0.251	-0.095
21	Lumber & Plywood	-0.283	-0.133
22	Wood Products & Furniture	-0.683	-0.400
23	Pulp & Paper	-0.161	-0.039
29	Synthetic Resins & Rubber	-0.260	-0.068
33	Rubber Products	-0.204	-0.058
34	Nonmetallic Mineral Products	-0.402	-0.171
36	Primary Iron & Steel Products	-0.476	-0.272
38	Fabricated Metal Products	-0.348	-0.190
41	Industrial Electrical Appliances	-0.281	-0.092
42	Electronic & Communication Equipment	-0.029	0.063
43	Shipbuilding	-0.391	-0.197
46	Measuring,Medical & Optical Instruments	-0.115	0.008
47	Miscellaneous Manufacturing	-0.100	0.069

Table A5.2. contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
3	Industrial Crops	0.008	0.167
5	Forestry Products	-0.004	0.177
6	Fishery Products	-0.154	0.033
7	Coal Mining	-0.060	0.083
8	Metallic Ores	-0.206	-0.005
9	Nonmetallic Minerals	0.070	0.240
10	Meat,Dairy & Fruits	-0.107	0.057
11	Seafood Processing	-0.116	-0.003
14	Other Food Preparations	-0.133	0.020
17	Fiber Yarn	-0.267	-0.153
18	Textile Fabrics	-0.266	-0.113
19	Fabricated Textile Products	-0.050	0.068
20	Leather & Leather Products	-0.223	-0.070
21	Lumber & Plywood	-0.257	-0.111
22	Wood Products & Furniture	-0.634	-0.358
23	Pulp & Paper	-0.135	-0.016
29	Synthetic Resins & Rubber	-0.229	-0.041
33	Rubber Products	-0.171	-0.030
34	Nonmetallic Mineral Products	-0.362	-0.138
36	Primary Iron & Steel Products	-0.448	-0.248
38	Fabricated Metal Products	-0.318	-0.163
41	Industrial Electrical Appliances	-0.245	-0.061
42	Electronic & Communication Equipment	-0.009	0.081
43	Shipbuilding	-0.356	-0.166
46	Measuring,Medical & Optical Instruments	-0.086	0.033
47	Miscellaneous Manufacturing	-0.070	0.095

		(.)=0.67 ARP=0.6	(.)=0.67 ARP=0.4
3	Industrial Crops	0.065	0.218
5	Forestry Products	0.053	0.228
6	Fishery Products	-0.111	0.070
7	Coal Mining	0.008	0.143
8	Metallic Ores	-0.151	0.043
9	Nonmetallic Minerals	0.112	0.277
10	Meat,Dairy & Fruits	-0.070	0.091
11	Seafood Processing	-0.095	0.015
14	Other Food Preparations	-0.102	0.047
17	Fiber Yarn	-0.250	-0.139
18	Textile Fabrics	-0.244	-0.095
19	Fabricated Textile Products	-0.027	0.088
20	Leather & Leather Products	-0.200	-0.051
21	Lumber & Plywood	-0.237	-0.093
22	Wood Products & Furniture	-0.595	-0.325
23	Pulp & Paper	-0.115	0.002
29	Synthetic Resins & Rubber	-0.204	-0.019
33	Rubber Products	-0.145	-0.008
34	Nonmetallic Mineral Products	-0.331	-0.111
36	Primary Iron & Steel Products	-0.426	-0.228
38	Fabricated Metal Products	-0.295	-0.142
41	Industrial Electrical Appliances	-0.217	-0.036
42	Electronic & Communication Equipment	0.007	0.095
43	Shipbuilding	-0.328	-0.142
46	Measuring,Medical & Optical Instruments	-0.063	0.052
47	Miscellaneous Manufacturing	-0.046	0.115

Table A5.3. Social Profitability, Classification 1, 1975.
(ARI= -19%)

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
1	Cereals	0.269	0.404
3	Industrial Crops	0.242	0.354
5	Forestry Products	0.211	0.356
6	Fishery Products	0.141	0.270
7	Coal Mining	0.191	0.286
8	Metallic Ores	0.269	0.381
9	Nonmetallic Minerals	0.304	0.433
10	Meat,Dairy & Fruits	0.218	0.328
11	Seafood Processing	0.120	0.199
14	Other Food Preparations	0.088	0.167
17	Fiber Yarn	0.116	0.195
18	Textile Fabrics	0.128	0.227
19	Fabricated Textile Products	0.125	0.212
20	Leather & Leather Products	0.132	0.238
21	Lumber & Plywood	0.117	0.210
22	Wood Products & Furniture	0.248	0.414
23	Pulp & Paper	0.175	0.256
25	Basic Organic Chemicals	0.145	0.218
26	Basic Inorganic Chemicals	0.113	0.209
27	Chemical Fertilizers	-0.075	-0.003
28	Drugs & Cosmetics	0.125	0.246
29	Synthetic Resins & Rubber	0.124	0.202
30	Other Chemicals	0.068	0.161
31	Petroleum Products	0.127	0.152
33	Rubber Products	0.139	0.220
34	Nonmetallic Mineral Products	0.163	0.301
35	Iron & Steel Manufacturing	0.100	0.166
36	Primary Iron & Steel Products	0.059	0.120
37	Primary Nonferrous Metal Manufacturing	0.113	0.215
38	Fabricated Metal Products	0.161	0.268
39	General Industrial Machinery	0.223	0.329
40	Household Electrical Appliances	0.284	0.346
41	Industrial Electrical Appliances	0.140	0.219
42	Electronic & Communication Equipment	0.166	0.234
43	Shipbuilding	0.252	0.350
44	Motor Vehicles	0.091	0.202
45	Other Transport Equipment	0.248	0.336
46	Measuring,Medical & Optical Instruments	0.126	0.191
47	Miscellaneous Manufacturing	0.199	0.310

Table A5.3. contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
1	Cereals	0.336	0.466
3	Industrial Crops	0.309	0.417
5	Forestry Products	0.281	0.421
6	Fishery Products	0.185	0.310
7	Coal Mining	0.273	0.361
8	Metallic Ores	0.318	0.427
9	Nonmetallic Minerals	0.351	0.476
10	Meat,Dairy & Fruits	0.252	0.359
11	Seafood Processing	0.140	0.218
14	Other Food Preparations	0.102	0.180
17	Fiber Yarn	0.127	0.204
18	Textile Fabrics	0.143	0.240
19	Fabricated Textile Products	0.149	0.233
20	Leather & Leather Products	0.151	0.255
21	Lumber & Plywood	0.131	0.223
22	Wood Products & Furniture	0.270	0.435
23	Pulp & Paper	0.192	0.272
25	Basic Organic Chemicals	0.154	0.226
26	Basic Inorganic Chemicals	0.125	0.220
27	Chemical Fertilizers	-0.063	0.008
28	Drugs & Cosmetics	0.152	0.271
29	Synthetic Resins & Rubber	0.136	0.213
30	Other Chemicals	0.085	0.177
31	Petroleum Products	0.131	0.156
33	Rubber Products	0.160	0.239
34	Nonmetallic Mineral Products	0.184	0.320
35	Iron & Steel Manufacturing	0.106	0.171
36	Primary Iron & Steel Products	0.064	0.124
37	Primary Nonferrous Metal Manufacturing	0.123	0.225
38	Fabricated Metal Products	0.179	0.283
39	General Industrial Machinery	0.242	0.347
40	Household Electrical Appliances	0.294	0.355
41	Industrial Electrical Appliances	0.158	0.236
42	Electronic & Communication Equipment	0.181	0.248
43	Shipbuilding	0.267	0.364
44	Motor Vehicles	0.117	0.226
45	Other Transport Equipment	0.268	0.355
46	Measuring,Medical & Optical Instruments	0.146	0.209
47	Miscellaneous Manufacturing	0.219	0.327

Table A5.3. contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
1	Cereals	0.379	0.506
3	Industrial Crops	0.353	0.457
5	Forestry Products	0.327	0.463
6	Fishery Products	0.213	0.335
7	Coal Mining	0.325	0.410
8	Metallic Ores	0.351	0.457
9	Nonmetallic Minerals	0.381	0.504
10	Meat,Dairy & Fruits	0.274	0.379
11	Seafood Processing	0.153	0.229
14	Other Food Preparations	0.112	0.189
17	Fiber Yarn	0.134	0.211
18	Textile Fabrics	0.152	0.249
19	Fabricated Textile Products	0.163	0.246
20	Leather & Leather Products	0.163	0.265
21	Lumber & Plywood	0.140	0.231
22	Wood Products & Furniture	0.285	0.448
23	Pulp & Paper	0.203	0.282
25	Basic Organic Chemicals	0.159	0.231
26	Basic Inorganic Chemicals	0.132	0.227
27	Chemical Fertilizers	-0.055	0.016
28	Drugs & Cosmetics	0.170	0.287
29	Synthetic Resins & Rubber	0.144	0.220
30	Other Chemicals	0.096	0.187
31	Petroleum Products	0.133	0.158
33	Rubber Products	0.174	0.251
34	Nonmetallic Mineral Products	0.197	0.332
35	Iron & Steel Manufacturing	0.109	0.174
36	Primary Iron & Steel Products	0.067	0.127
37	Primary Nonferrous Metal Manufacturing	0.130	0.231
38	Fabricated Metal Products	0.190	0.293
39	General Industrial Machinery	0.255	0.359
40	Household Electrical Appliances	0.301	0.362
41	Industrial Electrical Appliances	0.170	0.247
42	Electronic & Communication Equipment	0.191	0.258
43	Shipbuilding	0.277	0.373
44	Motor Vehicles	0.134	0.241
45	Other Transport Equipment	0.281	0.367
46	Measuring,Medical & Optical Instruments	0.159	0.221
47	Miscellaneous Manufacturing	0.231	0.339

Table A5.3. contd.

		(.)=0.67 ARP=0.6	(.)=0.67 ARP=0.4
1	Cereals	0.414	0.538
3	Industrial Crops	0.389	0.490
5	Forestry Products	0.364	0.498
6	Fishery Products	0.236	0.356
7	Coal Mining	0.368	0.449
8	Metallic Ores	0.377	0.481
9	Nonmetallic Minerals	0.406	0.527
10	Meat,Dairy & Fruits	0.291	0.396
11	Seafood Processing	0.163	0.239
14	Other Food Preparations	0.120	0.196
17	Fiber Yarn	0.139	0.216
18	Textile Fabrics	0.160	0.256
19	Fabricated Textile Products	0.176	0.257
20	Leather & Leather Products	0.172	0.274
21	Lumber & Plywood	0.148	0.237
22	Wood Products & Furniture	0.297	0.459
23	Pulp & Paper	0.212	0.290
25	Basic Organic Chemicals	0.163	0.235
26	Basic Inorganic Chemicals	0.138	0.232
27	Chemical Fertilizers	-0.049	0.021
28	Drugs & Cosmetics	0.184	0.300
29	Synthetic Resins & Rubber	0.150	0.226
30	Other Chemicals	0.104	0.195
31	Petroleum Products	0.135	0.160
33	Rubber Products	0.185	0.261
34	Nonmetallic Mineral Products	0.208	0.342
35	Iron & Steel Manufacturing	0.112	0.177
36	Primary Iron & Steel Products	0.070	0.130
37	Primary Nonferrous Metal Manufacturing	0.136	0.237
38	Fabricated Metal Products	0.199	0.302
39	General Industrial Machinery	0.266	0.369
40	Household Electrical Appliances	0.307	0.367
41	Industrial Electrical Appliances	0.179	0.256
42	Electronic & Communication Equipment	0.200	0.265
43	Shipbuilding	0.285	0.381
44	Motor Vehicles	0.147	0.253
45	Other Transport Equipment	0.292	0.377
46	Measuring,Medical & Optical Instruments	0.169	0.231
47	Miscellaneous Manufacturing	0.242	0.348

Table A5.4. Social Profitability, Classification 2, 1975.
(ARI= -19%)

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
3	Industrial Crops	0.263	0.396
5	Forestry Products	0.227	0.385
6	Fishery Products	0.186	0.328
7	Coal Mining	0.227	0.340
8	Metallic Ores	0.206	0.358
9	Nonmetallic Minerals	0.329	0.471
10	Meat,Dairy & Fruits	0.248	0.375
11	Seafood Processing	0.124	0.205
14	Other Food Preparations	0.165	0.286
17	Fiber Yarn	0.108	0.179
18	Textile Fabrics	0.140	0.244
19	Fabricated Textile Products	0.136	0.228
20	Leather & Leather Products	0.130	0.236
21	Lumber & Plywood	0.119	0.213
22	Wood Products & Furniture	0.223	0.383
23	Pulp & Paper	0.183	0.268
29	Synthetic Resins & Rubber	0.229	0.358
33	Rubber Products	0.165	0.262
34	Nonmetallic Mineral Products	0.188	0.332
36	Primary Iron & Steel Products	0.139	0.269
38	Fabricated Metal Products	0.144	0.251
41	Industrial Electrical Appliances	0.195	0.327
42	Electronic & Communication Equipment	0.192	0.260
43	Shipbuilding	0.193	0.323
46	Measuring,Medical & Optical Instruments	0.162	0.246
47	Miscellaneous Manufacturing	0.219	0.342

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
3	Industrial Crops	0.332	0.456
5	Forestry Products	0.297	0.446
6	Fishery Products	0.231	0.367
7	Coal Mining	0.308	0.412
8	Metallic Ores	0.264	0.409
9	Nonmetallic Minerals	0.376	0.513
10	Meat,Dairy & Fruits	0.287	0.410
11	Seafood Processing	0.143	0.222
14	Other Food Preparations	0.197	0.314
17	Fiber Yarn	0.118	0.187
18	Textile Fabrics	0.154	0.256
19	Fabricated Textile Products	0.160	0.248
20	Leather & Leather Products	0.147	0.251
21	Lumber & Plywood	0.133	0.225
22	Wood Products & Furniture	0.243	0.400
23	Pulp & Paper	0.200	0.283
29	Synthetic Resins & Rubber	0.246	0.372
33	Rubber Products	0.187	0.281
34	Nonmetallic Mineral Products	0.209	0.350
36	Primary Iron & Steel Products	0.149	0.277
38	Fabricated Metal Products	0.161	0.266
41	Industrial Electrical Appliances	0.218	0.347
42	Electronic & Communication Equipment	0.206	0.273
43	Shipbuilding	0.213	0.340
46	Measuring,Medical & Optical Instruments	0.183	0.264
47	Miscellaneous Manufacturing	0.240	0.359

Table A5.4. contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
3	Industrial Crops	0.375	0.495
5	Forestry Products	0.341	0.486
6	Fishery Products	0.259	0.391
7	Coal Mining	0.360	0.458
8	Metallic Ores	0.301	0.442
9	Nonmetallic Minerals	0.407	0.540
10	Meat,Dairy & Fruits	0.312	0.432
11	Seafood Processing	0.155	0.232
14	Other Food Preparations	0.217	0.332
17	Fiber Yarn	0.124	0.193
18	Textile Fabrics	0.164	0.265
19	Fabricated Textile Products	0.174	0.261
20	Leather & Leather Products	0.158	0.260
21	Lumber & Plywood	0.141	0.232
22	Wood Products & Furniture	0.256	0.411
23	Pulp & Paper	0.210	0.292
29	Synthetic Resins & Rubber	0.257	0.382
33	Rubber Products	0.201	0.294
34	Nonmetallic Mineral Products	0.222	0.361
36	Primary Iron & Steel Products	0.155	0.283
38	Fabricated Metal Products	0.172	0.275
41	Industrial Electrical Appliances	0.233	0.360
42	Electronic & Communication Equipment	0.216	0.281
43	Shipbuilding	0.225	0.351
46	Measuring,Medical & Optical Instruments	0.196	0.275
47	Miscellaneous Manufacturing	0.253	0.370

		(.)=0.67 ARP=0.6	(.)=0.67 ARP=0.4
3	Industrial Crops	0.410	0.526
5	Forestry Products	0.377	0.517
6	Fishery Products	0.282	0.411
7	Coal Mining	0.401	0.494
8	Metallic Ores	0.331	0.468
9	Nonmetallic Minerals	0.431	0.562
10	Meat,Dairy & Fruits	0.332	0.450
11	Seafood Processing	0.165	0.241
14	Other Food Preparations	0.233	0.346
17	Fiber Yarn	0.129	0.197
18	Textile Fabrics	0.171	0.271
19	Fabricated Textile Products	0.186	0.271
20	Leather & Leather Products	0.167	0.268
21	Lumber & Plywood	0.148	0.238
22	Wood Products & Furniture	0.266	0.420
23	Pulp & Paper	0.219	0.300
29	Synthetic Resins & Rubber	0.266	0.390
33	Rubber Products	0.213	0.304
34	Nonmetallic Mineral Products	0.232	0.370
36	Primary Iron & Steel Products	0.161	0.287
38	Fabricated Metal Products	0.181	0.283
41	Industrial Electrical Appliances	0.245	0.370
42	Electronic & Communication Equipment	0.223	0.288
43	Shipbuilding	0.235	0.360
46	Measuring,Medical & Optical Instruments	0.206	0.284
47	Miscellaneous Manufacturing	0.263	0.379

Table A5.5. Social Profitability, Classification 1, 1983.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
1	Cereals	0.082	0.130
3	Industrial Crops	0.033	0.054
5	Forestry Products	0.068	0.121
6	Fishery Products	0.101	0.135
7	Coal Mining	0.043	0.077
8	Metallic Ores	0.035	0.063
9	Nonmetallic Minerals	0.102	0.143
10	Meat,Dairy & Fruits	-0.013	0.007
11	Seafood Processing	0.072	0.086
14	Sugar	0.166	0.176
19	Fiber Yarn	0.054	0.064
20	Textile Fabrics	0.035	0.036
21	Fabricated Textile Products	0.082	0.096
22	Leather & Leather Products	0.078	0.083
23	Lumber & Wood Products	0.084	0.087
24	Pulp & Paper	0.020	0.026
26	Basic Chemicals	-0.064	-0.053
27	Chemical Fertilizers	0.158	0.157
28	Drugs & Cosmetics	0.071	0.101
29	Synthetic Resins & Rubber	-0.089	-0.071
31	Other Chemicals	-0.056	-0.036
32	Petroleum Products	0.075	0.082
34	Rubber Products	0.113	0.116
35	Nonmetallic Mineral Products	0.050	0.058
36	Iron & Steel Manufacturing	-0.041	-0.030
37	Primary Iron & Steel Products	-0.004	0.006
38	Primary Nonferrous Metal Manufacturing	-0.110	-0.103
39	Fabricated Metal Products	0.065	0.073
40	General Industrial Machinery	0.006	0.015
41	Household Electrical Appliances	0.233	0.246
42	Industrial Electrical Appliances	0.024	0.041
43	Household Electronic Appliances	0.227	0.246
44	Electronic Appliances	0.028	0.041
45	Semi-conductors & Integrated Circuits	0.026	0.044
46	Other Electronic Components	-0.060	-0.041
47	Communication Equipment	0.117	0.139
48	Shipbuilding	0.049	0.061
49	Motor Vehicles	0.196	0.207
50	Motor Vehicle Parts	-0.124	-0.107
51	Other Transport Equipment	0.035	0.034
52	Measuring,Medical & Optical Instruments	0.011	0.028
53	Miscellaneous Manufacturing	0.149	0.183

Table A5.5. contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
1	Cereals	0.177	0.226
3	Industrial Crops	0.133	0.154
5	Forestry Products	0.164	0.217
6	Fishery Products	0.163	0.197
7	Coal Mining	0.118	0.152
8	Metallic Ores	0.103	0.130
9	Nonmetallic Minerals	0.193	0.234
10	Meat,Dairy & Fruits	0.047	0.067
11	Seafood Processing	0.103	0.116
14	Sugar	0.185	0.196
19	Fiber Yarn	0.088	0.098
20	Textile Fabrics	0.072	0.074
21	Fabricated Textile Products	0.123	0.136
22	Leather & Leather Products	0.117	0.121
23	Lumber & Wood Products	0.113	0.116
24	Pulp & Paper	0.049	0.056
26	Basic Chemicals	-0.037	-0.026
27	Chemical Fertilizers	0.182	0.181
28	Drugs & Cosmetics	0.115	0.145
29	Synthetic Resins & Rubber	-0.055	-0.037
31	Other Chemicals	-0.020	0.000
32	Petroleum Products	0.081	0.087
34	Rubber Products	0.162	0.165
35	Nonmetallic Mineral Products	0.093	0.101
36	Iron & Steel Manufacturing	-0.024	-0.013
37	Primary Iron & Steel Products	0.018	0.028
38	Primary Nonferrous Metal Manufacturing	-0.080	-0.074
39	Fabricated Metal Products	0.106	0.114
40	General Industrial Machinery	0.047	0.056
41	Household Electrical Appliances	0.260	0.273
42	Industrial Electrical Appliances	0.060	0.077
43	Household Electronic Appliances	0.253	0.271
44	Electronic Appliances	0.053	0.066
45	Semi-conductors & Integrated Circuits	0.058	0.076
46	Other Electronic Components	-0.023	-0.004
47	Communication Equipment	0.156	0.178
48	Shipbuilding	0.095	0.107
49	Motor Vehicles	0.221	0.232
50	Motor Vehicle Parts	-0.079	-0.061
51	Other Transport Equipment	0.067	0.066
52	Measuring,Medical & Optical Instruments	0.054	0.072
53	Miscellaneous Manufacturing	0.190	0.223

Table A5.5. contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
1	Cereals	0.237	0.286
3	Industrial Crops	0.196	0.218
5	Forestry Products	0.224	0.278
6	Fishery Products	0.202	0.236
7	Coal Mining	0.166	0.200
8	Metallic Ores	0.146	0.173
9	Nonmetallic Minerals	0.250	0.291
10	Meat,Dairy & Fruits	0.084	0.105
11	Seafood Processing	0.122	0.135
14	Sugar	0.198	0.208
19	Fiber Yarn	0.109	0.119
20	Textile Fabrics	0.096	0.097
21	Fabricated Textile Products	0.148	0.162
22	Leather & Leather Products	0.141	0.145
23	Lumber & Wood Products	0.131	0.135
24	Pulp & Paper	0.068	0.075
26	Basic Chemicals	-0.021	-0.010
27	Chemical Fertilizers	0.197	0.196
28	Drugs & Cosmetics	0.142	0.172
29	Synthetic Resins & Rubber	-0.034	-0.016
31	Other Chemicals	0.003	0.023
32	Petroleum Products	0.084	0.091
34	Rubber Products	0.193	0.196
35	Nonmetallic Mineral Products	0.120	0.128
36	Iron & Steel Manufacturing	-0.013	-0.002
37	Primary Iron & Steel Products	0.032	0.041
38	Primary Nonferrous Metal Manufacturing	-0.062	-0.055
39	Fabricated Metal Products	0.131	0.139
40	General Industrial Machinery	0.073	0.082
41	Household Electrical Appliances	0.277	0.290
42	Industrial Electrical Appliances	0.083	0.100
43	Household Electronic Appliances	0.269	0.287
44	Electronic Appliances	0.069	0.082
45	Semi-conductors & Integrated Circuits	0.078	0.096
46	Other Electronic Components	-0.000	0.019
47	Communication Equipment	0.181	0.203
48	Shipbuilding	0.124	0.137
49	Motor Vehicles	0.236	0.247
50	Motor Vehicle Parts	-0.050	-0.033
51	Other Transport Equipment	0.087	0.086
52	Measuring,Medical & Optical Instruments	0.081	0.099
53	Miscellaneous Manufacturing	0.215	0.248

Table A5.6. Social Profitability, Classification 2, 1983.

		(.)=1 ARP=0.6	(.)=1 ARP=0.4
3	Industrial Crops	0.020	0.048
5	Forestry Products	0.058	0.116
6	Fishery Products	0.090	0.128
7	Coal Mining	0.027	0.066
8	Metallic Ores	0.014	0.048
9	Nonmetallic Minerals	0.088	0.135
10	Meat,Dairy & Fruits	-0.021	0.010
11	Seafood Processing	0.066	0.082
14	Sugar	0.161	0.176
19	Fiber Yarn	0.025	0.042
20	Textile Fabrics	0.025	0.029
21	Fabricated Textile Products	0.071	0.087
22	Leather & Leather Products	0.063	0.071
23	Lumber & Wood Products	0.070	0.076
24	Pulp & Paper	0.005	0.015
27	Chemical Fertilizers	0.115	0.121
29	Synthetic Resins & Rubber	0.066	0.091
32	Petroleum Products	0.074	0.081
34	Rubber Products	0.081	0.088
35	Nonmetallic Mineral Products	0.036	0.048
37	Primary Iron & Steel Products	-0.051	-0.029
39	Fabricated Metal Products	0.043	0.055
41	Household Electrical Appliances	0.187	0.201
42	Industrial Electrical Appliances	0.039	0.061
43	Household Electronic Appliances	0.143	0.161
44	Electronic Appliances	0.044	0.059
45	Semi-conductors & Integrated Circuits	0.050	0.070
46	Other Electronic Components	0.045	0.067
47	Communication Equipment	0.094	0.119
48	Shipbuilding	0.032	0.050
49	Motor Vehicles	0.137	0.159
52	Measuring,Medical & Optical Instruments	0.076	0.101
53	Miscellaneous Manufacturing	0.116	0.154

Table A5.6. contd.

		(.)=0.85 ARP=0.6	(.)=0.85 ARP=0.4
3	Industrial Crops	0.136	0.163
5	Forestry Products	0.166	0.224
6	Fishery Products	0.163	0.201
7	Coal Mining	0.117	0.155
8	Metallic Ores	0.099	0.132
9	Nonmetallic Minerals	0.194	0.239
10	Meat,Dairy & Fruits	0.064	0.094
11	Seafood Processing	0.102	0.118
14	Sugar	0.191	0.205
19	Fiber Yarn	0.077	0.093
20	Textile Fabrics	0.071	0.075
21	Fabricated Textile Products	0.118	0.134
22	Leather & Leather Products	0.110	0.117
23	Lumber & Wood Products	0.107	0.113
24	Pulp & Paper	0.043	0.053
27	Chemical Fertilizers	0.160	0.167
29	Synthetic Resins & Rubber	0.113	0.138
32	Petroleum Products	0.080	0.087
34	Rubber Products	0.142	0.148
35	Nonmetallic Mineral Products	0.090	0.101
37	Primary Iron & Steel Products	-0.004	0.018
39	Fabricated Metal Products	0.097	0.109
41	Household Electrical Appliances	0.222	0.236
42	Industrial Electrical Appliances	0.092	0.114
43	Household Electronic Appliances	0.171	0.189
44	Electronic Appliances	0.073	0.088
45	Semi-conductors & Integrated Circuits	0.088	0.108
46	Other Electronic Components	0.089	0.111
47	Communication Equipment	0.140	0.165
48	Shipbuilding	0.095	0.113
49	Motor Vehicles	0.195	0.217
52	Measuring,Medical & Optical Instruments	0.127	0.150
53	Miscellaneous Manufacturing	0.168	0.205

Table A5.6. contd.

		(.)=0.75 ARP=0.6	(.)=0.75 ARP=0.4
3	Industrial Crops	0.207	0.233
5	Forestry Products	0.232	0.289
6	Fishery Products	0.208	0.245
7	Coal Mining	0.171	0.209
8	Metallic Ores	0.150	0.183
9	Nonmetallic Minerals	0.258	0.303
10	Meat,Dairy & Fruits	0.115	0.145
11	Seafood Processing	0.125	0.140
14	Sugar	0.209	0.223
19	Fiber Yarn	0.108	0.124
20	Textile Fabrics	0.099	0.103
21	Fabricated Textile Products	0.147	0.162
22	Leather & Leather Products	0.138	0.145
23	Lumber & Wood Products	0.130	0.135
24	Pulp & Paper	0.067	0.076
27	Chemical Fertilizers	0.188	0.194
29	Synthetic Resins & Rubber	0.142	0.166
32	Petroleum Products	0.084	0.092
34	Rubber Products	0.179	0.185
35	Nonmetallic Mineral Products	0.122	0.133
37	Primary Iron & Steel Products	0.024	0.046
39	Fabricated Metal Products	0.131	0.142
41	Household Electrical Appliances	0.243	0.257
42	Industrial Electrical Appliances	0.124	0.146
43	Household Electronic Appliances	0.188	0.206
44	Electronic Appliances	0.091	0.105
45	Semi-conductors & Integrated Circuits	0.111	0.131
46	Other Electronic Components	0.116	0.137
47	Communication Equipment	0.168	0.192
48	Shipbuilding	0.134	0.151
49	Motor Vehicles	0.230	0.251
52	Measuring,Medical & Optical Instruments	0.157	0.180
53	Miscellaneous Manufacturing	0.199	0.236