DISCUSSION PAPER SERIES

Discussion paper No.08

Determinants of Small Business Presence in Japanese and UK Manufacturing

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1995

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ABSTRACT

The present paper has attempted to examine determinants of small business(SMEs) presence in Japanese and UK manufacturing industries, using a cross-industry model. The results suggest that market structure elements have a definite influence on SMEs' share. This conclusion is consistent with the findings observed in the US and other European countries. The main results here are the following; (1) Concentration is negatively related to SMEs' share. (2) Capital intensity and requirements have a negative influence. (3) Scale economies have a negative association with SMEs' share. (4) R&D provides disadvantages for SMEs.

(5) The above results are found for both the countries. But, advertising shows a different result between the countries; it has a negative effect in the UK, while it has no effect in Japan. (6) Also, both industry size and growth have a different relationship between the countries. These factors have a significant effect in the UK, but the former has a negative effect, while the latter has a positive effect. On the other hand, these factors have no discernible effect in Japan. (7) The subcontracting has no definite influence on SMEs' share in Japan.

First Version August 1995

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Determinants of Small Business Presence in Japanese and UK Manufacturing

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I Introduction

In recent years, the economic roles of small- and medium-sized enterprises (hereafter SMEs) are receiving interest in the developed countries. As Doi and Cowling[1995] suggest, there are large variations in SMEs presence among different countries. The variation is found among different industries within a country, as well. Many industries have a large SMEs sector. Such type of an economy is usually called "dual structure or economy" (Bowring[1986]). In order to analyze the roles of SMEs, it is important to examine the possible determinants of SMEs presence across industry.

However, although there exist a vast number of studies on firm size structure and SMEs, study is scarece in both Japan and the UK which examines the inter-industry variation of SMEs. In particular, in Japan small business economics has rich research performance, but is a field which is independent of industrial organization economics. On the contrary, many of industrial organization literature are concerned largely with the level of industrial concentration, not SMEs' share. We will be able to analyze the inter-industry variation in SMEs' share in a similar cross-sectional way.

The purpose of this paper is to provide some empirical evidence on the determinants of SMEs presence in Japanese and UK manufacturing industries, by examining the inter-industry difference in SMEs' share. This examination is very interesting, since SMEs presence is different between Japan and the UK (See Doi and Cowling[1995]). This paper is the second one which has resulted from our joint work on SMEs. The organization of the paper is the following; The second section compares SMEs presence by sector between Japan and the UK. The third section discusses the possible determinants of SMEs presence by

surveying the existing theoretical and empirical studies. The forth section presents the empirical methodology including the specification of estimated equation and the measurement of the variables. The fifth section examines the estimated results. And finally we conclude this paper, suggesting further problems.

II Comparison of SMEs' Share by Sector between Japan and the UK

Before empirically examining determinants of SMEs presence, we will look at the comparison of SMEs' share by sector in both the countries. Although, as suggested later, it is difficult to make an exact comparison of the share of an industry between the countries, due to the difference in the definition of industry, the comparison is significant.

Table 1 shows the share of SMEs in 2-digit industry sector in 1990. In this paper, SMEs are captured as firms either with less than 100 million yen of equity capital (hereafter equity-based SMEs. SMEs(1) in the Table) or with less than 300 employees (hereafter employment-based SMEs. SMEs(2) in the Table) in Japan, and as firms with less than 500 employees in the UK. The shares were measured by both employment and value of shipments in Japan, and by both employment and "sales and work done" in the UK. Share in terms of employment ia called "employment share", and share in terms of value-of-shipments or sales-and-work-done is called "sales share." Data source is the *Census of Manufacture, by Industry and by Firm, 1990* in Japan (hereafter *JP Census(Industry) and JP Census (Firm)* respectively), and the *Census of Production, 1990* (hereafter *UK Census*) in the UK.

《Table 1》

In Japan, share of equity-based SMEs can be computed from the *JP Census (Firm)*, but share of employment-based SMEs can not be computed directly, since the firm data of the *JP Census (Firm)* do not include data for establishments with less than 20 employees. It was assumed that all establishments with less than 20 employees were owned by SMEs with less than 300 employees. This assumption seems to be

reasonable. In this case, SMEs share was computed by adding data of establishments with less than 20 employees, which are available from the *JP Census (Industry)*, to data of firms which have establishments with 20 employees and more, which are available from the *JP Census (Firm)*. The correlation coefficient between both the definitions of SMEs is 0.959 (N=20) for employment, and 0.972 (N=20) for value of shipments.

Also, it should be noted that the definitions of an industry and also of a SME both are not always consistent between the countries.

In Japan, SMEs presence is high in many industries excluding chemicals, petroleum and coal products, iron and steel, non-ferrous metals, electrical equipments, and transportation equipment. In particular, textile, closing, lumber and furniture, plastics, leather, metal products are among SMEs-dominated industries. On the other hand, in the UK, SMEs have more than 50 percent of share in clothing, lumber, printing & publishing, plastics, metal product, general machinery, precision instrument, and other manufacturing. These industries have larger SMEs share in Japan, as well. Although the definition of SMEs is narrower in Japan than in the UK, there is a similarity in relative SMEs presence by 2-digit industry sector between the countries. For example, the correlation coefficient between Japanese SMEs (SME(2) in Table 1) and the UK SMEs is 0.741 (N=18) for employment share, and 0.710 (N=18) for sales share.

Further, there are several interesting findings. First, employment share is larger than sales share in many industries of both the countries. Therefore, SMEs sectors are more labor-intensive than large firms sectors. It is worth noting that SMEs' share may be different between employment and sales shares, as well. Therefore, it is necessary to examine some alternative measures of SMEs. Second, in many of the industries, SMEs' share is larger in Japan than in the UK. The difference is large in particular in food, textile and clothing [1]. But rather, SMEs' share is larger in the UK than in Japan in chemicals and precision instrument. Finally, the differential between employment and sales share is larger in Japan than in the UK.

Thus, there are some variations in relative SMEs presence (i.e., SMEs' share) among industries in a country, and also between Japan and

the UK. Therefore, it is interesting to examine and compare the determinants of SMEs presence in both the countries at a disaggregated industry level.

III Determinants of SMEs' Share

We will review the possible factors affecting to SMEs' share, following the discussions in the existing studies of industrial organization. The size, growth and efficiency of firms are likely to be related to the underlying product market characteristics. A great number of existing studies, theoretical and empirical, suggest that stochastic process, technological change, market structure and business behavior are among the possible determinants of firm size distribution or firm growth (See for example Scherer and Ross[1990] and Pratten[1991]). These theoretical and empirical results provide some suggestions for the presence of SMEs.

The size, significance and behavior of SMEs depend on market structure, and therefore are likely to vary across industry. In general, SMEs presence is dependent on their entry, exit and growth. It may be difficult for SMEs to enter industries, or grow into large firm sector, due to internal and external disadvantages facing potential and incumvent SMEs. Eventually some of existing SMEs may be forced to exit.

In fact, Doi[1992] shows that SMEs (with less than 100 million yen of equity capital) incur some disadvantages in efficiency against large firms in Japanese manufacturing industries, and that the efficiency disadvantage of SMEs in an industry is related to market structure elements. Also, taking up the difference in efficiency between large and small establishments, Caves and Barton[1990] suggest a similar conclusion for the US establishments. The factors conducive to disadvantages are frequently called "barriers to new entry or intra-industry mobility". The effects of those factors are explained by some of the industrial organization literature; the traditional entry barriers theory, and the intra-industry mobility barriers theory.

Now, we will look at possible sources of disadvantages facing SMEs. First, the disadvantages of SMEs may result from scale economies, since

they can not enjoy the economies due to smaller size. Therefore, SMEs are difficult to enter an industry, and also to have a higher viability. In particular, the Chicago School economists (for example Demsetz[1973] and Brozen[1983]) emphasize the importance of scale economies as a dominant determinant of firm size distribution.

However, some existing studies suggest that the importance of scale economies as disadvantages of SMEs has dwindled due to factors offseting the disadvantages. In fact, Pratten[1991] concludes, from the questionnaire survey in the UK, that "most of small firms produce their existing product range below the minimum efficient scale of production" (p.225). First, flexible manufacturing technologies such as new materials (for example plastics) and computers and general purpose machines (for example NC machine tools) tend to reduce the importance minimum efficient size. The flexible production is emphasized by for instance Acs et al.[1990].

Second, Audretsch and Yamawaki[1992] show that the presence of suboptimal scale plants is great in the US and Japan, and that the difference between suboptimal and optimal size is positively related to compensation difference. The findings suggest that the disadvantage of suboptimality is offset by lower wages of suboptimal scale plants. Therefore, although SMEs can not enjoy the economies, they can survive, owing to lower compensation. Thus, the SMEs-share-decreasing effect of scale economies may be disturbed.

The second source is product differentiation. It is expected to have a negative influence on SMEs' share on three-fold reasons; First, product differentiation, either imaged or physical, forces SMEs to make extra outlays of some sort to offset the goodwill of large firms or incumvents. Second, it does not allow for SMEs to have a market share necessary for efficient operation. Finally, differentiation may lead to non-price rivalry like advertising, proliferation brand and product lines, and model changes. In this case, SMEs can not follow the strategies of large firms, or they are forced to bear larger costs. Also, when these effects are expected, potential entrants, and in particular small potential entrants do not decide to start up their new undertakings.

However, there may be a counterpower against decreasing SMEs presence in consumer goods industries. Markets tend to become more hetrogeneous over time, evolving into progressively finer segments, as changes in consumer tastes and in technology take place. SMEs may survive in segmented or nich markets [2]. Therefore, the de-standardization of demand and thereby of products may help SMEs to increase or keep their share. More advertising-intensive, or higher product differentiation type of industries may have a larger SMEs' share than otherwise. Hence, there is no expectation on the direction and strength of the relationship.

Third, technological changes may limit the growth of SMEs. But, the discussions on the relationship between firm size and innovation are very divergent among economists [3]. It is argued that large firms are more R&D-intensive and innovative than SMEs. But, the hypothesis is not supported theoreticall and empirically. For example, a larger technological opportunity may induce the growth and entry of vital SMEs. In particular, the empirical findings are mixed.

Thus, although technological changes are likely to exert an influence on firm size distribution, the relation between the technological change and SMEs' share is a priori not expected definitely.

The fourth structural source affecting SMEs' share is large capital requirements. SMEs, actual and potential, are not likely to raise large capital necessary for an efficient operation. This burden limits the entry and growth of SMEs. In recent years, the problem of funding for entry and growth of SMEs is receiving surging interest [4]. Also, industries with larger capital requirements tend to have capital-intensive and industry-specific (i.e., irreversible) equipments, which lead to higher barriers to entry and growth. Therefore, the more capital-intensive an industry is, the smaller SMEs' share of the industry is.

Fifth, SMEs' share is likely to be affected by business behavior as well as market structure elements discussed above. SMEs or lower firms may receive growth restraints induced by large firms. Large or leading firms may adopt strategies to raise lower firms' costs, which lead to restricted growth of SMEs. The behavior may be called "artificial or

strategic barrier to growth". The relationship is discussed as the "raising rivals' costs" theory by Salop and Scheffman[1983]. In a highly concentrated industry, leading firms may have a larger capability to take such strategy. Therefore, concentration may have its own "behavioral" effect on SMEs' share.

Finally, SMEs not only operate as an independent rival to large firms in the same industry or in segmented and niche product market in an industry, but also sell the bulk of their products to other firms in an industry as a subcontractor. The institution of vertical inter-firm transaction may have an influence on firm size distribution. In Japan, large firms have increased their competitiveness by utilizing subcontracting relationships as sourcing of inputs (5), while the US and European firms tend to prefer in-house integration to outsourcings. This difference in sourcing may be reflected in SMEs' share; Industries with larger outsourcing tend to include more subcontractors, most of which are usually SMEs.

Thus, external market structure and behavior elements are likely to affect SMEs presence, although some of the problems faced by SMEs are internal to them, such as the availability of skilled managers and appropriate organization structures. But, MacGee[1989] indicates the hypothesis that small firms are more disadvantaged by their own inability to take advantage of market opportunities than by the structural characteristics of markets and the inherent power of existing competitors. The relative importance of external and internal factors is another interesting problem of SMEs' growth (6).

However, there are a few number of existing studies on the above-mentioned relationships. White[1981, 1982] suggests, for US industries, that capital-intensive and consumer-goods industries have a smaller SMEs presence. Also, Acs and Audretsch[1989, 1990] found that scale economies, concentration, capital intensity, advertising, capital requirements, R&D, and innovation, all have a negative effect on the presence of SMEs (with less than 500 employees) in the US manufacturing industries. In Schwalbach[1990] study, scale economies, product differentiation, R&D intensity, and exports are found to have a negative relationship with the presence of small plants (with less than

50 employees) in German manufacturing, providing an additional support for the Acs and Audretsch' findings. These results may be suggestive; Market structure is likely to affect SMEs presence.

One of problems with these studies is that the studies do not examine the difference in the effect of market structure on the viability of SMEs, depending on the measurement of the activity of SMEs. There are likely to be variation in subsistence within SMEs sector. Also, SMEs may be different from large firms in used technology. Therefore, the relationship between market structure and SMEs' share may vary, depending on the measurement of the size of SMEs.

On the other hand, as suggested earlier, there is no empirical study on SMEs' share at a cross-industry model in both Japan and the UK. Therefore, it is necessary to examine the problem empirically.

IV The Empirical Methodology

The size distribution of firm may be explained by the following linear-form model including the possible determinants discussed above;

$$S = \beta_0 + \beta_i \sum_{i=1}^{n} X_i + \gamma$$

where S is SMEs' share in an industry, X_i ($i = 1,..,n$) a vector of n ($i = 1,..,n$) observable industry-specific explanatory variables, and γ error term. β_0 and β_i are regression coefficients. SMEs' share was measured by both employment and sales. Among the explanatory variables are measures of scale economies, capital intensity, advertising intensity (product differentiation), research and development (R&D) intensity, overhead intensity (managerial and administrative capability), industry market size, industry growth, and subcontracting works.

The equation was estimated by the OLS method for 90 four-digit census industries in Japan, and also for 65 three-digit census industries in the UK, in 1990 respectively. The sample size is based on the availability of data for SMEs' share. Unfortunately the relevant data were not disclosed due to the secrecy rule in many industries. Therefore, the sample was restricted to the above size.

Next, we will present the measurement of the variables. There are some differences in the used variables and their measurements between Japan and the UK, largely due to the difference in the availability of necessary data. The variables are summarized in Appendix Table.

(1) *SMEs' share (Se, Ss).* SMEs are firms with less than 100 million yen of equity capital in Japan, and are firms with less than 500 employees in the UK [7]. Unfortunately, in Japan it is difficult to capture fully the share of firms with less than 300 employees, because the official statistics used does not disclose the data by industry of the economic activity of "firms" with less than 300 employees in 4-digit classification industry.

The shares in 1990 in terms of both employment (hereafter employment share(Se)) and sales (hereafter sales share(Ss)) were calculated from the *JP Census (Firms)* at 4-digit industry level in Japan, and from the *UK Census* at 3-digit industry level in the UK. Sales mean "value of shipments" in Japan, and "sales and work done" in the UK.

In most of the sample industries, sales share is lower than employment share. The fact, as suggested earlier, suggests that SMEs sectors are more labor-intensive than large firms sectors. The correlation coefficient is 0.9389 (N=90) in Japan, and 0.9629 (N=65) in the UK.

(2) *Concentration (CR).* Concentration has been found to be negatively related to SMEs share in the US manufacturing industries. The findings suggest two-fold effects; The first "structural" relationship is that higher concentration industries tend to have skewness in firm size distribution biasing against SMEs; The second "behavioral" effect is that in those industries, leading firms take strategies of giving SMEs disadvantages.

Concentration was measured by: 4-firm concentration ratio in terms of production in 1990 in Japan, and 5-firm concentration ratio in terms of output in 1990 in the UK.

(3) *Scale economies (SE).* It has been found that economies of scale have a significant influence on firm size distribution or industrial concentration; The economies are an important determinant of both industrial concentration and the height of entry barriers. Put

alternately, the economies provide disadvantages for SMEs. Therefore, the larger the economies relative to market size are, the smaller the share of SMEs is.

The economies were captured by the frequently-used approach; market share of the mean size of establishments accounting for more than half of the industry value-of-shipments in 1990 in Japan, and market share of the mean size of "business" accounting for more than half of the industry sales-and-work-done in 1990 in the UK.

(4) *Capital intensity (KA).* A capital intensity variable is included to test the traditional entry barrier theory. In an industry with higher capital intensity, it may be difficult to raise capital requirement for the undertakings. Also, firms and in particular SMEs may face exit barrier, since the equipments may be of an industry-specific type, and therefore include larger sunk costs. These burdens may limit SMEs' growth and share.

The capital intensity was measured by: fixed assets/employment in 1990 in Japan, and net investment/employment in 1990 in the UK, which are both in logarithm. In the UK, fixed or total assets are not available, and therefore net investment was used in spite of the qualification.

Also, the related variable is capital requirements. If the requirements are large in an industry, then SMEs may face difficulty of raising enough finance to grow or enter. Therefore, the larger the capital requirements are, the lower the share of SMEs is. The variable (KR) is captured by; fixed assets/number of establishments in Japan, and investment/number of firms in the UK.

(5) *Overhead intensity (OV).* Many economists emphasize the importance of managerial and administrative capability as a factor detering the size and growth of SMEs. The overhead element reflects the overall capability of management and administration including sales promotion and R&D referred to later. SMEs may have less capability to take advantage of the opportunity, relative to large firms, which is likely to lead to smaller share. In fact, Doi[1992] suggests that in more overhead-intensive industries, SMEs have less efficiency relative to large firms.

The importance of overhead element was captured by: non-production workers/total employment in both the countries, which is called overhead intensity here. The variable may reflect the combined effect of advertising and R&D discussed later, since non-production workers include persons responsible for sales promotion and R&D. In fact, it is significantly related to both advertising and R&D intensities.

(6) *Advertising intensity (AD, ADd).* Advertising has been found to have an entry-preventing function, and to hinder lower firms from growing into large firms sector. The finding suggests that the larger the intensity of advertising is, the smaller SMEs' share is.

Advertising intensity was measured by: advertising expenditures/ industry output (*AD*) in 1990 in Japan. The input-output table was utilized. But in the UK, the ratio was not able to be calculated because of unavailability of relevant statistics. The alternative method was to introduce a dummy variable (*ADd*); 1 for consumer goods and zero otherwise. It is because a consumer-goods industry is frequently advertising-intensive. The dummy variable was used in Japan as well.

(7) *R&D intensity (RD, RDd).* R&D-intensive undertakings, as discussed earlier, may provide disadvantages for SMEs. But, technological progress may throw up many opportunities for developing new products or processes. Then, in R&D-intensive industries, SMEs also may have more opportunity to innovate. In fact, for example Gellman Research[1982] shows that over 40 percent of "important innovations" in the US have taken place from SMEs with less than 500 employees. Also, more dramatic result is found in the UK; ENSR[1995] suggests that SMEs with less than 100 and 500 employees are responsible for 64 and 79 percent of total domestic innovations respectively (Also, Coombs et al. [1995]). Also, Pratten[1991] suggests the importance of technological development in the competitiveness of SMEs [8]. If SMEs are more innovative than large firms, then the relationship between SMEs presence and R&D may not be a priori definite.

R&D was measured relative to output in Japan; R&D expenditures/ output (*RD*) in 1990, available from the input-output table. But, the ratio was not available in the UK, and therefore a dummy variable (*RDd*) was introduced; 1 for the "progressive industries" such as chemicals,

general machinery, electrical equipment, transportation equipment and precision instrument, and 0 otherwise.

(8) *Subcontracting work ratio (SW).* SMEs in an industry consist of largely two subgroups; independents competing with large firms, and subcontractors supplying parts, components, and peripherals for large firms within the industry. If large firms integrate vertically and produce in-house, then there are a smaller number of the latter type of SMEs, and therefore there are a smaller number of SMEs.

The effect of subcontracting relationship or vertical integration may be captured by the intra-industry transacion ratio of an industry. In industries with larger intra-industry transaction, the transaction from SMEs' subcontractors to large firms may be larger, as well. Therefore, the variable may be positively related to SMEs' share. The variable was measured by the ratio of intra-industry transaction to industry output (SW) at 6-digit input-output-table industry classification, which is roughly similar to 4-digit SIC industry classification. The variable in 1990 was calculated for only Japanese industries from the input-output table.

Also, value-added/output ratio (VA) in 1990 was introduced as a proxy of vertical integration in both the countries.

(9) *Industry size (IS).* In general, other things being equal, the larger the industry market size is, the larger the share of SMEs is. The logarithms of industry value-of-shipments in Japan and of industry sales-and-work-done in the UK were respectively included to test the relationship.

(10) *Industry growth (DG).* Many existing studies show the finding that the larger industry demand growth is, the larger the rate of entry is. The finding suggests that more SMEs have a room for entering and surviving. Also, Doi[1992] shows that demand growth leads to lower SMEs productivity relative to industry productivity. The coexistence of efficient large firms and inefficient SMEs is supported by Audretsch and Yamawaki[1992]' finding that demand growth facilitates the viability of SMEs with suboptimal plants. Therefore, it is expected that demand growth is positively related to SMEs' share.

The growth was measured by: value of shipments in 1990/value of

shipments in 1986 in Japan, and output in 1990/output in 1986 in the UK.

The data sources of most of the variables used here are the *JP Census (Industry)*, the *JP Census (Firm)*, and the *Input-Output Table 1990* in Japan, and the *UK Census* in the UK. When data source was not referred to, the source used was the *Census* statistics in both the countries. In Japan, all the variables other than SMEs shares were computed from the *Census (Industry)*. But, the *Input-Output Table* was used for advertising intensity, R&D intensity, and subcontracting work ratio in Japan. Also, concentration ratio was used directly from the Fair Trade Commission' data (i.e., *The Trend in Cumulative Production Concentration Ratio and Herfindahl Index*), and for some industries was computed from published data (i.e., *Market Share in Japan*, by Yano Economic Research Institute; *Market Share*, by Nikkei Industrial Newspaper; and statistical data books published by trade associations).

V Estimated Results

The estimated equations are shown in Tables 2 (sales share) and 3 (employment share) for Japan, and in Tables 4 (sales share) and 5 (employment share) for the UK. We will look at the results in turn. The significance test of regression coefficients is based on two-tailed test; The significance level is shown in the tables.

(1) Japanese Results

《Tables 2 and 3》

Some alternative equations were estimated, taking into account high correlations found among several independent variables. First, concentration ratio(*CR*) is negatively and significantly related to SMEs share. This fact, as suggested earlier, reflects the skewness in firm size distribution, and also may suggest that SMEs are disadvantaged by the "inherent power" or strategies of leading firms. But, the relative importance of the two effects can not be distinguished. Also, this variable may be a summary variable including scale economies and capital

intensity and requirements discussed next, since the former has a high correlation with the latter variables respectively.

Also, capital intensity(*KL*) and capital requirements(*KR*), which have high correlation with concentration, are both negatively related to both measures of SMEs' share. These results are consistent with existing studies, suggesting capital assets as a factor detering SMEs' entry and growth. Thus, SMEs, potential and incumvent, have disadvantages in growth against large firms, because of capital assets barriers.

Further, the scale economies variable(*SE*) similarly have a negative influence. Therefore, in an industry with large scale economies, SMEs face disadvantages of smallness, with the result that they can not grow or enter.

Second, overhead intensity(*OV*) has a negative influence on sales share. Therefore, in industries with greater managerial and administrative capability, SMEs have disadvantages against large firms. The variable, as suggested earlier, may reflect the combined effect of R&D and sales promotion activity. But, there is no definite relationship between this variable and employment share.

In fact, R&D intensity(*RD*) is negatively related to both the measures of SMEs' share, although in equation E3 the variable was not significant, due to high correlation to scale economies. The result is consistent with the result of overhead intensity. Therefore, overhead-intensive and R&D-intensive industries have a smaller SMEs' share. Put alternately, SMEs are likely to have less capability of managerial administration and R&D, and thereby are difficult to enter or survive.

However, advertising intensity(*AD*), part of overhead capability variable, has a positive and significant effect on only employment share, which is different from the existing studies and also from the result in the UK discussed later. This result may be due to de-standardization of consumer taste referred to earlier. At least, advertising have no effect of providing disadvantages for SMEs. But, it is difficult to explain the difference in advertising effect between sales and employment shares. The insignificance of the variable in the sales share equation may imply that the viability of SMEs through product differentiation is weak.

Third, neither industry size(*/S*) nor industry growth(*/G*) has significant relationship with SMEs' shares, with the negative sign. These results are a little puzzling. The negative sign suggests that in industries with smaller market size, SMEs are dominant.

Finally, the coefficient on subcontracting work ratio (SW) is not significantly different from zero, suggesting no definite influence on SMEs' share [9]. Also, the sign is different between sales and employment share; negative for sales share, but positive for employment share. The sign may suggest that the extent of subcontracting relationship is better reflected in employment share than in sales share, since subcontractors are frequently labor-intensive. The intra-industry transaction ratio might not capture fully the extent of subcontracting works.

Thus, in Japan, the significant determinants of SMEs presence are concentration, overhead intensity, R&D intensity, advertising intensity, scale economies, capital intensity, and capital requirements. All the varioables excluding advertising intensity have a negative influence. Also, it is worth noting that the effect of adverising varies, depending on the measurement of SMEs' share.

(2) Results in the UK

Tables 4 and 5 shows interesting findings for both employment and sales shares of SMEs.

《Tables 4 and 5》

First, the effects of concentration ratio(*CR*), scale economies(*SE*), capital intensity(*KL*) and requirements(*KR*) are all consistent with the Japanese experience; Those variables have a negative influence on SMEs presence in both the shares. Thus, it is more difficult for SMEs to survive in industries with higher concentration, larger scale economies, larger capital intensity and requirements, since those factors are likely to serve to form the barriers to growth of SMEs.

Second, industry size(*/S*) is negatively and significantly related to SMEs share in both the shares. In other words, in industries with

smaller market size, SMEs are dominant; the larger the market size of an industry, the smaller the room for SMEs survival is. This result is different from the finding in Japan.

On the other hand, the results of industry growth(*IG*) are puzzling; it has a positive effect on SMEs' employment share, but has no significant effect on sales share, although having a positive sign. It may be that industry growth allows a greater number of SMEs to survive (which in turn lead to greater employment), but they can not gain a proportinate increase of sales.

Third, look at the effect of managerial capability. Overhead intensity(*OV*) has no significant effect, with a negative sign. But, both R&D and advertising (*RDd* and *ADd*), which are part of overhead capability variable and were captured by the 0-1 dummy, have a negative and significant effect on SMEs presence. In some equations, the coefficients of these variables were not significant due to high correlation with other variables (i.e., concentration and scale economies). Therefore, R&D and advertising have a significant, although weak, influence on SMEs presence. This result on advertising is consistent with Pratten[1991]'s conclusion that "the area where the handicap of small firms is serious is for selling and marketing".

Finally, value-added/output ratio(*VA*) was used as a proxy of vertical integration, since vertical integration in an industry is expected to be negatively related to SMEs presence in the industry. The result is not shown in the tables. The ratio has no definite effect. In recent years, as Morris and Imrie[1992] suggest, the UK large firms tend to transform input strategy from "in-house production" to "outsourcing in particular from SMEs", suggesting that SMEs have a greater share. But, the relationship could not be verified. The result may be attributable to the reason that the ratio can not capture the extent of vertical integration fully.

Thus, in the UK manufacturing industries, concentration, capital intensity and requirements, R&D and advertising, and industry size have a negative influence on SMEs presence. On the other hand, industry growth has a positive eefect, in particular on employment share of SMEs. The effects of concentration, capital intensity and requirements, and

R&D are consistent with Japanese counterparts.

VI Concluding Remarks

An attempt has been made to test and compare the possible determinants (and in particular with reference to market structure) of SMEs presence in both Japanese and UK manufacturing industries at a cross-industry model.

The results suggest that market structure elements have a definite influence on SMEs presence in Japanese and UK industries. This conclusion is consistent with the findings observed in the US and other European countries. The main results here are summarized as follows;

(1) Concentration is negatively related to SMEs' share.

(2) Capital assets factors like capital intensity and requirements have a negative influence on SMEs presence.

(3) Scale economies have a negative association with SMEs' share.

(4) R&D provides disadvantages for SMEs.

(5) The above results are found for both the countries, suggesting a similarity in the pattern of determinants.

However, some factors show different relationship between the countries. First, advertising has a negative effect in the UK, but in Japan it has a positive effect or has no effect.

Also, both industry size and growth have a different relationship between the countries. These factors have a significant effect in the UK; The former has a negative effect, while the latter a positive effect. On the other hand, these factors have no discernible effect in Japan.

(6) Subcontracting has no definite influence on SMEs' share.

Thus, industrial market structure affects SMEs presence. SMEs as a competitor and innovator are likely to be related to market structure. Therefore, public policy should be concerned with underlying product market characteristics; It is necessary to build competitive or free-access environments to promote SMEs.

However, there remain some problems to be examined. In particular, the effects of "flexible production", and of compensation differentials

between SMEs and large firms (which has been emphasized as the most important problem in Japan) should be analyzed. Also, SMEs sectors have diversified subsectors like "vital independents" and subcontractors. The determinants of their presence should be examined respectively.

Furthermore, it is necessary to investigate the determinants of "medium-sized firms", since one of the characteristics of contemporary industrial organization in the developed countries is surging importance of the medium-sized firms between large firms and SMEs, as well as SMEs. Finally, SMEs presence is likely to be affected by public policy toward SMEs. The problem is the subject of another paper.

Note

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The authors wish to acknowledge the financial contribution from the *Nomura Fund* (*Nomura Kikin*). They also are indebted to the Small and Medium Enterprise Agency and Fair Trade Commission, Japan for providing us the relevant data and information.

(1) One of the reasons of the diffrentials is that large firms' subsidiaries with less than 300 employees or with less than 100 million yen of equity capital are counted as SMEs in Japan. Also, small share in the UK food industry may be due to two-fold reasons; First, high is concentration of super markets as a buyer and retailor of manufactured foods; Second, the contents of foods in the UK may be different from Japanese counterpart, because of the difference in dietary habits or life.

(2) The possibility is suggested by the interesting findings that "own brands" have great share in the UK grocery markets, and that their extention has induced the growth of "tertiary brands" with no or weak brand power, which are frequently produced by lower firms

Appendix Table Summary Explanation of Variables

Variable		Explanation
Ss	SMEs share	SMEs sales/industry sales(Japan; UK)
Sc	SMEs share	SMEs employment/industry employment(Japan; UK)
CR	Concentration	cumulative 4-firm(Japan) and 5-firm(UK) shares
SE	Scale economies	market share of the mean size of establishments (Japan) and of businesses(UK) accounting for over half of industry sales
KL	Capital Intensity	fixed assets/employees(Japan); net investment/ employees(UK). logarithm
KR	Capital requirements	fixed assets/establishments(Japan); net investment /enterprises(UK). logarithm
OV	Overhead intensity	Non-production workers/total employment(Japan; UK)
RD	R&D intensity	R&D expenditures/output(Japan)
RDd	R&D dummy	1 for progressive industries, and 0 otherwise (UK)
AD	Advertising intensity	advertising expenditures/output(Japan)
ADd	Advertising dummy	1 for consumer goods, and 0 otherwise(UK)
SW	Subcontracting work ratio	within-industry transaction/output(Japan)
IS	Industry size	sales. logarithm(Japan; UK)
IG	Industry growth	1990 sales/1986 sales(Japan; UK)
VA	value-added ratio	value-added/industry output(UK)

Note: (1) All the variables excluding IG were measured in 1990.
(2) Sales mean: value-of-shipments in Japan, and sales-and-work -done in the UK.

Table 1 SMEs' Share in Japan and the UK, by Industry, 1990

Industry	Japan				UK	
	SMEs(1)		SMEs(2)		SMEs	
	EM	VS	EM	VS	EM	VS
Food	71.6 %	42.2 %	76.1 %	55.9 %	29.5 %	23.8 %
Textiles	79.1	69.0	83.5	75.4	49.4	49.4
Clothing	96.6	93.1	93.9	92.2	55.6	53.8
Lumber & furniture	89.6	81.1	92.9	85.5	78.2	76.7
Pulp & paper	64.5	38.5	70.0	46.9	48.3	44.6
Printing & publishing	75.5	56.3	78.4	56.7	57.9	50.5
Chemicals *	23.4	10.9	38.3	29.3	28.4	23.8
Petroleum & Coal products	20.2	3.1	44.8	16.1	n.a.	n.a
Plastics	73.5	55.1	81.8	69.2	67.1	60.9
Rubber	56.7	36.4	54.8	36.9	33.4	28.1
Leather	87.9	91.6	94.9	93.7	n.a.	n.a.
Clay & stone	68.3	52.6	78.7	66.9	35.6	32.3
Iron & steel	34.1	23.4	41.1	34.2	24.1	15.4
Nonferrous metals	42.8	25.5	49.8	37.6	40.9	34.3
Metal products	79.8	64.5	85.6	74.1	69.1	63.1
General machine	60.1	40.8	68.7	52.0	58.3	50.0
Machine for office/data**	n.a.	n.a.	n.a.	n.a.	35.3	17.3
Electrical equipment	49.3	23.2	46.1	22.2	34.1	29.4
Transportation equip.	34.8	13.6	32.7	13.1	20.3	13.1
Precision instrument	57.5	38.9	60.9	42.2	66.9	63.1
Others	80.1	56.8	84.4	65.5	83.8	82.1

Note: (1)Japan; SMEs(1) and (2) are respectively: firms with less than 100 million yen of equity, and with less than 300 employees.
UK ; SMEs: firms with less than 500 employees.
(2) EM stands for employment, and VS for value-of-shipments in Japan and sales-and-work-done in the UK.
(3) In the UK industry with *, man-made fibers are not included, due to undisclosed data. In Japanese industry with **, the data are included in general and electrical equipment.

Source: Japan; the *Census of Manufacture, by Industry,* and *by Firm, 1990.*
UK; the *Census of Production, 1990.*

Table 2 Estimation in Japan: Sales Share, 1990 (N=90)

Equation No.	S1	S2	S3	S4
Const.	124.030	108.696	111.354	85.227
	(10.667)	(9.331)	(10.389)	(7.533)
CR	-0.345a	-0.293a		
	(5.125)	(4.229)		
OV	-0.261c			
	(1.836)			
IS	-3.251b	-1.997	-2.420	-0.025
	(2.431)	(1.434)	(1.401)	(0.017)
IG	-9.171c	-7.496	-4.337	-4.827
	(1.753)	(1.448)	(0.878)	(0.854)
SE			-1.412a	
			(3.777)	
KL	-15.797a	-17.101a	-10.657a	-20.271a
	(7.407)	(8.305)	(3.298)	(9.587)
KR			-6.174b	
			(2.488)	
RD		-1.697a	-0.992c	-2.337a
		(2.881)	(1.686)	(3.729)
AD		0.237	0.008	0.243
		(0.372)	(0.012)	(0.347)
SW	-0.035	-0.072	-0.044	-0.256
	(0.201)	(0.438)	(0.284)	(1.456)
$\bar{R}^2$	0.611	0.628	0.670	0.550
	[24.321]	[22.477]	[23.590]	[19.135]

Note: Notations are shown in Appendix Table; t-value in ( ), and F-value in [ ]; Significance level: a=1%, b=5%, c=10% (two-tailed test).

Table 3 Estimation in Japan: Employment Share, 1990 (N=90)

Equation No.	E1	E2	E3	E4
Const.	130.657	118.176	135.054	97.160
	(9.765)	(9.010)	(11.422)	(7.898)
CR	-0.311a	-0.262a		
	(4.010)	(3.414)		
OV	-0.135			
	(0.824)			
IS	-2.361	-1.236	-1.121	-0.585
	(1.530)	(0.788)	(0.626)	(0.367)
IG	-6.422	-4.354	-0.348	-1.964
	(1.067)	(0.747)	(0.068)	(0.319)
SE			-1.327a	
			(3.112)	
KL	-20.340a	-21.385a	-10.581a	-24.223a
	(8.288)	(9.224)	(3.155)	(10.537)
KR			-9.727a	
			(3.777)	
RD		-1.750a	-0.676	-2.324a
		(2.640)	(1.107)	(3.410)
AD		1.356c	0.974	1.361c
		(1.896)	(1.544)	(1.791)
SW	0.105	0.044	0.136	0.120
	(0.529)	(0.237)	(0.845)	(0.629)
$\bar{R}^2$	0.600	0.634	0.724	0.589
	[23.277]	[23.021]	[30.196]	[22.081]

Note: Notations are shown in Appendix Table; t-value in ( ), and F-value in [ ]; Significance level: a=1%, b=5%, c=10% (two-tailed test).

Table 4 Estimation in the UK: Sales Share, 1990 (N=65)

Equation No.	S1	S2	S3	S4	S5
Const.	130.148	132.937	167.023	175.315	56.316
	(9.730)	(9.512)	(6.810)	(6.608)	(2.818)
CR	-0.771a	-0.756a			
	(12.124)	(11.097)			
OV	-0.121				
	(1.062)				
IS	-8.332a	-8.811a	-9.561a	-6.792b	-4.176c
	(5.260)	(5.664)	(3.753)	(2.587)	(1.873)
IG	9.119	8.017	19.938c	17.984	7.114
	(1.257)	(1.056)	(1.832)	(1.523)	(0.716)
SE			-3.501a		
			(3.421)		
KL			-8.228a	-12.051a	
			(2.717)	(3.938)	
KR					-8.751a
					(6.949)
RDd		-2.586	-2.256	-7.527c	-6.915b
		(1.011)	(0.574)	(1.916)	(2.111)
ADd		-1.876	-4.101	-11.219a	-8.076b
		(0.663)	(0.937)	(2.681)	(2.286)
$\bar{R}^2$	0.755	0.752	0.487	0.393	0.579
	[50.415]	[39.796]	[11.111]	[9.304]	[18.591]

Note: Notations are shown in Appendix Table; t-value in ( ), and F-value in [ ]; Significance level: a=1%, b=5%, c=10% (two-tailed test).

Table 5 Estimation in the UK: Employment Share, 1990 (N=65)

Equation No.	E1	E2	E3	E4	E5
Const.	114.067	118.175	154.786	162.348	39.855
	(7.936)	(7.891)	(6.430)	(6.308)	(2.179)
CR	-0.731a	-0.703a			
	(10.631)	(9.636)			
OV	-0.049				
	(0.396)				
IS	-8.221a	-8.541a	-8.867a	-6.342b	-3.434c
	(4.798)	(5.124)	(3.547)	(2.490)	(1.681)
IG	20.105b	18.576b	29.698a	27.917b	16.541c
	(2.563)	(2.283)	(2.782)	(2.437)	(1.816)
SE			-3.192a		
			(3.179)		
KL			-8.679a	-12.164a	
			(2.920)	(4.097)	
KR					-9.185a
					(7.963)
RDd		-1.940	-1.697	-6.504c	-5.843c
		(0.708)	(0.440)	(1.707)	(1.948)
ADd		-3.251	-5.365	-11.856a	-8.512b
		(1.071)	(1.249)	(2.921)	(2.631)
$\bar{R}^2$	0.708	0.709	0.496	0.418	0.640
	[39.819]	[32.255]	[11.484]	[10.187]	[23.713]

Note: Notations are shown in Appendix Table; t-value in ( ), and F-value in [ ]; Significance level: a=1%, b=5%, c=10% (two-tailed test).

or SMEs. See Doi[1994] and Samways and Whittome[1994].

(3) The divergent discussions are found in for example Scherer and Ross[1990] and Kirchhoff[1994].

(4) For example, Abbot and Hay[1995] is very interesting.

(5) For subcontracting relationship, see Doi and Cowling[1995].

(6) Also, the growth of SMEs is discussed in many studies like Bamberger[1994] and Barber et al.[1989].

(7) For the definition of SMEs, see Doi and Cowling[1995].

(8) In recent years, there are an increasing number of joint R&D ventures between large firms and SMEs. Doi[1995] shows that more than half of sampled big firms have joint R&D partnership with SMEs. The fact suggests that SMEs have a larger technological competitiveness.

(9) We used the ratio of within-industry transaction to output for SMEs of 2-digit industry, which was computed from the *Input-Output Table by Size* (unpublished), by Small and Medium-Sized Enterprise Agency, Japan. But, the variable had no effect as well.

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