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Market Structure and International Trade in Japan's Industry

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ABSTRACT

This paper examines the effects of industrial concentration and other control variables on international trade in Japan's manufacturing industry for 1976 -- 1980. The primary findings are: (1) Concentration has a positive and significant impact on both export share and import share; (2) both labor intensity and subcontract ratio have a positive and significant effect on export share; (3) tariff rate has an import-preventing effect, while the relative disadvantage due to the imports of main materials has a positive and significant impact on import share.

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Noriyuki Doi*

Introduction

Increased exports and external public policy in Japan are interesting economists. Their research interest includes factors such as behavior of Japanese firms, Japanese style of management, and the "industrial policy". Also, in recent years, from the view of competition policy, increasing attention is being paid to international competition, since it is crucially important for effective competition in an industry. A combination of domestic structure and international competition should be used to achieve the desired competitive situations.

Then, it is important to examine the effects of those international factors on economic performance. The factors such as exports, imports, tariffs and internal direct investment have been found to have some impact on industry performance in Japan.¹⁾ It is another prominent problem to clarify the determinants of international competition.

This paper is concerned with the latter problem. It is designed to present an industry-specific explanation of international trade in Japan's manufacturing industry for 1976 - 1980, placing special emphasis on the impacts of concentration on international trade. Certainly, we can find many studies about the international competition, but the discussions are in most cases at the macro-economic

level, or of a case study approach. The causes of international competition also can be approached in the framework of the theory of industrial organization. However, unfortunately the cross-industry discussion is still scanty, particularly in Japan. The organization of this paper is as follows; first, the relationship between concentration and international trade is discussed; second, research design and methodology for the empirical test are presented; third, the determinants of exports are analyzed; fourth, the inter-industry difference in import intensity is examined; and finally the findings and their implications are summarized, with suggestion for further research.

I Concentration and International Trade

I-1 Exports

The internationalization strategy of Japanese firms has centered on exports, in sharp contrast with the foreign penetration by direct investment of U. S. firms. Then, we will examine the relationship between concentration and exports or export-output ratio (hereafter export share).²⁾ If firms are capable of international price discrimination, then they can gain greater profits by exports than otherwise. Therefore, when industries are concentrated and sheltered enough to discriminate between home and foreign markets, they may have an incentive to export more.

This relationship may be described in Figure I. Let domestic demand D , two alternative domestic supplies S_{d1} and S_{d2} , and world price P_w be as shown in the Figure. Examine the monopoly situation. In the case of a world price inferior to a domestic competitive price

($P_w < P_{c1}$: curve S_{d1}), if a firm is not capable of international price discrimination, then the price that rules in the market is P_w , the domestic output is OQ_3 , and imports are Q_3Q_5 . These results are the same as under the domestic competitive situation. But if a monopolist is sheltered from foreign competition due to trade barriers, then his export share is Q_1Q_3/OQ_3 . However, a different tariff rate may induce a different pattern.³⁾ Let price P_e be as shown in Figure I ($Q_3 = D(P_e)$). If tariffs are not high enough to enable a monopolist to set the above- P_e price, then exports don't take place; for domestic price between P_e and P_{c1} , foreign trade doesn't take place, and for domestic price between P_{c1} and P_w , there are imports.

On the other hand with domestic supply curve S_{d2} , if a monopolist is not discriminator, then his export share is Q_5Q_6/OQ_6 .⁴⁾ This result also is the same as under the domestic competitive situation. But if the monopolist is capable of discrimination, then his export share is Q_1Q_6/OQ_6 , which is greater than Q_5Q_6/OQ_6 . A rightward shift in the domestic supply curve relative to the world price represents an increase in comparative advantage. Relative to S_{d1} , curve S_{d2} reflects lower costs and greater efficiency, presumably because most capacity is of minimum optimum size.

Thus the impact of monopoly on exports (and export share) is not clear. If a firm is capable of international price discrimination, both exports and export share can be greater than otherwise. Also, it is derived that exports are likely to be greater in the presence of the world price superior to domestic competitive price. However, the preceding formal discussion suggests that the influence of concentration on the export process is not direct. Put alternatively,

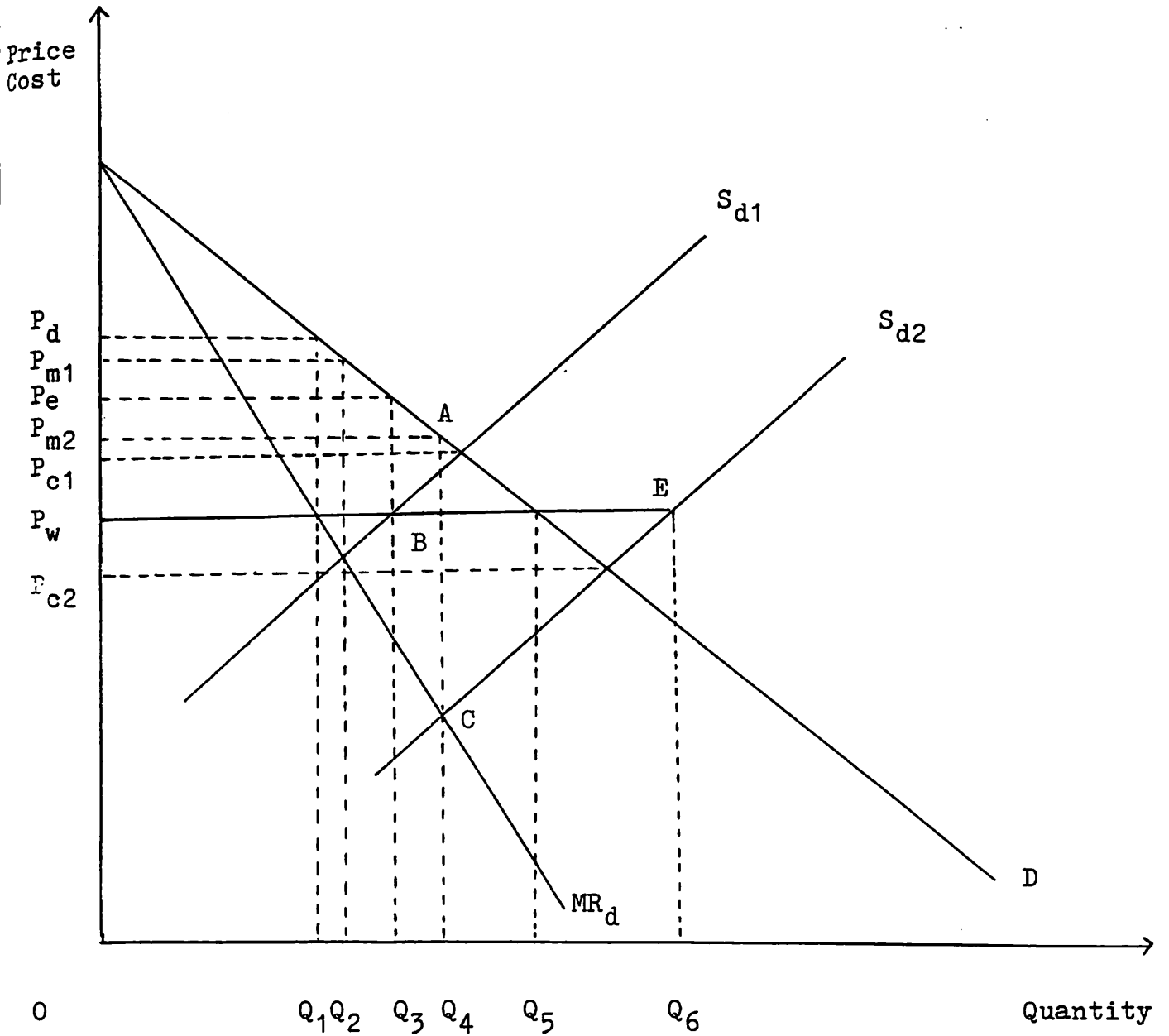


Figure I Monopoly and Trade : A Small Economy Case

concentration is positively related to exports through trade barriers such as tariffs. If a monopolist can press governments to protect himself from foreign competition--a "rent-seeking behavior"--, then market power is directly related to exports.⁵⁾

The above discussion has two assumptions. The first is that market structure has no influence on cost conditions. If the transformation of the competitive industry into a monopoly is accompanied by the leftward shift in domestic supply curve ($S_{d2} \rightarrow S_{d1}$) then all possible cases of the change in exports can happen depending upon the magnitude of the shift in domestic supply curve. On the other hand, when a monopoly results in cost savings ($S_{d1} \rightarrow S_{d2}$), exports take place or increase. Thus, if market structure has any impact on cost conditions, then the influence of market structure on exports is not clear, though there is the possibility that monopoly promotes exports.

Also, the previously-mentioned discussion assumes the "small economy" case--the "constant world price" case. The assumption can be replaced by the "large economy". The model of price discrimination is applied.⁶⁾ In Figure II, D is domestic demand, MR_d its marginal revenue, M_f foreign demand, MR_f its marginal revenue, MR_{d+f} the horizontal sum of the two marginal revenues, and S_{di} ($i = 1, 2, 3, 4$), S'_{d1} and S'_{d3} six alternative domestic supplies.

Assume that resale doesn't take place between domestic and export markets. A relationship between market structure and export share will be examined for a range of specifications of a cost function. Then, a non-discriminating monopolist is confronted with curve $E_{CGMR_{d+f}}$ which is marginal to reverse kinked demand curve $E_{ID} + M_f$, while a discriminating monopolist is confronted with marginal revenue

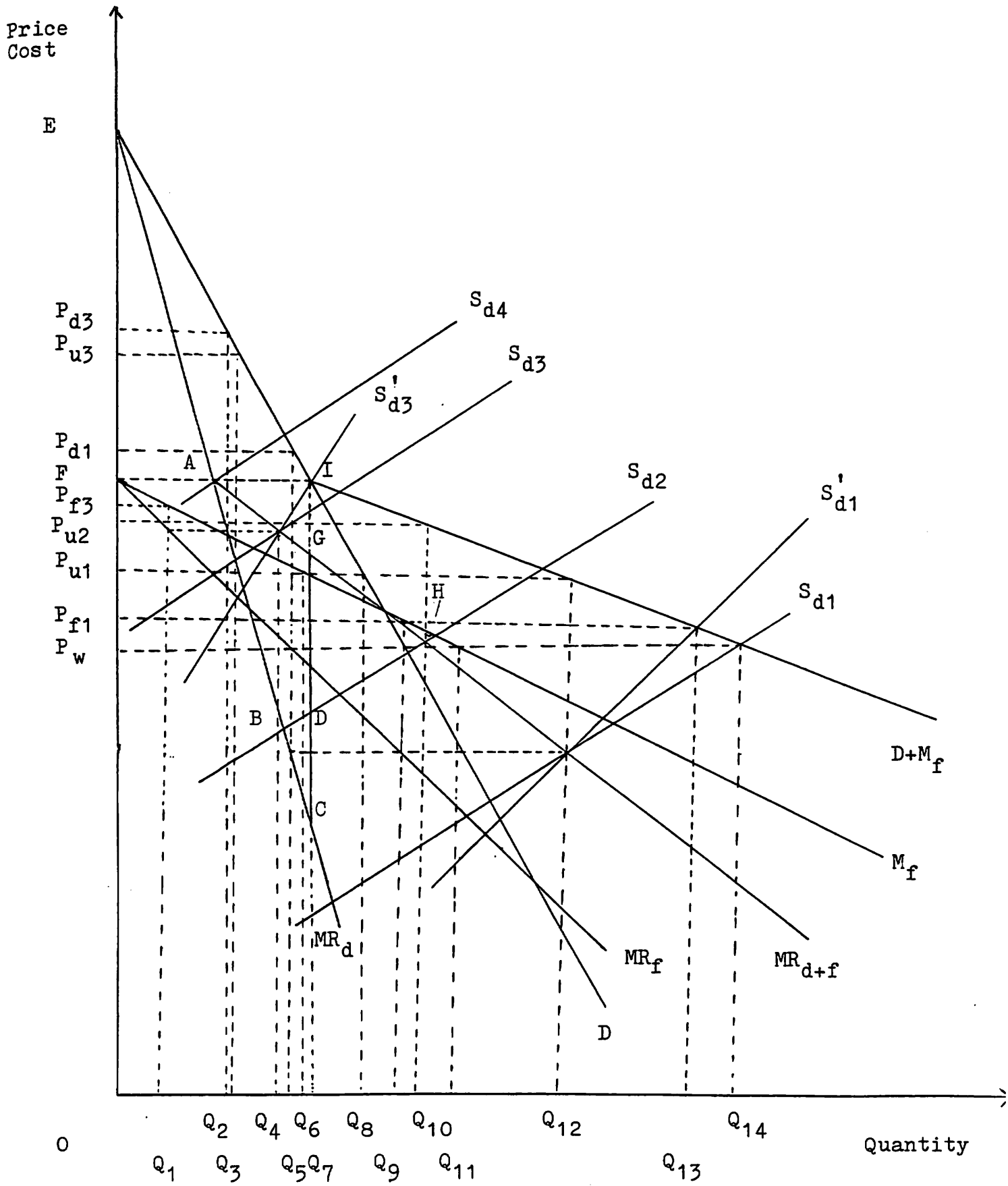


Figure II Monopoly and Exports : A Large Economy Case

curve $EAMR_{d+f}$.

First, with curve S_{d1} , the competitive industry produces output OQ_{14} , and exports output OQ_{11} . A monopolist, discriminating and non-discriminating, produces output OQ_{12} , but their exports are different; OQ_6 for the non-discriminating monopolist, and OQ_9 for the discriminator. Thus,

$$\frac{OQ_{11}}{OQ_{14}} > \frac{OQ_6}{OQ_{12}} \quad 7)$$

and

$$\frac{OQ_9}{OQ_{12}} = \frac{OQ_9}{OQ_5 + OQ_9} > \frac{OQ_6}{OQ_{12}}$$

In other words, export share is greater for the competitive industry than for the non-discriminating monopolist, and a monopolist's export share is greater with discrimination than with uniform pricing. However, the relative magnitude of discriminator's export share and the competitive industry's share is indeterminate, since discrimination will increase exports, relative to the uniform pricing. For example, with curve S'_{d1} both a competitive industry and a discriminating monopolist export the same quantity OQ_9 , but their output is different ($OQ_{13} > OQ_{12}$). Therefore, export share is greater with discrimination than with competitive situation ($OQ_9/OQ_{12} > OQ_9/OQ_{13}$). Thus, if there is no restriction on discrimination, with curve S_{d1} , monopoly can favor export share.

Second, with curve S_{d3} , a monopolist's export share is zero (output OQ_3) with non-discrimination, but is OQ_1/OQ_4 ($OQ_4 = OQ_1 + OQ_2$) with discrimination. On the other hand, exports in the competitive situation depend on the value of cost functions; it is conceivable that they don't take place (with curve S'_{d3}). Thus,

the likelihood that monopoly's export share is greater than the competitive situation's is higher relative to the S_{d1} case.

Third, with curve S_{d4} , exports don't take place, regardless of market structure. Therefore, the leftward shift in supply curve relative to S_{d4} , doesn't lead to exports.

Finally, with curve S_{d2} , under competitive situation exports always take place, like the S_{d1} case. But the output-price decision of a monopolist is a little complicated. The decision of a non-discriminating monopolist depends on an evaluation of the profits of two possible choices: two output-price combinations which are equivalent to point B and H. When the area GDH is greater than the area BCD (depicted in Figure II), point H, therefore the combination $OQ_{10} - P_{U2}$ will be chosen, and there are exports. In the opposite case, the combination equivalent to point B will be chosen, and therefore exports don't take place. On the other hand, a discriminator has greater exports (and export share) than the non-discriminating monopolist's, as the discriminator's behavior with curve S_{d1} , suggests it.⁸⁾

Thus, in case of the "large economy", the following relationships are derived; (1) a monopolist's export share is greater with discrimination than with non-discrimination; and (2) a competitive situation's export share is greater than a non-discriminating monopolist's share. However, the relative magnitude of a discriminator's export share and a competitive situation's share is, as suggested, indeterminate. If discrimination is not restricted, then monopoly can be favorable to export share, depending on the forms of cost function. If market structure has any impact on cost functions, monopoly may either favor or restrict exports.

However, the possibility of the positive relationship between market power and exports may be promoted by the "oligopolistic interdependence".⁹⁾ Concentration may induce the interdependent reaction among firms, which in turn is likely to have a definite impact on exports. When oligopolists compete for market share or firm growth, exporting leaders frequently persuade their customers to get their products by suggesting that increased exports show the international superiority of the quality of their products. In other words, in concentrated industries the non-price competition such as product differentiation overpowers price competition. Then, increased exports are likely to lead to product differentiation, and thereby raise a firm's market share. Or firms may expand their size by increasing their exports in the foreign market, since they cannot expand more easily in the domestic markets because of the retaliation of rivals and the threat of anti-monopoly policy. In any case, when firms start up or increase their exports, other firms also are compelled to take the similar behavior, since the latter firms are otherwise likely to have a relative disadvantage over leaders in the domestic markets as well as in the foreign markets. Such a "group-motivation" may exist for the export decision. Thus concentrated industries, other things being equal, tend to be export-oriented.

In addition, exports may usually include difficulties or risks, such as variation in exchange rate, government regulation, fluctuation in foreign demand and burdensome penetration or marketing costs. Oligopolists have a greater hedge against the risk of unsuccessful exports. This is favorable to the positive relationship between concentration and exports.

Thus, to the extent that concentration serves as a summary measure of interdependence and also of the shelter from foreign penetration, a basis is provided for expecting concentration and export share to be positively associated. In addition, if concentration is highly correlated with the economies of scale, then exports provide firms the opportunity to attain efficient operation. Therefore they may have an incentive to export more in concentrated industries. However, in contrast, concentration may have a restrictive impact on exports. Concentration may induce X-inefficiency or the sluggishness of decision-makings--the leftward shift in domestic supply curve. The U. S. steel industry is a case in point.¹⁰⁾ The X-inefficiency is likely to lead to reduced international competitiveness, which in turn decreases exports.

Thus, the relationship between concentration and exports is not clear. The plausible relationship is complex and is not straightforward, involving both direct and indirect causations and common causal factors. The empirical evidence is mixed. The positive association between concentration and export intensity has been confirmed by Pagoulatos and Sorensen (21) and Caves and Khalilzadeh-Shirazi (3) for the U. S. A. and by Utton and Morgan (31) for the U. K.. Caves and Uekusa (2) also suggest for Japanese industries that export-oriented industries are concentrated. But Marvel (17) failed to detect the significant effect of concentration for the U. S. industries. Caves et al. (4) also report the lack of a positive direct influence of concentration on export share for Canadian industries. Goodman and Ceyhun (9) found for the U. S. industries, using the time-series analysis, that the concentration-export relationship was positive for R & D-intensive industries,

but turned negative for less R & D-intensity industries. Ray (25), rather, suggests the negative effect of concentration on exports for the U. S. manufacturing. Grejser et al. (8) also conclude for Belgian exporting firms that a high degree of domestic concentration negatively affects firm export share. The last two studies conclude that oligopolists are not interested in exporting.¹¹⁾

I-2 Imports

Next, we will address the association between concentration and imports or import-output ratio (hereafter import share). Figure I suggests that imports Q_3Q_5 take place for both a competitive situation and a non-discriminating monopolist facing domestic supply curve S_{d1} . If a monopolist is capable of discrimination, then imports either decrease or disappear. Thus, the relationship between monopoly and import share is not clear.

The variation of the "dominant firm price-leadership" model suggests one of the prediction about the association, since the supply curve of "fringe firms" can be replaced by the supply curve of imports. Therefore, it is assumed that the import supply curve is positive and definite, in contrast with the constant world price case. Also, the domestic firms, which are comparable to the "dominant firm" in the original model, are price searchers which face a residual demand curve equal to the horizontal difference between the market demand and the import supply curve.¹²⁾

Let domestic demand D , two alternative import supplies S_{f1} and S_{f2} , and three alternative domestic supplies S_{di} ($i = 1, 2, 3$) be as shown in Figure III. Then, the demand curve facing domestic firms is kinked demand curve ABD . MR is the curve which is marginal

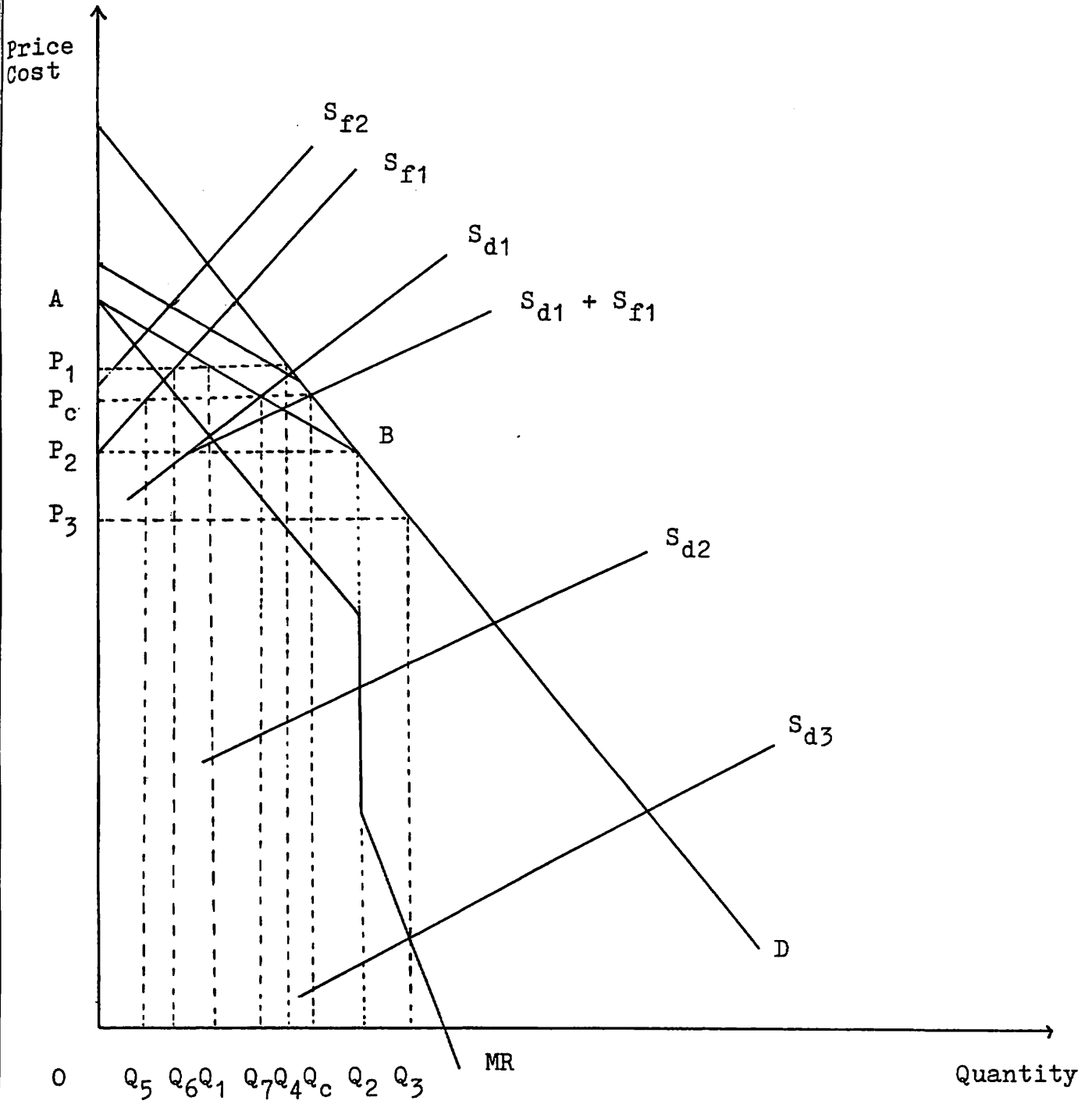


Figure III Monopoly and Imports

to demand curve ABD. If the domestic supply curve is S_{d1} , import share is Q_7Q_c/OQ_7 for the competitive situation, and is Q_1Q_4/OQ_1 for the monopoly, which is greater than Q_7Q_c/OQ_7 . Thus, in this case, imports and import share both are smaller under the competitive situation than under the monopoly situation. However, if the domestic supply curve is S_{d2} or S_{d3} , then imports don't penetrate into the domestic market. In these instances, the domestic firms in the industry are not only able to meet domestic demand, but also can competitively enter the export market. A rightward shift in the domestic supply curve relative to the import supply curve reveals an increase in comparative advantage.

Thus, given the market demand curve and the import supply curve providing pressure for domestic firms, as the domestic output goes away from the competitive level to the monopoly level, import share will increase. Further, foreign firms may have an incentive to enter domestic industries enjoying above-average profits. Also, if concentration causes X-inefficiency, in other words if it shifts the domestic supply curve upward, then increased imports are possible.

However, if a monopolist adopts import deterrence strategies, which are reflected in the shift in import supply curve to left ($S_{f1} \rightarrow S_{f2}$), then the observed relationship between concentration and imports may be disturbed. Thus, the influence of concentration on imports depends on the shape and position of the import supply curve, and therefore on tariffs, marketing costs and other trade barriers. For a given level of trade barriers, concentration is likely to have a positive relationship to imports, and also to import share.

However, if the domestic producers themselves are importers of the competitive foreign products, then they may restrict or control imports. Thus, the positive relationship between concentration and import intensity depends on both import supply curve and domestic supply curve. Therefore, the relationship is not straightforward, as well. The balance of the existing empirical studies suggests that there is likely to exist a positive association between concentration and import share. The positive relationship has been empirically supported by Pagoulatos and Sorensen (21), Caves and Khalilzadeh-Shirazi (3), and Marvel (17) for the U. S. A., and by Utton and Morgan (31) for the U. K.. But Caves et al. (4) conclude, using the sample of Canadian industries, that concentration is unrelated to import share. This result may be related to the fact that foreign-affiliated firms-- an alternative to imports--control not less than a half of Canadian manufacturing output.

II Research Design and Methodology

The "concentration impact" hypothesis was tested by the multiple regression equations, relating export intensity and import intensity to concentration ratio and other control variables. The sample consists of 53 six-digit input-output table industries (with some exceptions) over 1976 - 1980, which are comparable to four-digit SIC industries (hereafter Sample I). And another sample was additionally used; 52 industries, which also are for the most part comparable to 4-digit SIC industries (hereafter Sample II). The two samples are not always consistent.¹³⁾

The models used here and variables will be presented.

The Statistical Model

The general structure of the models used here is the following;¹⁴⁾

$$\begin{aligned} EX = \alpha_0 + \alpha_1(CR) + \alpha_2(RD) + \alpha_3(AD) + \alpha_4(LK) \\ + \alpha_5(IG) + \alpha_6(SR) + \alpha_7(SK) + \gamma \end{aligned}$$

$$\begin{aligned} IM = \beta_0 + \beta_1(CR) + \beta_2(RD) + \beta_3(AD) + \beta_4(LK) \\ + \beta_5(IG) + \beta_6(TR) + \beta_7(DM) + \mu \end{aligned}$$

where EX denotes export share, IM import share, CR concentration ratio, RD research and development (R & D) intensity, AD advertising intensity, LK labor intensity, SR subcontract ratio, SK labor skill intensity, IG industry growth, TR nominal tariff rate, DM dummy variable for imports of main materials, α_i ($i = 0, \dots, 7$) and β_j ($j = 0, \dots, 7$) estimated parameters, and γ and μ the residual element, respectively.

Dependent Variables: Export Share (EX) and Import Share (IM)

The importance of international trade is captured by export and import intensities, since they have a significant effect in spite of their faults. The export intensity here is the export share which is defined as export-output ratio. The data source is MITI (13) for Sample I, and is MITI (13), MF (12) and MITI (14) for Sample II. And import intensity in a domestic industry is picked up by the ratio of imports to apparent consumption; $I/(O - E + I)$, where I stands for imports, O output, and E exports, respectively. The data source is MITI (13). Both of the two

measures are averaged over 1976 - 1980.

Concentration Ratio (CR)

Concentration ratio is likely to be an overall measure to capture market power or oligopolistic interdependence and also scale economies. 4-firm concentration ratio in 1978 was used from Japan, Fair Trade Commission's data (Senoo (28)), Toyo Keizai (29) and Yano (34). For the industries in which the ratio is not available in those sources, the ratio was computed from alternative data sources.¹⁵⁾

Control Variables

Among the control variables included are: R & D intensity, advertising intensity, labor intensity, nominal tariff rate, subcontract ratio, labor skill intensity, industry growth, and the dummy variable for imports of main materials. Capital intensity, labor skill intensity and import material dummy represent different factor endowments, and R & D intensity, advertising intensity and subcontract ratio, which may be grouped as "specific advantages", may similarly generate a differential in the ratio of foreign to domestic prices. The possible effects of these elements are examined in turn.

(1) R & D intensity (RD_i and RD_f). The above-mentioned discussions implicitly assume the existence of a single homogeneous product and no "intra-industry trade". The assumption can be relaxed. International competitiveness may be closely related to the "non-price" competitiveness. If domestic firms have the advantage of international product differentiation, in particular the "quality-

based" differentiation, then they can export more at the expense of foreign producers. R & D-oriented industries may have such an international non-price competitiveness. Also, R & D activities may result in superior processes which give a definite advantage to those industries over foreign firms. Thus the positive association is expected between R & D intensity and export share. In this paper, two measures of R & D intensity were used. One is industry-level R & D expenditure-output ratio (RD_i) for Sample I, which is averaged over 1977 - 1980. Another is the weighted average of R & D expenditure-sales ratio for leading firms in an industry in 1978 (RD_f) for Sample II.

On the other hand, when the limitation of new entry or new growth takes the form of efficient adaptation by domestic firms to market and production opportunities, as suggested in Figure II, the limits to new entry or new growth faced by imports are inevitable. R & D may promote the efficient adaptation. Thus, R & D may have a restrictive impact on imports. This advantage of domestic firms also may be captured by the R & D intensity as a proxy. The negative relationship between R & D intensity and import share has been confirmed by Pagoulatos and Sorensen (21), but has not been supported by Pugel (24).

(2) Advertising intensity (AD). Advertising also can create the product differentiation, which is largely "image-based", in foreign markets as well as in domestic markets. Therefore, the advertising intensity can be a reflection of the advantage of international product differentiation in export markets.

However, at the same time it may serve as an impediment to exports, since the foreign industries also may have a competitive

advantage over the domestic industries in their own home markets, due to the product differentiation. Thus the expectation of the effect of advertising intensity on exports is not clear. The intensity is the ratio of advertising expenditures to output, which is averaged over 1976 - 1980.

R & D and advertising, as suggested earlier, may have an exports-promoting effect. In this paper, the interaction, RD_i X AD, also was used as a summary proxy of the international product differentiation, or the "non-price" competitiveness.

On the other hand, product differentiation is an important blockage for imports, since, as the formal theory of entry barriers suggests it, it is likely to involve higher penetration costs and/or small market share. But in sharp contrast, the product differentiation, as alluded to above, may attract imports which cater for different or differentiated demand from domestic products. In other words, it may invite an "intra-industry specialization". Thus, the product differentiation, which is picked up by the advertising intensity, has an ambivalent effect on imports.

(3) Labor intensity (LK). Industry factor intensity is an important element in international trade, since, as the formal theory of foreign trade suggests it, it reflects the difference in factor endowments. An aspect of the intensity may be quantified by capital-labour ratio. Pugel (24) shows for U. S. industries that it is not significantly related to export share, but is positively and significantly related to import share.

The observation for the Japanese industries suggests the positive relationship between labor intensity and export share.¹⁶⁾ The findings mean that the export-oriented industries are mainly

intensive both in capital and labor, in particular skilled labor. The findings may imply, also, that labor intensity is likely to be negatively related to import share, since higher labor-intensity industries are likely to have a comparative advantage.

The factor intensity used here is defined as the reciprocal of the natural logarithm of the ratio of end-of-year fixed assets to employees in 1978.

(4) Labor skill intensity (SK). The economy which is relatively skilled labor abundant is likely to have a comparative advantage over foreign economies. Therefore skilled labor has an export-promoting effect, while it has an import-preventing effect. The variation in labor skill is captured by the ratio of non-production workers to total workers in 1978.

(5) Industry growth (IG). The industry life cycle or business condition may have an impact on international trade. Higher demand growth leads to the expansion of firm size, and thereby makes possible the attainment of scale economies and innovation. Thus growth provides firms export-competitiveness. However, stagnant demand also may promote exports, since firms are likely to have an incentive to maintain their operation through exporting.

On the other hand, higher growth industries are likely to impede imports, since they, as suggested, have an advantage over foreign products. However, when higher growth invites excess demand, imports take place.

Industry growth is measured by the ratio of 1980 value of industry shipments to 1976 value of industry shipments.

(6) Nominal tariff rate (TR). The protectionist tariffs are clearly an impediment to imports. The effect can be explained

by shifting the import supply curve upward. However, in the case of Figure III, the association between tariff rate and import share is not determinate, since increased tariff rate will lead to reduced output due to higher price, as well as to decreased imports ($S_{f1} \rightarrow S_{f2}$). The negative effect of tariffs has been empirically supported by Pugel (24).

The tariff rate used here is: $(T + C)/I$, where T is tariffs, C commodity tax of imported goods, and I imports, respectively. The rate is averaged over 1976 - 1980. It is the nominal rate, not the effective rate.

(7) Subcontract ratio (SR). Japanese firms frequently use the subcontract system--a variation of vertical integration. Through the system, parent or center firms can not only reduce transaction costs, but also decrease purchasing prices of their inputs, due to great bargaining power over subcontract firms or subsidiaries.¹⁷⁾ Also, one of the advantages of the system may be the smooth transfer of technological progress from subcontract firms to parent firms. The consequence is lower production costs. Therefore, the subcontract system can be one of the sources of the "specific" or "unique" advantages that the domestic firms have relative to the products of foreign countries. Thus, a positive relationship is expected between subcontract ratio and export share.

The subcontract ratio used here is defined from the input-output table as the ratio of output traded within an industry to total output. The ratio is averaged over 1976 - 1980.

(8) Imported material dummy (DM). If domestic firms have a less favorable access to main materials than foreign firms do,

Table I Estimated Results : 1976 - 1980, Sample I

Equation No.	Export Share				Import Share	
	1	2	3	4	5	6
Constant	-14.614	-13.057	-14.649	-15.204	-6.314	-3.751
CR	0.169 (2.146)	0.165 (2.037)	0.181 (2.313)	0.217 (2.773)	0.116 (2.667)	0.104 (2.375)
RD _i	4.030 (1.149)				0.387 (0.176)	
AD		1.057 (0.988)				0.682 (1.073)
SK				-0.210 (1.354)		
IG	-3.104 (0.451)	-1.443 (0.318)	-1.266 (0.274)	-1.717 (0.392)	0.455 (0.179)	0.212 (0.089)
LK	56.912 (2.245)	52.791 (2.003)	56.422 (2.187)	62.053 (2.473)	15.021 (1.132)	12.343 (0.929)
SR	0.530 (2.742)	0.583 (2.718)	0.566 (2.853)	0.524 (2.724)		
RD _i x AD			0.632 (0.797)			
TR					-32.905 (2.032)	-39.378 (2.420)
DM					11.779 (4.736)	11.178 (4.616)
\bar{R}^2	0.345 (6.489)	0.341 (6.376)	0.336 (6.214)	0.352 (6.658)	0.298 (4.689)	0.315 (4.989)

Note: Figures in parentheses are t-values for regression coefficients, and F-values for coefficients of determination adjusted for degrees of freedom (\bar{R}^2)

then they are likely to be at a disadvantage, compared with foreign firms. Consequently they may be forced to submit themselves to the penetration of imports. The imports of main materials may be one of less favorable access. The dummy variable for the imports of main materials was used; it is one for an industry with great dependence on imports of main materials, and zero otherwise.

The data source of RDi, AD, TR, SR is MITI (13) and KL, SK and IG are available in MITI (14). Rdf is from Nikkei's Survey (18).

·III Empirical Results: Export Share

Attempts have been made to detect the influence of concentration and other control variables on exports and imports.¹⁸⁾ The estimated results are shown in Table I. Examine first the results about export share.

Before analyzing the central problem, we will examine the two findings which are probably of an important implication for the export behavior in an industry. First, the association between firm size and exports (or export share) was examined. The following equation was estimated for exporting listed firms; $\log E = \beta_0 + \beta_1 (\log S)$, where E is firm exports, and S firm sales. Then coefficient β_1 is export elasticity. Data source is Nikkei (19). The association, industry by industry, is shown in Table II. Larger firms are likely to export more than smaller firms. Also, for export-intensive industries such as transportation equipment, export-sales ratio rises with an increase in firm size, as suggested by the values of export elasticity. Therefore, export behavior

of an industry may be explained by the factors which characterize the leading firms in the industry.

Second, the relationship between domestic export share and Japan's share in a world market was analyzed. The relationship for 63 available industries (t-values in Parentheses) is shown as follows;

$$\begin{array}{ll} WS = 0.915 + 0.750 (EX) & \bar{R}^2 = 0.715 \\ (3.120)(12.364) & R = 0.845 \end{array}$$

where EX is as defined above, and WS is the ratio of Japan's exports to total world imports in 1978, which is from UN (30). There is a high correlation between domestic export share and Japan's world market share. Thus, it is conceivable that higher export share industries are comparable to a "large economy" case. In this case, domestic firms can set their own export price in world markets. Thus, if concentration goes hand in hand with scale economies and international discrimination, then it is likely to favor export share.

Turn now to the problem directly addressed by the present paper. First, concentration is positively and significantly associated with export share. This result is compatible with the "concentration impact" hypothesis and also with the suggestion by Caves and Uekusa (1) for Japanese industry. The implication is that oligopolistic reaction is likely to lead to the "drive to increase exports". This hypothesis may explain in part the phenomenon of a "concentrated downpouring of exports" or a "targeting behavior" of exports by Japan's industries, which is now

Table II Firm Size and Exports : 1978

$$\log E = \beta_0 + \beta_1 (\log S): E = \text{Exports}, S = \text{Sales}$$

Industry	Export Intensity	No. of Firms	$\beta_1(t_2)$ (t1)	Correlation
Food	0.88%	21	0.625 (-1.861) (3.102)	0.580
Textile	6.79	42	0.952 (-0.281) (5.566)	0.661
Paper and Allied Products	2.12	17	0.919 (-0.419) (3.212)	0.811
Chemicals	8.60	132	1.251 (3.212) (16.007)	0.815
Petroleum and Coal Products	1.58	9	0.483 (-2.363) (2.208)	0.641
Leather Products	11.00	15	0.516 (-1.630) (1.738)	0.434
Stone and Clay Products	4.52	33	0.758 (-1.677) (5.252)	0.686
Iron and Steel	10.27	41	1.472 (3.532) (11.016)	0.783
Non-Ferrous Metals	8.16	30	0.895 (-0.782) (6.666)	0.783
Metal Products	8.93	20	0.495 (-1.657) (1.624)	0.357
Machinery	15.70	112	1.163 (2.264) (16.156)	0.839
Electrical Machinery	19.70	129	1.265 (4.676) (22.322)	0.893
Transport Equipment	26.99	46	1.395 (3.662) (12.934)	0.889
Precision Instrument	31.05	30	1.511 (2.390) (7.067)	0.801
Miscellaneous Products	6.50	17	1.221 (0.734) (4.057)	0.723
Total	10.53%	694	1.053 (1.063) (21.121)	0.742

Note: 1. Export elasticity is for exporting listed firms.
 2. t1 is t-ratio for the test of whether elasticity is significantly different from zero, and t2 is t-ratio for the test of whether elasticity is significantly different from unity.
 3. Export intensity is industry exports/industry output, from MITI (13 Source: Nikkei (19)

subject to the challenge from foreign governments and industries.¹⁹⁾ This finding could also reflect the achievement of scale economies-- a common causal factor which leads to higher concentration and also to efficient operation through exports.

However, it may be worth noting that the concentration coefficients are relatively low, ranging from 0.17 - 0.22. Each ten point increase in an industry's concentration is only accompanied by an 1.7 - 2.2 point increase in export share.

The present result is consistent with the previous findings that both concentration and export share have a positive and significant relationship with profitability (Doi (5)).

Second, R & D intensity and advertising intensity are factors relevant to international product differentiation. However, they are significantly correlated. Therefore, they are incorporated alternately. RD_i has a positive, but non-significant influence on export share. Therefore R & D activity doesn't always lead to the export competitiveness or the international product differentiation. This result is a little perplexing, since it is frequently argued that Japan's trade competitiveness in many product sectors is due to its technological leadership, which is reflected in high productivity, superior quality and the development of products desired in export markets.

This finding may be attributable to the reliability problem in the R & D data of the input-output table. Then, Sample II in which another R & D intensity measure, RD_f, is available was analyzed. The estimated equation is:

$$EX = -13.756 + 0.211(CR) + 0.514(RDf) + 38.725(LK) + 0.798(SR)$$

$(2.939) \quad (0.539) \quad (1.950) \quad (4.360)$

$$\bar{R}^2 = 0.493$$
$$F = 13.393$$

Therefore, RDf also has no significant effect. These findings could be explained probably by the inability of the measures used here to pick up properly the dynamics of the technological leadership.

Advertising intensity also has a positive, but non-significant impact on export share. The indication may be that the "image-based" product differentiation in domestic markets doesn't always lead to the differentiation in international markets.

In addition, the interaction, RDi X AD, is of a positive sign, but is not statistically significant. Thus, R & D intensity, advertising intensity and their interaction only display the direction we would expect.

Third, labor intensity is positively signed and is statistically significant. This result is consistent with Caves and Uekusa's suggestion. This shows that export-oriented industries are not labor-intensive with relatively simple skills, but are intensive both in capital and labor, particularly skilled labor, since those export-oriented industries are processing and assembly industries such as electrical and transportation equipments.

Fourth, labor skill intensity is not significant and has a different sign from the expectation. The same result has been found for Sample II. The equation is:

$$EX = -6.217 + 0.211(CR) + 39.626(LK) - 0.240(SK) + 0.849(SR)$$

$$\quad \quad \quad (2.999) \quad \quad (2.047) \quad \quad (1.498) \quad \quad (4.672)$$

$$\bar{R}^2 = 0.513$$

$$F = 14.432$$

The negative sign may suggest that industries with higher non-production labor ratio are less efficient at competing in foreign markets--an "overhead X-inefficiency". The measure might not capture labor skill sufficiently.

Fifth, industry growth is not only non-significant, but also is negatively signed. The implication may be that lower growth industries are more interested in exports. The weakness of the domestic demand might induce firms to force exports for recouping a larger share of the overhead costs by means of a larger output and for counterbalancing the sharp decrease in profits.

Finally, subcontract ratio has the expected effect. The implication is that industries which use the subcontract system have an "industry specific" advantage over foreign industries. The result is consistent with the traditionally-argued hypothesis.

The subcontract ratio measure used here may be subject to qualifications, since it depends on the industry classification of the input-output table. An alternative measure for subcontract ratio was used. It is the ratio of "consignment production costs" to the value of industry shipments (SRc), which is averaged over 1976 - 1980, from MITI (14).²⁰⁾ The result for Sample I is:

$$EX = -9.228 + 4.880(RDi) + 0.213(CR) - 1.521(IG) + 1.475(SRc)$$

$$\quad \quad \quad (1.399) \quad \quad (3.043) \quad \quad (0.355) \quad \quad (4.503)$$

$$\bar{R}^2 = 0.345$$

$$F = 7.836$$

The result for Sample II is:

$$EX = -9.916 + 0.750(RDf) + 0.318(CR) + 1.487(SRc)$$

(0.721) (4.289) (3.986)

$$\bar{R}^2 = 0.389$$
$$F = 11.844$$

Thus, the additional subcontract ratio, SRc, also has a significant and positive effect on export share.

Therefore, Japan's subcontract system has an export-promoting effect.

IV Empirical Results: Import Share

The estimated results for imports are shown in Table I.

First, concentration, as expected, is positively signed and is statistically significant. This evidence is in support of the previously mentioned assertion that concentration is positively related to import share, and also is consistent with the findings by Caves and Khalilzadeh-Shirazi (3), Pagoulatos and Sorensen (21), Marvel (17), and Utton and Morgan (31). Thus, the exercise of market power by domestic firms induces increased imports, if there are any sufficient reasons for imports.

Second, neither R & D intensity nor advertising intensity is statistically significant, with positive sign. The sign of R & D intensity is not in accord with the expectation that the quality and cost advantages from R & D activity are likely to be an impediment to imports. The result of advertising intensity may imply that the product differentiation is a blockage for the

penetration of imports in some industries, while it promotes the "intra-industry specialization" in other industries. Imported watches and clocks in Japan are a good example of such an "intra-industry specialization"; Japanese watch and clock makers export the popular products, while the high-grade products are imported.

Third, labor intensity also is not significant, and displays a sign that is contrary to the expectation derived from the result of export share.

Fourth, tariff rate has a negative and significant association with import share, indicating support for the imports-preventing effect. In this instance, no association has been found between concentration and tariff rate.

Fifth, industry growth is positively signed, but non-significant. This non-significant result may reflect that higher growth impedes imports by promoting the efficient adaptation to market and production opportunities, while it invites imports when there is excess demand.

Finally, the imported material dummy variable is positively signed and is significant. The result provides support for the possibility that industries with greater dependence on imported main materials have a relative disadvantage over foreign products.

V Concluding Remarks

In this paper, the "foreign-presence", particularly exports and imports, in Japan's industry, have been examined. The main findings are:

- (1) Concentration has a positive and significant impact on both export share and import share.
- (2) Both labor intensity and subcontract ratio have a significant effect on export share, with positive sign.
- (3) Tariff rate has an import-preventing effect while the relative disadvantage due to the imports of main materials has a negative and significant impact on import share.
- (4) Neither R & D intensity nor advertising intensity has a definite impact on international trade.
- (5) Neither labor skill nor industry growth has a significant effect.

Thus, industrial concentration is a significant factor in export and import behavior of an industry. Therefore, in the absence of the prohibitive protection policy, concentration is likely to lead to increased trade. However, whether increased trade immediately means enhanced competition in an industry is arguable, since increased trade is likely to be attributable to market power, though imports may have a greater downward pressure on domestic market power than in their absence. In other words, market power is likely to help to increase exports at the expense of domestic consumers.

Also, it is worth noting that the magnitude of the impact of concentration on export share is not so large. Therefore, the attempts to relax the anti-monopoly regulation in order to promote export performance will very likely be undesirable for a society.

However, the present study involves some problems;

- (1) it has not sufficient statistical performance. To improve the results, we must take into account other relevant factors

such as export cartels and non-tariff trade barriers;²¹⁾

(2) our sample size is small due to unavailability of data; and

(3) variables are not included which reflect directly the relationship between Japan and the rest of the world. Such improvements or refinements are left to another study.

FOOTNOTES

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1. For the impact of international competition on market performance in recent Japan, see Doi (5).
2. See for example Jacquemin (10), Owen (20), Pagoulatos and Sorensen (22) and White (32).
3. See also Rieber (26).
4. However, if a monopolist is protected by barriers, but is not permitted to discriminate, then he has a choice; he can either adopt the same policy as the non-discriminating monopolist's, or he might not export at all, choosing output-price combination $Q_4 - P_{m2}$. The choice will depend on the relative magnitude of the area $P_{m2}ABP_w$ and the area BCE.
5. For the influence of market power on tariffs, see for example Lavergne (16). The examination of a "rent-seeking behavior" is provided by Buchanan, et al. (1).
6. For the theory of price discrimination, see for example Robinson (27).

7. In the Figure II,

$$\frac{OQ_{11}}{OQ_{14}} - \frac{OQ_6}{OQ_{12}} = \frac{OQ_{11}}{OQ_{12}} \left(\frac{OQ_{12}}{OQ_{14}} - \frac{OQ_6}{OQ_{11}} \right) > 0, \text{ since}$$

$$\frac{OQ_6}{OQ_{11}} = \frac{F P_{u1}}{F P_w} = \frac{Q_7 Q_{12}}{Q_7 Q_{14}} = \frac{OQ_{12} - OQ_7}{OQ_{14} - OQ_7} < \frac{OQ_{12}}{OQ_{14}}$$

8. See for example Frenkel (7).

9. The competitive export behavior is consistent with, or parallel with the argument, presented and empirically verified by Knickerbocker (15), that concentration promotes outward direct investment in U. S. industries.

10. See for example Duke, et al. (6).

11. The dependent variable for Ray (25) is not export share, but exports.

Also, Glejser, et al. (8) has some problems;

(1) the industry classification is overinclusive;

(2) the number of sampled industries is small; and

(3) if smaller firms in an industry have lesser export share,

and the sample consists of a large number of smaller firms,

then the effect of concentration on firm export share may have

a downward bias. Therefore, though concentration has a

positive effect on industry export share in an inter-industry

model, it is conceivable that it has a negative effect on

firm export share in an inter-firm model.

12. This model implicitly assumes imports fit into or comply with domestic collusion schemes, since domestic firms have price

power, while imports are price takers.

13. The unavailability of R & D intensity data reduced our sample to 53 or 52 industries. The samples occupied 50.6 (Sample I) and 56.6 (Sample II) per cent of the total manufacturing exports in 1978.
14. The internal direct investment is likely to have some influence on imports. But in Japan, the importance of internal direct investment generally is not so great. Therefore, the variables related to the direct investment were left out of consideration.
15. Top 4 firms in an industry were identified, and then their sales were divided by the value of industry shipments. Then, the financial statements of firms concerned, and MITI (14) were used.
16. Caves and Uekusa (2), p. 42.
17. Toyota Motors' "Just-in-Time" or "kanban" production system is a case in point. The system is based on the subcontract system which is formed by the "business coalition"--a set of separate entities controlled by Toyota Motors calculating on a group-wide basis.

One of a parent firm's advantages from the subcontract system is lower input price due to both its bargaining power over subcontract firms and their lower wages. This may be exemplified by the wage-differentials in Japanese auto industry. The industry is divided into assembly firms, car body firms, and part & accessory firms. Assembly firms control body and part & accessory firms. If the base level of 100.0 is wage rate for assembly firms, then wage rates of body and

part & accessory firms are 91.5 and 73.8, respectively.

The indexes are calculated from the wage rates averaged over 1976 - 1980, using MITI (14).

18. For the export behavior of Japanese firms, see for example Piercy (23).
19. For the problem, see for example Yamamura (33).
20. SRc is highly correlated to LK ($r = 0.789$ for Sample I, and $r = 0.659$ for Sample II). Therefore, LK was excluded.
21. For the export cartels in Japan, see for example Jacquemin, et al. (11).

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