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COMPETITION EFFECTS OF IMPORT DISCIPLINE IN KOREA

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Competition Effects of Import Discipline in Korea

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Competition Effects of Import Discipline in Korea

Abstract

Whether an increase in foreign competition, in an imperfectly competitive market structure, really provides an additional avenue of enforcement of more competitive market behaviour and increases the efficiency of resource allocation provides an important policy implication for competition policy.

This paper, using the two-stage least-square method based on 77 KSIC 4-digit level of Korean manufacturing data, provides evidence that the import discipline hypothesis is applicable in a small open developing economy. In particular, the constraint by foreign competition on domestic firms' monopoly power will be greater, the greater the liberalisation of trade in the Korean manufacturing. Meanwhile, the paper also investigates economic factors that affected industry concentration.

These results imply that an increase of foreign competition is essential to implement competition policy, particularly in a highly concentrated industry. The other implication for public policy is that financial subsidies for selected industries and firms as a development policy accelerate concentration of market structure and, coupled with protection, distort efficiency in resource allocation.

I. Introduction

Traditional international trade theory, with an assumption of perfect competition, predicts that trade liberalisation will bring various benefits such as static allocative and dynamic efficiencies. In reality, however, imperfectly competitive market structure is prevalent (Lee et al. 1990, Caves et al. 1987, Caves et al. 1976). Economists studying industrial organisation, however, have also ignored the potential of the influence of foreign trade on domestic market power. Although the threat of potential entry has been recognised as an important constraint on established firms' monopoly power, foreign competitors have rarely been considered explicitly in analysis (Domowitz et al. 1986, Clarke 1984, Demsetz 1973).

This article examined the links between international trade and domestic industrial organisation to see how imports affected domestic firm's market power in an imperfectly competitive market. The effects of foreign competition on constraining domestic market firms' market power are still controversial. Import intensity did not significantly affect profitability in Japan(Tanaka et al. 1985) and Taiwan(Chou 1988), whereas it showed negative relationship with the price-cost margin in EU(Neumann et al. 1979, Jacquemin et al. 1980) and the USA(Esposito et al. 1971, Pugel 1980).

The main objectives of this article are two. First, it tries to investigate, using the two-stage least-square method, whether the hypothesis of import discipline is applicable to the case of developing economy, Korean manufacturing. Korean manufacturing was chosen because it provides an interesting case, namely, an oligopolistic industry structure with trade liberalisation. In particular, in contrast with other researches, comparative static analysis was carried out for the highly protected 1970s and the liberalised 1980s. Second, it attempts to estimate the economic factors behind industry concentration, emphasising government intervention in the financial market which has been ignored in other researches, for 77 KSIC 4-digit level industries.

Section II below describes the import discipline hypothesis and model specification. Section III describes data for the estimation and section IV explains statistical results and analysis. Section V contains summary and conclusion.

II. The Import Discipline Hypothesis and Model Specification

In general, in an imperfectly competitive market imports will reduce the price-cost margin and decrease domestic market concentration. Greater competition from foreign producers, including the threat of imports, is believed to restrain the market power of domestic firms in the domestic market; this is known as the import discipline hypothesis.

The negative relationship between imports and profitability is not always guaranteed, since firms' behaviour in an imperfectly competitive industry is influenced by many factors. Assume a static, non-cooperative, oligopolistic firm in the domestic market. Also assume that imports and domestic goods are perfectly substitutable and that imports constitute additional competition for domestic firms and import volumes are exogenous. Domestic producer i 's profit function can be written as:

$$\pi_i = q_i \cdot f(Q + M) - c_i(q_i) - S_i \quad (1)$$

where q_i is firm i 's output; Q is total output of domestic firms; M is imports; $f(Q+M) = P$ is the inverse domestic demand function; c is variable costs; and S is fixed(sunk) costs. Some manipulation and aggregation of domestic producer i 's profit maximisation condition gives us domestic Lerner index for the industry(L):

$$L = \frac{PQ - \sum_{i=1}^n q_i c_i}{PQ} = \frac{H}{\varepsilon} \left(\frac{Q}{Q+M} \right) \quad (2)$$

where $H (= \sum_i (\frac{q_i}{Q})^2)$ is the Herfindahl index of industry concentration; ε is absolute value of price elasticity of industry domestic demand ($Q+M$).

Equation (2) seems to show the negative relationship between imports and price-cost margin. However, the relationship between imports and price-cost margin is not so simple. This is because the level of imports affects market concentration, the price elasticity of demand and the market share of imports in domestic sales at the same time.

$$\frac{\partial L}{\partial M} = \frac{\partial H}{\partial M} \cdot \frac{\eta_Q}{\varepsilon} - \frac{H}{\varepsilon^2} \cdot \eta_Q \cdot \frac{\partial \varepsilon}{\partial M} - \frac{H}{\varepsilon} \cdot \frac{\partial(1 - \eta_Q)}{\partial M} \quad (3)$$

$$\text{where } \eta_Q = \frac{Q}{Q+M}, (1 - \eta_Q) = \frac{M}{Q+M}.$$

When we specify the model for empirical analysis, therefore, we should consider other variables such as factors related with elasticity of demand. The market concentration equation and price-cost margin equation should also be analysed simultaneously.

$$\text{Profitability equation: } PCM = f(F_i, D_i, ACR) \quad (4)$$

$$\text{Concentration equation: } ACR = f(F_i, D_i, PCM) \quad (5)$$

where PCM is price-cost margin; ACR is market concentration; and the variables F_i and $D_i(D_j)$ represent other variables relating to foreign trade and domestic market structure, respectively. The regression equations are specified as follows.

$$\ln PCM = \beta + \lambda_1 \ln IMI + \lambda_2 \ln EXI + \delta_1 \ln CAOUT + \delta_2 RGR + \delta_3 \ln ACR + v \quad (4)'$$

$$\ln ACR = \alpha + \gamma_1 \ln IMI + \gamma_2 \ln EXI + \theta_1 \ln EOS + \theta_2 \ln IIT + \theta_3 \ln BANK + \theta_4 \ln PCM + v \quad (5)'$$

The profitability variable was measured as the value of sales less the costs of bought-in materials and the wage bill divided by the value of sales. The measurement excludes capital costs and advertising expenses and hence it inflates margins in those industries where capital and advertising intensities are high. However, the measurement is easy to handle data based on the 4-digit level of industry classification and has the advantage of being closely related to the Lerner index.¹

Import intensity(IMI) and export intensity(EXI) are foreign trade factors both in profitability and industry concentration equations. In profitability equation, industry

¹ The accounting rate of return on assets or on equity and Tobin's q (the ratio of a firm's stock market value to its replacement value) are alternative choices. However, the treatment of depreciation means that accounting measures may bear little resemblance to the true return. Accounting standards also do not incorporate the real value of assets such as reputation and brand into the company account, which can bias profitability estimates in cross-section studies and overstate the stability of profits over time. It is difficult to estimate the replacement value of assets for Tobin's q .

growth(RGR) or industry size can be used as a proxy for growth in market demand. Capital intensity(CAOUT) is included to control for normal rate of return, as the price-cost margin includes both normal and excess rates of return.

In industry concentration equation, economies of scale(EOS), product differentiation, estimated by intra-industry trade(IIT) and distortions in capital market, estimated by the ratio of long-term bank loan(Bank) in total fixed liabilities were the variables selected as the domestic market factors.

III. *Data: Protection and Market Imperfection*³

1. Distortions in Foreign Trade

High protection and financial subsidies were important features of Korean industrial policy. Both tariffs and quantitative restrictions (QRs) remained high until the early 1980s. In the 1970s quantitative restrictions were strengthened whereas average legal tariffs generally decreased. The set back in liberalisation was partly due to the government's effort at that time to promote heavy and chemical industries. The heavy and chemical industries policy was designed to cope with decreasing comparative advantage in light industries resulting from wage increases and to strengthen the industrial base of the economy to enhance national security. In addition, import tariffs constituted a major source of government revenues.⁴ The current account balance was also an important factor to be considered when the liberalisation plan was put into action.

Actual liberalisation of both tariffs and QRs has occurred since the early 1980s. The adverse effects of government industry policy intervention were prominent by the end of the 1970s. In particular, the government intervention and protection resulted in distortions in the credit market and in the industrial organisation. In 1983, the government announced a time-phased import liberalisation plan for the 1983-89 period.

³ Definitions of variables and data sources are in Appendix 1.

⁴ The share of total legal tariff revenue in GNP was 3.7 per cent in 1966, 5.7 per cent in 1970 and 4 per cent in 1975.

TABLE 1: IMPORT PROTECTION IN KOREA

Year	Average of legal tariffs ¹	Rate of Import Liberalisation ^{1,2}	NPRs ³			EPRs ⁶		
			Prim. ⁴	Manuf. ⁵	All industry	Prim. ⁴	Manuf. ⁵	All industry
1967	46.3	56.4	16.5	12.2	14.0	-	-	-
1973	39.9	48.4	-	-	-	-	-	-
1975	39.8	45.4	27.9	12.2	16.1	33.6	-4.6	9.5
1978	34.3	56.2	76.3	23.6	34.6	86.1	11.2	33.5
1980	29.6	64.3	70.9	43.5	47.5	80.4	21.9	36.1
1983	29.1	73.5	82.3	42.9	48.4	94.6	19.6	35.8
1985	24.9	83.0	80.3	30.1	36.6	95.9	10.7	26.5
1988	19.2	90.3	90.0	9.2	16.3	123.4	0.1	13.5
1990	13.1	92.0	130.2	21.9	30.7	174.5	5.8	22.9

Notes: 1. Average legal tariffs and rates of liberalisation are average values of Korean Traders Association (various issues) and Kim's (1993) estimation; 2. Automatic approval items divided by total importable items; 3. Nominal protection rates; 4. Primary industry; 5. Manufacturing industry; 6. Effective protection rates (Corden's method).

Sources: Korean Traders Association, Annual Report on Foreign Trade, various issues; Hong 1992; Nam 1993; Kim 1993.

Tariff exemptions for strategic industry were also abolished in order to minimise tariff preferences that tends to promote specific industry under heavy and chemical industry promotion policy.⁵ In addition, the balance of payment became favourable in 1983.

The average rate of legal tariffs for Korea decreased from about 40 per cent in the mid 1970s to about 25 per cent in the mid 1980s (Table 1). Over the same period trade liberalisation ratio, defined by the percentage of commodities which can be imported without prior government license, increased from 45 per cent to 83 per cent. QRs have traditionally been important in Korean protection as export industries have generally been exempted either directly or through a rebate system.

After the successful completion of the 1983 liberalisation plan, a new tariff reform plan was prepared for 1989-93. According to this new plan, the average tariff rate for

⁵ Industries designated as important included iron and steel, non-ferrous metal, shipbuilding, general machinery, chemicals, electronics, and others designated by the president.

manufactures was to be decreased from 16.9 per cent in 1988 to 6.2 per cent in 1993. As of 1996, average tariff rate for manufactures(agricultures) was 6.2 (16.6) per cent and import liberalisation rate was 99.9 (91.8) per cent.

Table 1 also shows estimates of nominal protection rates (NPRs), which are based on price differentials between home and world markets, and effective protection rates (EPRs), which are based on value added differentials between home and world markets. The average NPRs and EPRs for manufacturing failed to show any consistent pattern of change.⁶ The main feature, however, is their dispersion across industries, resulting from QRs (Nam 1993). The estimation of EPRs by Hong(1993) indicated that the dispersion in EPRs became wider in the early 1980s and the early 1990s, suggesting a worsening of the resource allocation effects of the protection structure at those times. In particular, the EPRs has tended to be higher for the agricultural sector, for the machinery and for the transportation equipment industry, sectors in which Korea had a relatively low comparative advantage.

2. Distortions in the Financial Market

Financial subsidies were another important measure in Korean industrial policy. The government intervened selectively, especially in the 1970s, in resource allocation to implement the heavy and chemical industries policy, which began in 1973. In contrast to the 1960s, the financial subsidy policy became more industry specific after the mid 1970s.⁷ In particular, the National Investment Fund (NIF) was established in 1973 to support heavy and chemical industries.⁸ The fund was financed by various sources including banks, insurance companies and the government (through bonds). NIF finances were mainly used to establish industrial areas, buy domestic machinery and facilitate investment and exports.

⁶ If trade incentives take the form of direct or indirect subsidies to a specific activity, the effective subsidy rates is the better measure of incentives for value-adding process. In 1978, the rates for manufacturing and primary product was 15.8 per cent and 14.5 per cent, respectively. In particular, consumer products and intermediate products received high subsidies for export sales (Nam 1993).

⁷ Until the early 1970s financial subsidy policy emphasised export activity rather than specific industries.

⁸ Preferential tax treatment was another important measures to encourage investment in strategic industries (Kwack 1986).

TABLE 2: RATIO OF DEBT TO TOTAL ASSETS AND AVERAGE INTEREST RATES OF
LARGE FIRMS, SMALL AND MEDIUM SIZED FIRMS AND EXPORT INDUSTRY (%)

	1973-81	1982-86	1987-90
<i>Debt/Total Asset</i>			
Manufacturing (x_1)	40.4	31.5	27.7
Large Firms (x_2)	40.9	31.6	27.0
Small and Medium Firms (x_3)	32.7	31.3	31.4
Export industry (x_4)	45.1	35.9	30.3
$x_2 - x_1$	0.5	0.1	-0.7
$x_3 - x_1$	-7.7	-0.2	3.7
$x_4 - x_1$	4.7	4.4	2.6
<i>Average Interest Rate</i>			
Manufacturing (y_1)	13.3	14.0	13.0
Large Firms (y_2)	13.0	14.0	12.6
Small and Medium Firms (y_3)	14.9	14.2	14.3
Export industry (y_4)	12.6	12.7	12.6
$y_2 - y_1$	-0.3	0.0	-0.4
$y_3 - y_1$	1.6	0.2	1.3
$y_4 - y_1$	-0.7	-1.3	-0.4

Source: Adapted from Kim 1992.

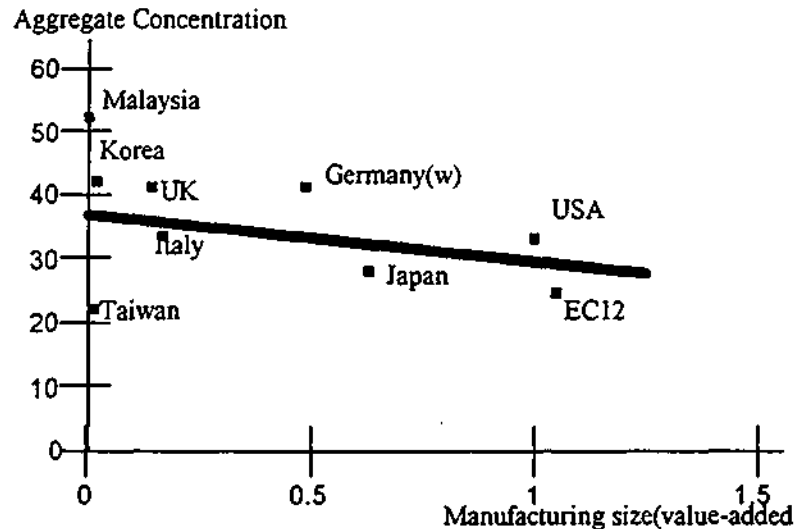
The government also increased its direct control over the banking system to finance investment in the heavy and chemical industries; the line between commercial and specialised banks thus became blurred, as both served as instruments of government credit policy. In addition, the government borrowed from overseas markets and guaranteed the private sector's foreign loans. In Korea, the long-term bank loans and foreign loans were mostly allocated by government policy.

In 1973-81, the large firms' and export industry's loan availabilities, measured by the ratio of debt to total assets, were higher than that for total manufacturing (Table 2). In addition, in the period 1973 to 1981, the average interest rate for large firms and export industry were lower than that for total manufacturing. These favourable interest rates for large firms and export industries continued in the 1980s, whereas favourable loan availabilities for large firms disappeared in the 1980s.

3. Distortions in Industrial Organisation

While protection and subsidy policies were implemented, until recently the government failed in its attempts to enact law related to industrial organisation policy.

FIGURE 1: AGGREGATE MANUFACTURING CONCENTRATION BY 100 LARGEST FIRMS AND SIZE OF MANUFACTURING INDUSTRY



Notes: 1. Value of intercept and slope is 39.3 and -10.52 respectively; 2. Horizontal figure denotes the relative size of each country compared to the USA (based on constant value); 3. EC 12 includes Belgium-Luxembourg, Denmark, France, Germany(W), Greece, Ireland, Italy, Netherlands, Portugal, UK.

Data sources: Min 1995.

The overall level of concentration seems to be higher in Korea than in Japan, although the difference in economy size makes direct comparison difficult.⁹ Figure 1 shows the relation between the aggregate manufacturing concentration ratio of the 100 largest firms and size of manufacturing industry for selected countries. The figure suggests that the larger the size of manufacturing industry, the lower is aggregate concentration.

The aggregate concentration is higher than the slope, indicating that the aggregate concentration in Korea is high by international standards. The comparison with Taiwan and Italy (other small open economies similar in size to Korea) also suggests that the aggregate concentration in Korea is fairly high by international standards

⁹ Overall concentration refers to the proportion of output or sales accounted for by a small number of dominant firms in the manufacturing sector as a whole.

Although Korean manufacturing is small compared to US manufacturing, it is more concentrated.¹⁰ In particular, the ratio of highly concentrated industries, defined as $60 \leq CR \leq 100$, is much higher in Korea than in the USA (Table 3). The ratio in Korean manufacturing increased from 51.7 per cent in 1977 to 54.3 per cent in 1981 whereas the ratio in the USA decreased from 21.4 per cent in 1963 to 19.8 per cent in 1982.

TABLE 3: DISTRIBUTION OF VALUE OF SHIPMENTS IN KOREA AND USA BY MANUFACTURING CONCENTRATION RATIO

Concentration Ratio	Korea		USA ¹	
	1977	1981	1963	1982
$80 \leq CR \leq 100$	33.0	28.1	12.2	4.9
$60 \leq CR < 80$	18.7	26.2	9.2	14.9
<i>Subtotal</i>	<i>51.7</i>	<i>54.3</i>	<i>21.4</i>	<i>19.8</i>
$40 \leq CR < 60$	22.5	21.8	19.5	19.7
$20 \leq CR < 40$	21.1	19.3	39.3	38.8
$0 \leq CR < 20$	4.7	4.6	19.8	21.7
Total	100	100	100	100

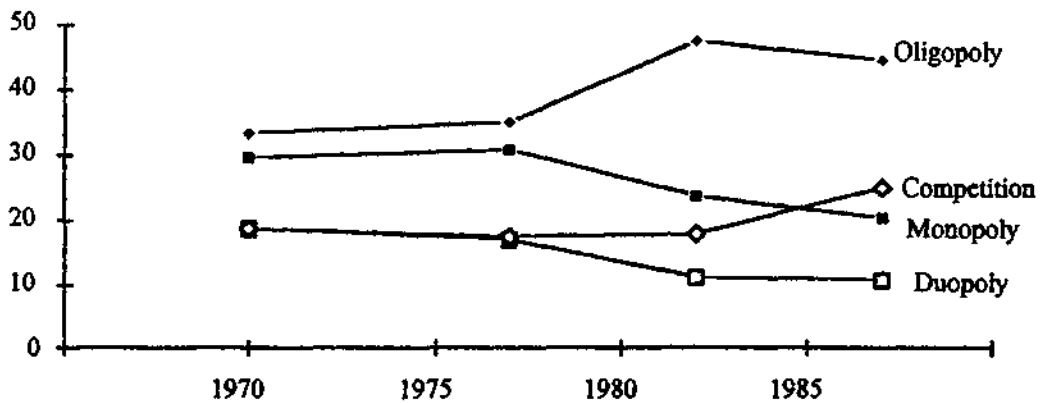
- Notes:*
1. Based on Value-added
 2. CR3 for Korea, CR4 for the USA in five-digit level.
 3. Korean manufacturing consisted of 400 sectors in 1977 and 512 sectors in 1984; US manufacturing consists of 417 sectors.

Sources: Recited from Min 1995.

Figure 2 shows the trends of monopoly, duopoly, oligopoly and perfect competition in the commodity market in Korea in 1970-87. It indicates that an oligopolistic market structure has been the distinguishing characteristic of Korean manufacturing.

¹⁰ The industry concentration ratio refers to concentration within an industry, and is defined as the proportion of total industry output produced by the industry's largest three or four firms.

FIGURE 2: COMMODITY MARKET CONCENTRATION IN KOREA, 1970-85 (%)



Notes: Based on the 7-digit KSIC manufactured commodity classifications.

monopoly is defined as $CR1 > 80\%$, and $S1/S2 > 10.0$; duopoly is $CR2 > 80\%$, and $S3 < 5.0$; oligopoly is $CR3 > 60\%$ (excluding monopoly and duopoly); and competition is $CR3 < 60\%$. CRi and Si represent the i -firm shipment concentration rate and the market share of the i th firm, respectively.

Data Sources: Lee et al. 1990; EPB and KDI 1991.

From 1970 to 1982, the share of oligopolies increased from 35.1 per cent to 48.6 per cent (in terms of value of shipments). The figure also indicates that the competitive market ratio increased continuously from 1977 to 1987 and the monopolistic competition market, defined as the monopoly market plus the duopoly market, generally declined.

IV. Statistical Results and Analysis

1. Determinant of the level of Profitability

Effects of imports

The estimation results for profitability shown in Table 4 indicate that the hypothesis of import discipline is confirmed for Korean manufacturing. Interestingly, the statistical significance of the variable increased greatly between 1974 and 1986.¹⁰

There are three important reasons for this change. First, a reduction of trade restrictions and hence increased competition occurred during the period. An increased

¹⁰ Based on Chow test, the statistical estimation results for 1974 and 1986 were described separately (See Appendix 1).

imports associated with trade liberalisation implemented in the 1980s constrained market power of domestic firms. Second, a large number of import quota restrictions in the 1970s diluted the effects of import discipline. This result suggests that care should be taken in applying the import discipline hypothesis in cases where a country has a large number of import quota restrictions. Third, the government controlled prices directly in 1974. After the first oil shock, the government controlled prices on a large number of commodities in monopolistic and oligopolistic markets. The Korean government enacted the Price Stabilisation and Fair Trade Act in 1974 for the purpose of eliminating the harmful effects of high industrial concentration. However, the government started to emphasise the free market mechanism in 1981, when it enacted the Act Concerning Monopoly Regulation and Fair Trade. Direct control over prices suppressed price increases and the generation of monopoly profits.

The effects of trade on profitability in Korea are consistent with the case of US (Esposito and Esposito 1971; Pugel 1978; Pugel 1980) but are different from the case of Japan. According to Odagiri (1994), the profit rate in Japanese manufacturing is not affected by import competition but is lower in heavily exporting industries. Odagiri explained that the insignificant effect of imports is due to intense competition among domestic firms, whereas the negative effect of exports is a result of lower profitability in overseas markets than domestic markets.¹² Tanaka et al.'s (1985) estimation results also failed to show the import discipline hypothesis in Japan, a result they attributed either to problems with the data or Japan's import restriction policy.

In Taiwan, import competition did not influence profits in Taiwanese manufacturing. Chou (1988) explained the insignificance of import penetration in the domestic sector as being due to the country's policy of import control.

¹² As Odagiri admitted correctly, the effects of trade on profitability are not clear. For example, the lower capacity utilisation between 1982 and 1983 may have prompted firms to undertake an aggressive export drive.

TABLE 4: DETERMINANTS OF INDUSTRY PROFITABILITY, 1986 AND 1974

	constant	<i>ln</i> ACR	<i>ln</i> IMI	<i>ln</i> EXI	<i>ln</i> CAOUT	RGR
OLS(1986)						
	-1.23 (-10.13) ^a	0.022 (0.38)	-0.062 (-3.00) ^a	0.011 (0.57)	0.230 (2.79) ^a	0.0009 (0.86)
	n=77	$R^2=0.17$	$F=272.22$			
2SLS(1986)						
	-1.20 (-8.79) ^a	0.008 (1.02)	-0.057 (-2.49) ^b	0.014 (0.69)	0.203 (2.47) ^a	0.0009 (0.83)
	n=77	$R^2=0.14$				
OLS(1974)						
	-1.42 (-8.85) ^a	0.029 (0.35)	-0.044 (-1.72) ^c	0.056 (2.09) ^b	-0.061 (-1.44)	0.00005 (0.17)
	n=77	$R^2=0.12$	$F=146.54$			
2SLS(1974)						
	-1.39 (-5.15) ^a	0.052 (0.29)	-0.041 (-1.36)	0.058 (2.01) ^b	-0.060 (-1.41)	0.00005 (0.16)
	n=77	$R^2=0.11$				

Notes: Figures in parentheses are *t* values.

a: Significant at the 99 per cent level by two-tail *t* test.

b: Significant at the 95 per cent level by two-tail *t* test.

c: Significant at the 90 per cent level by two-tail *t* test.

Effects of Export

All signs for the export intensity variable were positive, both in 1986 and 1974. However, this variable was significant (at the 5 per cent level) only in 1974. This seems odd since there is a strong presumption that Korean exporting was based on dumping in the world market in the 1970s. Economic theory suggests that if domestic firms have difficulty in colluding effectively in the world market, exporting may negatively affect the observed average price-cost margin.

In actuality, however, many Korean exporters were supported by government policies including subsidies in the 1960s and 1970s. Subsidies effectively reduce costs and hence increase price-cost margins. The results indicate that the effect of subsidies, rather than oligopolistic exploitation by Korean firms of foreign markets, may have compensated for losses from dumping in the 1970s.

Tanaka et al. (1985) found export intensity was significant and positive, with exports seeming to enhance Japanese firms' efficiency and profitability.

(2) Effects of Market Structure

The coefficient of concentration ratio had a positive sign but was not significant. The results thus seemed to imply that the structuralist argument is not directly applicable to Korean manufacturing. Similar results were obtained by Jacquemin et al. (1980) in another small, open economy for Belgian manufacturing. However, Tanaka et al. (1985) found that concentration was an important determinant of industry profitability in Japanese manufacturing.

In fact, the relationship between market structure and performance is complex and controversial. According to the traditional structure-conduct-performance approach, profits are mainly influenced by the structure of a particular market (Mason 1939; Bain 1951). The traditional premise is that market structure is exogenously given. However, Demsetz (1973) suggested that the high profits of firms represent the efficiency of firms rather than market power. Transaction cost economists argue that firms may become large and profitable because of organisational economies (Williamson 1975). In addition, modern oligopoly theory using non-cooperative game theory suggests that a collusive outcome may obtain in oligopolistic markets without any direct communication (Tirole 1988).

Research in the USA since the early 1970s has also been controversial. Domowitz et al. (1986) reported that the relationship between market structure and profit has disappeared since 1970s. Many studies in the UK have failed to find a positive relationship between concentration and profitability (Hart et al. 1980; Clarke 1984).

Although domestic concentration is in itself an essential determinant of market power, it is also necessary to consider the interaction of domestic concentration and other elements of market structure, especially international trade. Import competition and the

uncertainty it brings about are likely to modify the reaction of rival firms to oligopolistic decisions; the constraining effect of import competition on market conduct and the performance of domestic producers will be stronger the higher the industrial concentration (Jacquemin et al. 1980). Therefore, the effect of the interactive term $ACR * IMI$ was also examined. The sign of the interactive variable (CRM) is then expected to be negative.

The results (Table 5) imply that market concentration, coupled with protection, can distort allocative efficiency in mid 1980s. Thus it would seem that, while in 1974 only import intensity directly affected domestic firms' profitability, in 1986 both the direct influence of import intensity and the indirect influence of the interactive variable restricted market power.

TABLE 5: PROFITABILITY EQUATION WITH INTERACTIVE VARIABLE BETWEEN IMPORTS AND CONCENTRATION, 1986 AND 1974

	constant	$\ln ACR$	$\ln IMI$	$\ln CRM$	$\ln EXI$	$\ln CAOUT$	RGR
$\ln PCM86$	-1.39 (-8.47) ^a n=77	-0.10 (-0.20) $R^2=0.21$	-0.012 (-3.52) ^a $F=241.5$	-0.063 (-2.31) ^b	0.015 (0.077)	0.189 (2.38) ^b	0.0008 (0.79)
$\ln PCM74$	-1.47 (-8.47) ^a n=77	-0.007 (-0.07) $R^2=0.13$	-0.074 (-1.51) $F=124.8$	-0.032 (-0.72)	0.056 (2.05) ^b	0.146 (3.16) ^a	0.00003 (0.08)

Notes: 1. Figures in parentheses are t values.
2. $\ln CRM$ is interaction variable between concentration (ACR) and import intensity (IMI).
a: Significant at the 99 per cent level by two-tail t test.
b: Significant at the 95 per cent level by two-tail t test.
c: Significant at the 90 per cent level by two-tail t test.

2. Determinants of the level of concentration

(1) International Trade Factors

The results in Table 6 indicate that foreign competition strongly suppressed the level of industry concentration in 1986 and 1974. An increase in import intensity in Korea

tends to decrease domestic market concentration, since imports provide additional competition for domestic firms.¹²

TABLE 6: DETERMINANTS OF INDUSTRY CONCENTRATION, 1986 AND 1974

	constant	<i>ln</i> PCM	<i>ln</i> EOS	<i>ln</i> IMI	<i>ln</i> EXI	<i>ln</i> IT	<i>ln</i> BANK
OLS(1986)							
	-0.05 (-0.15)	-0.023 (-0.14)	0.362 (9.00) ^a	-0.108 (-3.34) ^a	-0.035 (-1.22)	0.140 (3.02) ^a	0.015 (0.16)
	n=77	R ² =0.60	F=74.87				
2SLS(1986)							
	-0.51 (-0.54)	-0.340 (-0.54)	0.364 (8.77) ^a	-0.128 (-2.55) ^b	-0.029 (-0.93)	0.163 (2.53) ^b	0.003 (0.03)
		R ² =0.57					
OLS(1974)							
	-0.33 (-0.91)	0.041 (0.27)	0.119 (2.97) ^a	-0.146 (-4.31) ^a	-0.106 (-2.73) ^a	0.114 (2.31) ^b	0.241 (2.27) ^b
	n=77	R ² =0.32	F=38.18				
2SLS(1974)							
	-0.21 (-0.16)	0.121 (0.13)	0.119 (2.89) ^a	-0.142 (-2.50) ^b	-0.109 (-2.05) ^b	0.111 (1.76) ^b	0.247 (2.05) ^b
		R ² =0.32					

Notes: Figures in parentheses are *t* values.

a: Significant at the 99 per cent level by two-tail *t* test,

b: Significant at the 95 per cent level by two-tail *t* test,

c: Significant at the 90 per cent level by two-tail *t* test.

Export intensity also showed a negative relationship with industry concentration. Thus the export market would seem to have played a role for new entrants or smaller firms in the mid 1970s in providing additional room for domestic firms. In actuality, in the

¹² As a proxy for import competition, the effective protection rate estimated by the Corden method and the freedom from quantitative restrictions were also included. However, the results were not significant, possibly because the data obtained at the 4-digit level were not reliable.

early years of development, Korean exports depended greatly on small and medium sized firms and light industry. The pattern of exporting changed in the 1980s, with heavy and chemical industries dominating. Therefore, considered together with the economies of scale variable, the impact of overseas markets in providing room for a greater number of enterprises seems to have been diluted by increased economies of scale among larger firms in the mid 1980s.¹⁴

Chou (1988) analysed the effects of international competition on profitability in Taiwan. In the concentration equation, import intensity was significant and positive only for the export-oriented sector. Chou presumed that this meant that imports used as inputs in exported goods were more concentrated, particularly among the largest firms. The policy of protection from imports accounted for the lack of significance of the variable for the domestic sector.

(2) Effects of Government Intervention

Another important barrier to entry, particularly for firms in developing countries, is government intervention in the financial market. Most research on market concentration has focused on developed countries, and so government intervention in developing countries has largely been ignored. If the market mechanism is severely distorted by government policy, this exogenous variable could influence domestic market concentration, and thus should be included among entry barriers.

In contrast to more traditional factors, government intervention had a marked effect on the level of industry concentration in the early years of development in Korea. The government encouraged large firms to exploit economies of scale. In particular, the government played a pivotal role in allocating scarce capital resources during the period and, in view of the country's immature capital market, low-interest rates for long-term bank loans and foreign loans were regarded as important policy measures (Kim 1992). The results indicate that market concentration in the mid 1970s was positively influenced by government intervention in the financial market. In particular, the favourable flow of funds with lower interest rates for large firms in the 1970s resulted in concentration of

¹⁴ In 1985, the export ratios of light industry and heavy and chemical industries were 36.9 per cent and 54.4 per cent respectively. By contrast, in 1975, these ratios were 57.4 per cent and 25.1 per cent.

industry and an inefficient allocation of resources.¹⁴ The coefficient was not, however, significant in 1986.

Interestingly, the distortion caused by government intervention was most severe in the consumer goods industry (Table 7). During the period of government intervention in the financial market, most capital was directed to the producer goods industry, especially the heavy and chemical industries, in the 1970s. This may have meant that the relative scarcity of capital in the consumer goods industry allows only a few large firms access to the low interest rates of long-term bank loans. In addition to financial policy, the tax system was regarded as another important channel for government intervention (Kwack 1986). However, these variables were excluded from our final results as they were not significant in 1986 or 1974.

TABLE 7: DETERMINANTS OF INDUSTRY CONCENTRATION IN CONSUMER GOODS AND PRODUCER GOODS INDUSTRIES, 1986 AND 1974

	Constant	<i>ln</i> EOS	<i>ln</i> PCM	<i>ln</i> BANKL	<i>ln</i> IIT	<i>ln</i> IMI	<i>ln</i> EXI
<i>Consumer goods</i>							
<i>ln</i> CR86	-0.26 (-0.55)	0.356 (6.55) ^a	-0.015 (-0.07)	-0.077 (-0.63)	0.112 (1.53)	-0.137 (-2.76) ^a	0.007 (0.16)
	n=41	R ² =0.64	F=35.51				
<i>ln</i> CR74	-0.42 (-0.92)	0.099 (1.74) ^c	-0.073 (-0.39)	0.29 (2.23) ^b	0.191 (2.29)	-0.186 (-3.71) ^a	-0.076 (-1.37)
	n=41	R ² =0.44	F=21.81				
<i>Producer goods</i>							
<i>ln</i> CR86	0.15 (0.28)	0.369 (5.69) ^a	-0.251 (-0.86)	0.278 (1.44)	0.143 (2.19) ^b	-0.081 (-1.57)	-0.067 (-1.60)
	n=36	R ² =0.59	F=37.31				
<i>ln</i> CR74	-0.31 (-0.39)	0.130 (2.00) ^c	0.213 (0.56)	0.082 (0.36)	0.077 (1.07)	-0.117 (-1.88) ^c	-0.082 (-1.18)
	n=36	R ² =0.21	F=14.84				

Notes: Figures in parentheses are *t* values.

a: Significant at the 99 per cent level by two-tail *t* test.

b: Significant at the 95 per cent level by two-tail *t* test.

c: Significant at the 90 per cent level by two-tail *t* test.

¹⁴ Caves et al. (1976) also argued that capital market discrimination in 1956-71 in favour of large firms in Japanese manufacturing resulted in concentration of industry. However, they did not provide any econometric evidences.

V. Summary and conclusion

The main finding of the estimation analysis is that, in contrast with the Taiwanese and Japanese economies which have a relatively lower economic concentration than Korea, imports restricted domestic firms' market power in Korea in the mid 1970s and 80s. Interestingly, import intensity significantly constrained the price-cost margin in the mid 1980s as the Korean economy was liberalised from protection.

The results showed that exporting was profitable in the mid 1970s, possibly because of the government's export subsidy policy. The results, however, indicate that the traditional structure-conduct-performance approach is not directly applicable to Korean manufacturing.

In addition, estimation results demonstrate that the barrier to new entry caused by government intervention in the financial sector in the mid 1970s was an important factor in market concentration in Korean manufacturing. The allocation of capital by the government significantly and positively influenced market concentration in the 1970s. However, imports seem to have provided an avenue for enforcing more competitive market behaviour and increasing the allocative efficiency of Korean manufacturing in the mid 1970s and 80s.

An important policy implication from the results is that an increase of foreign competition is essential to implement competition policy in a highly concentrated industry. In addition, financial subsidies for selected industries and firms in a small open economy accelerate concentration of market structure and, coupled with protection, distort efficiency in resource allocation.

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APPENDIX 1: DEFINITIONS OF VARIABLES AND DATA SOURCES

Most of the variables used in the estimation are derived from *Report on Mining and Manufacturing Survey* (Economic Planning Board), with some adjustment for the values of import intensity and export intensity. The basic data for import and export intensities were compiled from *UN Trade System* (IEDB, RSPAS, Australian National University); adjustments were based on the *Input-Output Table* (Bank of Korea) for the 4-digit level of KSIC classifications.

TABLE A.1: DEFINITIONS OF VARIABLES AND DATA SOURCES

Variable	Mean		Definition	Source
	1986	1974		
Tariff ²	0.24(1.33)	0.44(2.06)	Effective protection rate calculated by Corden method	(1)
FQR	0.74(0.24)	0.35(0.26)	Degree of freedom from quantitative restriction	(2)
ACR3	0.43(0.26)	0.45(0.23)	Trade-adjusted three-firm concentration ratio	(3)
PCM	0.27(0.10)	0.28(0.11)	(Value added - Wages)/Value of shipment	(4)
EOSL	0.09(0.11)	0.11(0.15)	Shipments of large plants accounting for 50% of total output, divided by total value of industry shipments	(4)
RGR	38.5(35.5)	152.2(147.7)	Change in value of shipments over three years (%)	(4)
CAOUT	0.37(0.17)	0.59(1.72)	Depreciable assets at end of year divided by output	(4)
BANKL	0.12(0.05)	0.12(0.06)	Long-term bank loans divided by industry's total fixed liabilities	(4)
IIT	0.45(0.30)	0.39(0.34)	Intra-industry trade index: $1 - \frac{ EX - IM }{EX + IM}$	(6)
IMIMS	0.19(0.21)	0.24(0.25)	Imports divided by domestic consumption (Sales + imports - exports)	(6)
EXI	0.25(0.29)	0.22(0.25)	Exports divided by sales	(6)

Notes: 1. Figures in parentheses are standard deviation.
 2. Data sources are: (1) Hong (1992); (2) Kim (1993); (3) KDI database (Korea Development Institute); (4) *Report on Mining and Manufacturing Survey* (Economic Planning Board 1988, 1976); (5) *Financial Statement Analysis* (Bank of Korea 1974, 1989; Korea Development Bank 1974, 1989); and (6) UN World Trade (IEDB, Australian National University) and Input-Output Table (Bank of Korea 1976, 1988)

APPENDIX 2: DIAGNOSTIC TESTS

(1) *Stability*

The Chow test was applied to test the stability (constancy) of the estimated parameters in the price-cost margin and concentration equations between 1974 and 1986. The null hypothesis of no structural change was rejected both for the concentration and for the price-cost margin equations.¹⁶

(2) *Test of Simultaneity of the Equation*

The statistical test employed here is the Hausman test, which compares two estimates of a certain parameter that are consistent and asymptotically normal if the model is correctly specified. The Hausman test, if applied to equations (A.1) and (A.2), is equivalent to estimating the following redefined equations:

$$\ln PCM = \beta + \lambda \cdot \ln D_i + \delta_i \cdot \ln F_i + \phi_1 \cdot \ln ACR + \phi_2 \cdot \ln \hat{ACR} + \nu \quad (\text{A.1})$$

$$\ln ACR = \alpha + \theta_i \cdot \ln D_i + \gamma_i \cdot \ln F_i + \phi_3 \cdot \ln PCM + \phi_4 \cdot \ln \hat{PCM} + u \quad (\text{A.2})$$

where $\ln \hat{PCM}$ and $\ln \hat{ACR}$ are estimated from a set of instrumental variables consisting of all the exogenous variables in the model. The null hypothesis of the simultaneity of the system is ϕ_2 equals zero for equation (A.1) and ϕ_4 equals zero for equation (A.2). The estimation results show that neither variable is statistically significant.¹⁷

¹⁶ Pooled data for 1974 and 1986 are used for the calculation of the residual sum of squares for the restricted equation. The F -value for the price-cost margin equation is 2.68 while the critical value for $F(6, 142)$ is 2.1 and 2.8 at the 5 per cent and 1 per cent level, respectively. The F -value for the concentration equation is 11.59, while the critical value for $F(7, 140)$ is 2.01 and 2.64 at the 5 per cent and 1 per cent level, respectively.

¹⁷ In 1986, the t -ratios for the estimated price-cost margin and concentration were, respectively, -0.54 and 1.10; in 1974, they were 0.09 and 0.14.

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