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Price Markups, Market Structure, and Business Fluctuation in Japanese Manufacturing Industries

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Abstract

This paper investigates the determinants of markups (the value of shipment divided by the material and labor costs) and of the percentage changes in markups using the data of Japanese manufacturing industries for each of the twelve periods defined over 1958-1982 according to the phases of business fluctuation. The positive effect of concentration and product differentiation on markups is observed but this effect seems to take place mainly through its effect on risk as measured by the variability of markups; that is, concentration is observed to increase this risk which in turn increases markups. The study with the changes in markups suggests that the hypothesis of Wachtel and Adelsheim, and Cowling that the firms in concentrated markets increase their markups during recession is not supported with the Japanese data. Causes for this Japan-U.S. differences are discussed.

1. Introduction

How much price markup to make, that is, how much profit margin (gross of capital costs) to add to the labor and material costs, is certainly the most important decision for a monopolistic or oligopolistic firm. Too large a markup will hurt the demand, reducing the sales revenue. Too small a markup will stimulate the demand but, with the slim profit margin, may decrease the total profits. The firm thus endeavors to make this decision most deliberately with as much information as it can get on the factors that affect the demand for the product. The two most important such factors are probably the strength of industry demand and its distribution across the firms. Given the attractiveness of the product and the preference ordering of consumers, the first will be mostly determined by the purchasing power of the buyers which should be larger in expansionary phases of business fluctuation than in recessionary phases. The second will be mostly determined by the market structure of the industry such as concentration, entry barriers, the extent of import, product differentiation, and individual firms' market shares. The study of price markups can be fruitful therefore only when their relation with business fluctuation and market structure is fully considered. The present analysis aims to do this by using the Japanese data for manufacturing industries in 1958-82.

There are a few studies that have addressed to the similar or related questions. Shinjo (1977), in his examination of the administered price hypothesis for the manufacturing industries in Japan, 1960-74, revealed that the effect of concentration on annual price change, controlling the rates of labor cost increase and material cost increase (weighted with respective shares in costs), is significantly positive in contractionary periods but mostly insignificant (though positive) in other periods. The study therefore suggests the variability of pricing decision of oligopolistic firms over business cycle,

suggesting also the variability of markups.

Our analysis unlike Shinjo's focuses on markups rather than prices for the following reasons. First, because the past studies in industrial organization yielded numerous evidences on the relationship between markups or, equivalently, price-cost margins on the one hand and market structure on the other, we want to make our study comparable with them. Second, the study of administered prices by Shinjo (and implicitly by such American authors as Dalton and Lustgarten) assumes a Cobb-Douglas production function and profit-maximizing levels of non-capital inputs such as employment and raw materials. However, whether employment is in fact at an instantaneous-profit-maximizing level may not be assumed a priori. Third, oligopolistic firms are often observed to aim at target markups as a pricing rule of thumb (the classical reference is of course Hall and Hitch (1939)), in which case the markups must be a better dependent variable in regression analyses. And fourth, the data for markup ratios can be obtained from the same source, i.e., Census of Manufactures, as the data for some of the explanatory variables, thus minimizing the disturbances.

Whether firms with market power tend to increase or decrease their markups (in ratio) in recession is not a priori obvious. Wachtel and Adelsheim (1977, hereafter WA) and Cowling (1983) argue that they tend to increase them. WA says "firms operating in concentrated industries will increase their price markups during recessions to the extent they can, in order to recapture revenues lost from declining sales" (WA, p.7), whereas Cowling says "the existence of excess capacity will tend to bolster collusion by making it clear to participants that rivals can react immediately — the existence of excess capacity makes the threat of retaliation more credible" (Cowling, 1983, p.342). Thus, according to these writers, firms in recession have both an incentive to increase markups and the means to attain it, namely, collusion fostered by the existence of excess

capacity. WA justified this hypothesis by use of the American industrial data (to be discussed in detail in Section 3) and Cowling, the aggregate time-series data for the U.K. manufacturing. Qualls, on the contrary, hypothesized that "the same factors (such as high concentration) which allow for the maintenance of higher margins above cost also may allow for margins to be varied (in keeping with industry-wide profit maximizing considerations) in the face of fluctuating industry demand without interfirm coordination being destroyed" (Qualls, 1979, p.310, the first parenthesis is mine, the second his), and showed that the trend-free price-cost margin is positively correlated with concentration in 1966, the peak year of a business cycle, and negatively correlated in 1958 and 1970, the trough years.1/

Therefore, whether the markup or price-cost margin should increase or decrease in recession in concentrated markets cannot be a priori determined. Moreover, it may differ across countries. For instance, Cowling's thesis may not hold in Japan where the claim by the oligopolistic industries of 'excessive' competition tends to be particularly vocal during recession. WA's thesis may be also questioned in Japan where the maintenance of employment against stagnating demand is considered one of the prime objectives of the management. (More will be said on this in the concluding section.) Thus the controversy can be only fruitfully examined by means of empirical studies. Hopefully, by comparing the Japanese result to the American or British result, a new perspective will be obtained on the Japan-U.S. (or U.K.) comparison of the behavior of the firm.

The paper is organized as follows. Section 2 investigates the determinants of the level of markups in each of twelve periods defined over 1958-82. Section

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1/ With the data of 283 German corporations, Neumann et al (1983) obtained a similar result; that is, the effects of concentration on price-cost margin (not free of trend) were larger in the years of business cycle upswings than in the years of recession.

3 explains WA's empirical justification and gives the result of a comparable attempt for Japan. Section 4 presents the results of multiple regressions to account for the change in markups. These results are rather negative to the hypothesis of WA and Cowling that firms with market power tend to increase markups in recession. The concluding Section 5 summarizes the results and attempts to interpret this Japan-U.S. difference with different employment practice and management motivation of the two countries.

2. The determinants of markups

The list of the variables, their definition, and data source is given in Table 1. As for the concentration ratio we had a difficult choice. The concentration data published by the Japanese Fair Trade Commission is available every year but its industrial coverage is selective and the industrial classification often differs from that used in the Census of Manufactures from which the markup ratio, MU, has been computed. Another concentration data is the unpublished one of the Ministry of International Trade and Industry. Although this is available only for 1971, it is computed from the same source as the Census, minimizing the disturbances in regressions and increasing the number of observations compared to the FTC data. In fact, with the MITI data 189 to 254 observations (varying from period to period and from model to model) can be used, more than double than those available with the FTC data. The price for this larger sample is the need to assume that the concentration ratio has been invariant over time. According to Senoo (1983, p.167) the coefficient of rank correlation between the Herfindahl indexes in 1971 and 1974 was 0.7950; between 1974 and 1977, 0.7704; between 1977 and 1980, 0.8118; and between 1971 and 1980, 0.6651, all being highly significant.[2/] This result, together with the high

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2/ These were computed with the 327 industries (including non-manufacturing industries) reported in the FTC data, many of which cannot be used in our study due to the lack of correspondence with the Census data.

correlation between CR4 and Herfindahl index in our sample (the correlation coefficient was 0.865), seems to suggest that the assumption of invariant industrial ranking of concentration ratio is not farfetched. In our judgement at least, it is not so farfetched as to outweigh the advantage of a larger sample and the accurate pairing of industry classification across variables. For these reasons, we have decided to use the MITI data.[3/]

The period under study, 1958-1982, was divided into twelve subperiods based on the definition of business cycle by the Economic Planning Agency. This definition gives the months of peak and trough of every business cycle. Therefore, we defined those years mostly in the transition from trough to peak as expansion periods and those from peak to trough as recession periods. The twelve periods thus defined are in Table 2.[4/] As one will immediately observe, all the recession periods (even-numbered periods) have the lengths of only one year except for the most recent twelveth period, whereas all the expansion periods (odd-numbered periods) have the lengths of two to five years. Of course, this reflects the fact that until recently Japan was essentially a growing country with only modest and short-lived downturns.

We first examine the effect of market structure on the markup ratio MU. Table 3 gives the result of OLS multiple regression[5/] of MU on the four-firm concentration ratio CR4, the capital-requirement entry barrier KR, the advertising intensity ADP which is a proxy for the extent of product differenti-

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3/ The assumption of intertemporal invariance had to be also made with respect to IM and ADP due to the unavailability of the time-series data.

4/ All the peaks (troughs) occurred either before March of a year in which case this year was included in a recession (expansion) period or after October in which case the year was included in an expansion (recession) period, except for the peak of July 1970. After deliberate examination, this year was included in an expansion period.

5/ All the regressions in this and the following analyses are weighted with the value of industry shipment.

ation, the measure of capacity utilization AD (which is calculated on the assumption that the year of the highest output-capital ratio during 1958-82 is the year of full utilization of capital), and the proportion of imports IM. According to the received hypothesis in the industrial organization literature, all the coefficients should be positive except IM which supposedly intensifies competition and gives a negative impact on MU. The estimation results are mostly consistent with this hypothesis except for KR. The coefficients for KR are positive until Period 5 and negative thereafter and, except for Periods 5 and 6, are statistically significant at the five-percent level. In contrast, both CR4 and ADP have consistently positive and mostly significant coefficients. The coefficients for capacity utilization AD are negative in the first four periods and afterward positive, whereas IM has the expected negative effect in nine of the twelve periods. Both these effects are significant only in a few cases, however.

The results thus suggest larger markups in more concentrated industries, which are consistent with the hypothesis of stronger market power or tighter collusion in these markets. There are two additional findings. The first is the tendency that seems to exist of the diminishing influences of concentration. This is particularly evident in the eighth and the following periods, that is, in the periods after the so-called oil shock of 1973. The second is the tendency that the effect is stronger in expansion than in recession, agreeing with the American result of Qualls (1979) and the German result of Neumann et al. (1983), though this tendency also becomes obscure after the oil shock. Since as discussed above, the effect of capital-requirement barrier KR also turns to negative and significant after the oil shock, a structural change may have taken place following the oil shock in the direction of weakening the impact of market structure on markups.

Table 4 gives the regression results when the standard deviation calculated for each industry from the 1958-82 data of MU, denoted by MUSD, is added as an explanatory variable to capture the effect of risk. Compared to Table 3 a surprisingly consistent and clear change is that MUSD has a strong positive effect whereas the effect of CR4 is now all insignificant with some of the coefficients turning to negative. This suggests the presence of positive risk premiums and agrees with the previous Japanese result of Goto (1973) and the American result of Fisher and Hall (1969), giving the impression that higher markups in concentrated industries are due to the higher risk there, and the risk-adjusted markups (namely, those after deducting the risk premiums) may not differ between concentrated industries and more competitive industries. This, one may argue, is because concentration yielded a more volatile over-time movement of markups, in which case MUSD has to be treated as endogenous (see Caves and Yamey, 1971). To investigate this possibility, we estimated the following system of two equations (the error terms are suppressed):

(1) $$MUSD = \alpha_0 + \alpha_1 CR4 + \alpha_2 KR + \alpha_3 ADP + \alpha_4 IM$$

(2) $$MU = \beta_0 + \beta_1 MUSD + \beta_2 AD$$

(1) presumes that the riskiness is influenced by concentration and other market structure characteristics, while (2) presumes that the riskiness together with the business condition represented here by capacity utilization determines the markups. Since this is a recursive system the OLS is expected to yield unbiased estimates. The result is in Table 5. As expected, the coefficients of CR4 on MUSD are all positive and significant.[6/] The coefficients of ADP are also significantly positive and those of IM, significantly negative. All these results

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6/ For similar findings in the United States, see Qualls (1979) and Winn (1977). Because the data for KR and AD were not available for Period 1, the regression was made only for Periods 2-12.

suggest that a less competitive environment tends to yield a larger variance of markups, except that the effect of KR was not confirmed. This larger MUSD then results in a larger MU as verified by the positive and highly significant coefficients of MUSD in Equation (2). In fact, comparing this result with Table 4, we find that the decreases in R^2 (unadjusted for degrees of freedom) when CR4, KR, ADP and IM are eliminated from the right-hand side are modest and the F values have increased.

Therefore a larger markup in a concentrated industry appears mostly to be the result of the larger variability of markups in such an industry. We are not going to investigate further why concentration yields high variability; however, an important lesson is that one needs to discuss the welfare consequences of concentration very carefully. Neither argueing simply that concentration increases markups and thereby hurts welfare, nor argueing that because risk-free markups are not affected by concentration it cannot hurt welfare is likely inappropriate.

Finally, looking at Table 5 again, we find that the estimated coefficients of MUSD against MU have decreased after Period 8, namely, again, after the oil shock. The coefficients of CR4 against MUSD increased after Period 6 and stayed more or less constant thereafter. Thus, our finding earlier that the contribution of less competitive market structure on markups has declined after the oil shock seems mainly to be the result of a weaker effect of MUSD on MU in these periods.

3. Changes in markups: The hypothesis of Wachtel and Adelsheim

As discussed in the introductory section, WA argued that in concentrated industries the firms tend to increase markups during recession to compensate for the loss of revenues. They compiled Table 6(a) to support this contention. The figure shows the average percentage change in markup for each period and

for each of three groups — high-concentration (CR4 > 50) industries (H) medium-concentration (25 < CR4 $\leq$ 50) industries (M), and low-concentration (CR4 $\leq$ 25) industries (L). Obviously in every recession except 1969-70, the change was largest in the high-concentration industries. In fact, except for 1969-70 markups increased during recession in Group H but decreased in Groups M and L (except for L in 1960-69). In 1969-70, Group H showed a decrease but when the auto industry (particularly hit by the competitive threat of imports during this period) was excluded, the change was positive. In all of the expansion periods the change was largest in Group M while that of Group H was lowest in one period and second lowest in three periods.

The comparable figures for Japan are provided in Table 6(b). In contrast to WA, we find that in none of the six recession periods the percentage change in markup, GMU, was largest in Group H. In fact, it was lowest in three periods and second lowest in the other three periods. On the contrary, it was largest in three of the six expansion periods. Thus the Japanese evidence is inconsistent with the WA hypothesis and, if there is any systematic tendency at all, the high-concentration industries seem to be relatively decreasing their markups in recession and increasing them in expansion. This behavior is opposite to that of the American industries witnessed by WA and may suggest different corporate behavior between the two countries.

There are two additional findings. First, the above-mentioned tendency for the concentrated industries in Japan — relatively increasing MU in expansion and decreasing it in recession — is consistent with the larger effect of CR4 on MU in expansion than in recession observed in the previous section. Second, the variance of GMU across industries in each group for each period (in parentheses in Table 6(b)) was largest in Group H in every period except the sixth.

This study of the WA hypothesis, though simple and appealing, may be criticized because only the means are compared and the effects of other variables are not considered. Multiple regressions are therefore needed.

4. The determinants of the changes in markups

Table 7 gives the results when GMU is regressed to CR4, KR, ADP, GS and IM. This regression differs from the regressions for MU in using the annual rate of sales increase GS in place of capacity utilization AD, because with the dependent variable being a rate of change, the demand condition should be also represented by the rate of change. In addition, the risk variable MUSD is omitted here because there appears no a priori reason to expect a positive or negative effect of risk on the changes in markups.[7/]

According to the WA hypothesis the coefficient of CR4 should be negative in expansion and positive in recession. Only in three of the twelve periods the result agreed with this hypothesis. In Period 6, a recession period, it was significantly positive and in Period 7, an expansion period, it was significantly negative. In Period 10, a recession period, it was positive but insignificant. In other nine periods the result contradicted the WA hypothesis. In particular, in Periods 3 and 9 the coefficients were significantly positive and in Periods 4 and 8 they were significantly negative. Thus any clear tendency cannot be observed and except for the two periods immediately before the oil shock, the general picture is unfavorable to the WA hypothesis.[8/]

7/ In some of the preliminary investigation we added MUSD. The coefficient was significant in several periods; however, its sign was unstable and did not have any consistent tendency (e.g., positive in recession and negative in expansion, or vice versa).

8/ We have estimated another set of regressions replacing KR by the ratio of tangible fixed assets to total shipments, AK, namely capital-output ratio, because in preliminary investigation we found AK to be often better correlated with GMU than KR. In this regression the coefficient of CR4 stayed significantly

(Continued on next page)

The effect of capital requirements KR on GMU in recession may be twofold. On the one hand, because it works as a barrier to entry, it reinforces concentration and, according to the WA hypothesis, likely increases GMU. On the other, KR may deter exit than entry in recession because capital equipments usually constitute sunk costs, in which case a firm with a larger KR may relatively decrease its price to maintain a higher rate of capacity utilization. Thus it is difficult to expect a particular sign for the coefficient of KR, which explains why we had mixed signs with the estimated coefficients of KR. The coefficients are significant in only three periods with mixed signs. Among the six recession periods, the coefficients are positive in three and negative in three. Among the five expansion periods,[9/] they are positive in three and negative in two. Thus neither of the above-mentioned two effects appears dominant.

When AK, the ratio of tangible fixed assets to shipments, was used in place of KR (see footnote 8), the coefficients were positive in Periods 4, 7 and 11, significantly in Period 11, and negative in the other eight periods, significantly in four periods at the five-percent level and in six periods at the ten-percent level. Thus there are much more negative cases than positive cases and particularly in all the recession periods except Period 4 they were negative. Hence as for AK it appears that the negative effect is dominant in recession. Why the result differs this much between AK and KR is an interesting question that cannot be answered here.

(Continued)
negative in Period 7 but turned to negative in Period 6. In Periods 10, 11 and 13, the signs agreed with the WA hypothesis but were insignificant. In all other periods, they remained inconsistent with the WA hypothesis. Thus except for Period 7, the general picture was again unfavorable to the WA hypothesis. Since KR is more easily interpreted than AK as capital requirements associated with entry, we report only the regression results with KR.

9/ Due to the unavailability of the capital data in Period 1, KR was excluded from the estimated equation in Period 1.

ADP is a proxy variable for product differentiation and is expected to increase the market power of the firm. The estimated result reveals the following. Among the six recession periods, the coefficients were negative in Periods 2 and 8, both significantly, and positive in Periods 4, 6, 10 and 12 though significant only in Period 10. Among the six expansion periods, they were negative in Periods 5 and 7, both significantly, and positive in Periods 1, 3, 9 and 11 though significant at the five-percent level only in Period 9. Therefore, no difference is observed between expansion and recession concerning the effect of ADP. Likewise it is difficult to conclude if its effect is in general positive or negative, which makes a good contrast to the consistently positive effect of ADP on MU discussed in Section 2. In other words, it appears that product differentiation tends to affect the level of markups but not the change.

Sales growth is usually associated with the rightward shift of demand curve, which should tend to increase the price and markups. This expected positive effect of growth is confirmed by the generally positive and significant coefficients of GS. The effect of import ratio IM is ambiguous and significant only in Periods 7 and 8.[10/]

Overall, therefore, the result is not conclusive except for the effect of growth, and is not consistent with the WA hypothesis. In fact it appears that there are more evidences against the hypothesis than those favoring it, though this conclusion is tentative because not only the tendency is unclear but also the fit of the model is hardly satisfactory. A possible explanation for this poor fit is that business condition often differs from industry to

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10/ We have also estimated an equation replacing IM by IM times CR4 to test the hypothesis that import gives an additional competitive pressure only in concentrated industries (i.e., a market with low CR4 is competitive regardless of the extent of imports). No improvement was observed and multicollinearity seemed to be serious because IM and CR4×IM are highly correlated.

industry so that even if the macro economy is in recession some industries may be enjoying expanding demands. (Needless to say, this criticism also applies to the analysis of WA in the previous section.) This possibility can be examined by estimating the model with interactive terms as follows:

$$(3) \qquad GMU = \beta_0 + \beta_1 CR4 + \beta_2 (CR4 \times GS) + \beta_3 KR + \beta_4 (KR \times GS) + \beta_5 ADP + \beta_6 (ADP \times GS) + \beta_7 GS + \beta_8 IM$$

suppressing the error term. By differentiation we have

$$(4) \qquad \frac{\partial GMU}{\partial CR4} = \beta_1 + \beta_2 GS.$$

The WA hypothesis may be interpreted as implying that when the rate of growth is small (or more negative) a firm in a concentrated market tends more strongly to increase markups; hence, β_2 will be negative. Although this hypothesis is somewhat supported by our result (see Table 8) because of the five significant (at the ten-percent level) cases four are negative, and of the entire twelve cases seven are negative, the result is hardly consistent across the periods. The same conclusion has to be drawn on the other two interactive terms as captured by the coefficients β_4 and β_6 in (3). At the ten-percent level the coefficients are significantly different from zero in about half of the cases, but the signs are not stable. There are weak tendencies that the interaction term between KR and GS has a positive effect in recession and a negative effect in expansion, and that the signs of the interaction term between ADP and GS are more positive than negative; however, the general picture is by no means conclusive.

Comparing Tables 7 and 8, we find that the introduction of interaction terms has resulted in changes in the estimated coefficients of other terms. For instance, Periods 1, 10 and 11 now have significantly positive effects of CR4, whereas in Period 4 the effect turned from significantly negative to

significantly positive. Thus CR4 now has positive coefficients more often than before, which is not surprising because in equation (4) GS is basically positive and β_2, as we found, is estimated to be more often negative. Another finding from comparing Tables 7 and 8 is that the estimated coefficients of GS tend to be significantly positive in Table 7 but significant only in three cases in Table 8, suggesting that the effect of growth may have been absorbed by the interactive terms.

5. Conclusion

Let us first summarize our findings. Using the samples of 189 to 254 manufacturing industries in Japan, we have investigated the determinants of the level of markups (the ratio of the value of shipments to the costs of raw materials and labor), MU, and the rate of change in markups, GMU, for each of twelve periods during 1958-1982. These periods were defined so that the odd-numbered periods are in expansionary phases of business fluctuation and the even-numbered periods are in recessionary phases. As for MU, we had the following results: (1) Concentration, CR4, significantly increases MU in most periods when the standard deviation of markups, MUSD, is not included as an explanatory variable but does not significantly affect MU in any case when MUSD is taken into account. (2) In fact, high concentration is associated with high MUSD which in turn explains the large MU. (3) Product differentiation increases MU significantly in all the periods, whereas capital requirements increase MU until Period 5 and decrease MU afterward. (4) The effect of CR4 on MU tends to be larger in expansion. (5) When MUSD is not taken into account the effect of CR4 on MU appears to have diminished after the oil shock of 1973-4. This may be basically the result of diminishing effect of MUSD on MU after the shock.

As for GMU, (6) the hypothesis of Wachtel and Adelsheim that the firms in

concentrated markets tend to increase MU in recession and decrease it in expansion is not supported when the average GMU is compared across the three industry categories (classified by concentration ratio) in the manner of WA. In fact the Japanese evidence is rather suggestive of the tendency opposite to the American evidence of WA. (7) The same conclusion is drawn when GMU is regressed to CR4 and other variables. (8) Neither capital requirements entry barrier nor product differentiation seems to have exerted strong or consistent effect. (9) When the interactive term, CR4×GS, is introduced to capture the consequences of interindustry differences in business condition, its sign is more often negative as suggested by the WA hypothesis but the coefficient of CR4 turns to be more often positive.

In general, therefore, it is hard to draw a firm conclusion as to the effect of market structure on the change in markups. The only conclusion we can make is that the WA hypothesis claimed to hold in the United States does not appear to be supported in Japan. Although it is beyond the scope of this analysis to give a comprehensive inquiry into the causes of this Japan-U.S. difference, the following two explanations appear appropriate. The first concerns the different impact of business fluctuation. As discussed in Section 2, recession lasted longer in the United States than in Japan. In Japan, recession lasted only for a year (except Period 12) and tended to be modest, where a decrease in real GNP took place merely once — from 1973 to 1974 (our Period 8) — as a consequence of the so-called oil shock. Therefore it is quite likely that the Japanese managers expected (correctly) that any recession is short-lived and not serious. With this expectation they may have opted not to take a drastic measure in response to declining sales, such as closing the plants, laying off the workers, and changing the pricing policy, which probably explains why little difference was observed between expansion

and recession regarding the determinants of GMU.

This last statement that the Japanese managers tended to avoid laying off the workers is closely related to the second explanation we are now going to make for the Japan-U.S. difference. It has become more widely accepted that human resources are the integral constituents of firms (Odagiri, 1984a). By human resources we imply not only manual labor (as taught in textbook micro-economics) but also all the members of the corporate organization — from manual workers to high-rank managerial staffs — that possess those skills, knowledge and experience specific to the firm and to the individuals. With this importance of human resources, that management makes every effort not to lay off the workers becomes hardly surprising. For one thing, workers with specific skills cannot be immediately and costlessly hired at the market; hence, the firm has an incentive to maintain the surplus workers during recession in expectation of the future need to these workers. For another, these workers and staffs tend to influence the decision-making of the firm, particularly when, as observed by many, control is separated from ownership. In particular they will endeavour to minimize dismissal of fellow workers, even if this hurts the stockholders' interests. For both of these reasons the firm makes efforts to avoid layoffs. One of the present authors has elsewhere analyzed such "layoff minimization behavior" of the firm in comparison to the profit maximization behavior and made an international comparison using the aggregate data (Odagiri, 1984b). His finding clearly indicates that the observed behavior may be consistent with profit maximization in the United States but not in Japan where it is more consistent with layoff minimization. This is hardly surprising in view of the more prevalent practice of lifetime employment and less significant control by ownership in the country.

When the firm increases markups under declining demand as suggested by

WA, it should decrease output even more, forcing many workers to be laid off. Therefore the WA hypothesis is contradictory to the behavior predicted by the layoff minimization hypothesis, and the Japan-U.S. difference in markup decisions observed in the present analysis is consistent with the above finding of Odagiri. That this difference brings important consequences to the macroeconomic stability, that is, layoff minimization serves to reduce business fluctuation, has been theoretically shown in Odagiri and need not be repeated here.

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Table 1. List of Variables

Variable Name	Definition	Period of Observation	Data Source*
MU	Value of shipment divided by the sum of material and labor costs	1958-82	Census
GMU	100×(MU-MU(-1))/MU(-1), where MU(-1) is the value of MU in the last year	1958-82	Census
CR4	Four-firm concentration ratio (in percentage)	1961	MITI
KR	Total tangible fixed assets divided by the number of plants (in billion yen)	1962-82	Census
AK	Total tangible fixed assets divided by the value of shipment	1962-82	Census
MUSD	Standard deviation of MU calculated from the 1965-79 values of MU		Census
GS	Value of shipment this year divided by that in the last year	1958-82	Census
IM	Value of imports divided by total domestic demand	1970	IO
ADP	Advertising expenditures divided by sales	1970	FSPE
AD	AK*/AK where AK* is the minimum AK during the period	1962-82	Census

* Census = Census of Manufactures, Ministry of International Trade and Industry

MITI = Seisan Shuchudo Chosa, Ministry of International Trade and Industry

IO = Input-Output Table, Prime Minister's Office

FSPE = Financial Statements of Principal Enterprises, Bank of Japan

Table 2. Business Cycles in Japan

Expansion		Recession	
Period No.	Years	Period No.	Years
1	1958 - 1961	2	1962
3	1963 - 1964	4	1965
5	1966 - 1970	6	1971
7	1972 - 1973	8	1974
9	1975 - 1976	10	1977
11	1978 - 1979	12	1980 - 1982

Table 3. The Determinants of Markups

Period	Estimated coefficients of*						R^2 (F)	Number of Samples
	constant	CR4	KR	ADP	AD	IM		
1	1.17	0.0033[a] (5.92)		0.009 (0.91)		-0.0026 (-0.94)	0.17 (12.66)	189
2	1.25	0.0015[b] (2.18)	0.043[a] (3.01)	0.041[a] (4.49)	-0.039 (-0.44)	-0.0026 (-1.05)	0.21 (10.34)	199
3	1.19	0.0023[a] (3.59)	0.025[a] (2.73)	0.048[a] (5.64)	-0.011 (-0.12)	-0.0017 (-0.71)	0.29 (16.22)	200
4	1.31	0.0018[a] (2.93)	0.017[a] (2.69)	0.046[a] (5.82)	-0.148[c] (-1.63)	-0.0011 (-0.49)	0.29 (16.38)	200
5	1.26	0.0032[a] (4.33)	0.005 (0.85)	0.017 (1.45)	-0.080 (-0.62)	-0.0050[c] (-1.77)	0.17 (8.29)	199
6	1.01	0.0022[a] (2.95)	-0.006[c] (-1.71)	0.060[a] (5.52)	0.332[a] (2.87)	-0.0021 (-0.66)	0.17 (9.98)	241
7	1.21	0.0016[b] (2.43)	-0.007[b] (-1.99)	0.050[a] (5.17)	0.077 (0.75)	0.0034 (1.21)	0.15 (8.41)	240
8	1.24	0.0007 (1.32)	-0.007[a] (-3.11)	0.037[a] (5.05)	0.063 (0.80)	-0.0022 (-1.04)	0.14 (7.65)	238
9	1.12	0.0010[c] (1.92)	-0.009[a] (-3.95)	0.049[a] (6.91)	0.242[a] (2.95)	-0.0029 (-1.38)	0.23 (13.98)	237
10	1.14	0.0011[b] (2.07)	-0.007[a] (-3.32)	0.050[a] (6.90)	0.177[b] (2.32)	-0.0009 (-0.44)	0.21 (12.91)	238
11	1.20	0.0009 (1.44)	-0.006[a] (-3.14)	0.057[a] (6.76)	0.132[c] (1.72)	0.0015 (0.57)	0.21 (12.91)	237
12	1.23	0.0002 (0.32)	-0.003[b] (-2.18)	0.050[a] (6.04)	0.096 (1.31)	0.0014 (0.54)	0.17 (9.94)	236

* In parentheses are the t-values. a indicates significance at the one-percent level; b, at the five-percent level; c, at the ten-percent level.

Table 4. MUSD and Other Determinants of Markups

Period	Estimated coefficients of							R^2 (F)	Number of Samples
	constant	CR4	MUSD	KR	ADP	AD	IM		
1	1.06	0.0005 (1.02)	4.78[a] (8.77)		0.005 (0.57)		-0.0037 (-1.57)	0.41 (32.71)	189
2	1.26	-0.0002 (-0.44)	3.86[a] (8.35)	0.032[b] (2.55)	0.020[b] (2.47)	-0.129[c] (-1.70)	-0.0088[a] (-3.81)	0.42 (23.31)	199
3	1.13	0.0008 (1.38)	3.50[a] (7.95)	0.019[b] (2.41)	0.028[a] (3.65)	-0.013 (-0.16)	-0.0075[a] (-3.38)	0.46 (28.40)	200
4	1.15	0.0004 (0.71)	3.48[a] (8.42)	0.014[a] (2.64)	0.027[a] (3.84)	-0.038 (-0.49)	-0.0073[a] (-3.45)	0.48 (30.40)	200
5	1.00	0.0009 (1.30)	4.70[a] (7.85)	0.002 (0.42)	0.006 (0.63)	0.142 (1.23)	-0.0114[a] (-4.37)	0.37 (19.36)	199
6	0.89	-0.0006 (-0.82)	4.53[a] (7.00)	-0.004 (-1.19)	0.048[a] (4.85)	0.406[a] (3.83)	-0.0077[a] (-2.58)	0.31 (18.19)	241
7	1.07	-0.0008 (-1.18)	4.04[a] (6.99)	-0.007[b] (-1.99)	0.012[a] (4.68)	0.192[b] (2.04)	-0.0017 (-0.63)	0.30 (16.59)	240
8	1.19	-0.0004 (-0.82)	1.98[a] (4.26)	-0.007[a] (-2.88)	0.032[a] (4.55)	0.104 (1.37)	-0.0048[b] (-2.24)	0.20 (9.89)	238
9	1.08	-0.0000 (-0.06)	1.70[a] (3.74)	-0.008[a] (-3.84)	0.046[a] (6.56)	0.281[a] (3.50)	-0.0054[b] (-2.51)	0.27 (14.46)	237
10	1.10	0.0001 (0.29)	1.53[a] (3.21)	-0.007[a] (-3.26)	0.047[a] (6.59)	0.207[a] (2.75)	-0.0032 (-1.44)	0.25 (12.91)	238
11	1.15	-0.0001 (-0.23)	1.69[a] (3.43)	-0.006[a] (-3.04)	0.054[a] (6.54)	0.160[b] (2.13)	-0.0013 (-0.47)	0.26 (13.23)	237
12	1.20	-0.0007 (-1.07)	1.46[a] (3.59)	-0.003[c] (-1.93)	0.048[a] (5.83)	0.113 (1.57)	-0.0012 (-0.45)	0.22 (10.86)	236

See notes in Table 3.

Table 5. The Determinants of Markups: Two-Equations System

Period	Dependent variable = MUSD						Dependent variable = MU				Number of Samples
	Estimated coefficients of					R^2 (F)	Estimated coefficients of			R^2 (F)	
	constant	CR4	KR	ADP	IM		constant	MUSD	AD		
2	0.030	0.00026[b] (2.37)	0.0032 (1.29)	0.0073[a] (4.45)	0.0014 (3.17)	0.22 (14.25)	0.980	6.505[a] (9.89)	0.120 (0.79)	0.32 (48.99)	199
3	0.029	0.00028[b] (2.45)	0.0019 (1.10)	0.0073[a] (4.52)	0.0014[a] (3.20)	0.22 (14.49)	1.137	6.377[a] (9.92)	-0.049 (-0.28)	0.32 (50.58)	200
4	0.034	0.00021[c] (1.68)	0.0012 (0.86)	0.0080[a] (4.53)	0.0013[a] (2.61)	0.17 (10.80)	0.393	9.893[a] (13.97)	0.700[a] (3.51)	0.50 (107.61)	200
5	0.027	0.00035[a] (3.33)	0.0003 (0.41)	0.0058[a] (3.41)	0.0011[a] (2.72)	0.21 (13.49)	0.820	6.621[a] (9.68)	0.328[c] (1.70)	0.31 (47.72)	199
6	0.022	0.00054[a] (6.24)	-0.0005 (-1.07)	0.0034[b] (2.56)	0.0010[a] (2.72)	0.24 (19.83)	0.702	5.950[a] (8.73)	0.034[a] (3.77)	0.24 (41.50)	241
7	0.021	0.00055[a] (6.27)	-0.0004 (-0.96)	0.0031[b] (2.39)	0.0011[a] (3.09)	0.26 (21.44)	1.086	5.279[a] (8.49)	0.134 (0.94)	0.22 (36.17)	240
8	0.021	0.00051[a] (5.96)	-0.0004 (-1.21)	0.0032[b] (2.53)	0.0011[a] (3.08)	0.25 (20.24)	1.225	3.243[a] (6.31)	-0.026 (-0.22)	0.13 (20.17)	238
9	0.022	0.00052[a] (5.91)	-0.0005 (-1.37)	0.0028[b] (2.22)	0.0012[a] (3.36)	0.25 (19.80)	1.207	3.192[a] (6.15)	0.002 (0.02)	0.13 (18.95)	237
10	0.021	0.00053[a] (6.10)	-0.0004 (-1.35)	0.0027[b] (2.15)	0.0013[a] (3.66)	0.27 (22.00)	1.259	3.286[a] (6.02)	-0.084 (-0.84)	0.13 (18.53)	238
11	0.021	0.00054[a] (5.97)	-0.0004 (-1.39)	0.0025[c] (1.89)	0.0015[a] (3.68)	0.26 (20.76)	1.320	3.294[a] (5.20)	-0.104 (-0.96)	0.10 (13.97)	237
12	0.022	0.00056[a] (5.48)	-0.0004 (-1.54)	0.0025[c] (1.77)	0.0017[a] (3.65)	0.24 (19.05)	1.354	2.856[a] (4.77)	-0.182 (-1.61)	0.09 (12.27)	236

See notes in Table 3.

Table 6. Average Percentage Changes in Markup by Degree of Concentration

(a) the United States

Period	H	M	L
1948-49 recession	10.78	-8.52	-8.16
1949-52 expansion	4.76	8.67	-4.54
1953-54 recession	14.15	-0.08	-0.32
1954-56 expansion	6.97	14.42	3.60
1957-58 recession	13.47	-4.91	-7.55
1958-60 expansion	-10.92	7.42	5.04
1960-61 recession	5.29	-1.86	1.34
1961-69 expansion	15.28	18.36	13.65
1969-70 recession	-1.05	0.82	2.54
Exluding the auto industry	1.75	—	—

(b) Japan

Period No.	Period	H	M	L
1	1958-61 expansion	0.929 (3.980)	0.315 (3.305)	0.725 (1.910)
2	1962 recession	1.040 (8.226)	1.845 (6.132)	1.199 (4.786)
3	1963-64 expansion	0.909 (5.526)	-0.052 (4.138)	1.512 (3.190)
4	1965 recession	-0.196 (9.129)	-0.327 (5.550)	0.036 (7.751)
5	1966-70 expansion	0.402 (2.143)	0.447 (1.626)	0.408 (1.359)
6	1971 recession	-0.149 (8.548)	3.149 (9.409)	-0.120 (3.530)
7	1972-73 expansion	0.893 (5.482)	0.807 (4.521)	0.465 (2.363)
8	1974 recession	-4.595 (11.033)	-2.817 (5.909)	-2.109 (3.670)
9	1975-76 expansion	1.798 (6.419)	-0.551 (2.600)	-0.019 (3.138)
10	1977 recession	-0.787 (7.167)	-1.051 (4.548)	0.285 (3.866)
11	1978-79 expansion	1.467 (4.804)	1.877 (3.468)	0.870 (1.641)
12	1980-82 recession	-0.412 (2.393)	-0.396 (1.868)	-0.600 (1.723)

Notes: H refers to those industries with high concentration ($50 \leqq CR4$); M, medium concentration ($25 \leqq CR4 < 50$); and L, low concentration ($CR4 < 25$). Source for (a) is Wachtel and Adelsheim, 1977, Table 2. In parentheses in (b) are the variances.

Table 7. The Determinants of the Rate of Change in Markup

Period	Estimated coefficients of						R^2 (F)	Number of Samples
	constant	CR4	KR	ADP	GS	IM		
1	-0.617	0.004 (0.49)		0.181 (1.08)	2.447[b] (2.17)	0.006 (0.15)	0.03 (1.84)	191
2	1.311	-0.021 (-1.08)	0.075 (0.17)	-0.971[a] (-2.95)	8.806[a] (4.06)	0.065 (0.70)	0.12 (5.08)	192
3	-1.463	0.025[b] (2.31)	0.054 (0.32)	0.271[c] (1.76)	0.334 (0.15)	-0.004 (-0.11)	0.06 (2.83)	203
4	4.215	-0.092[a] (-2.75)	0.098 (0.26)	0.497 (1.06)	17.679[a] (7.72)	-0.085 (-0.64)	0.28 (15.85)	204
5	0.296	0.007 (1.38)	-0.019 (-0.45)	-0.249[a] (-2.82)	-1.229 (-0.97)	0.016 (0.77)	0.04 (2.03)	203
6	-0.779	0.048[a] (3.14)	-0.775[a] (-9.23)	0.019 (0.08)	11.265[a] (4.64)	-0.100 (-1.48)	0.29 (20.23)	245
7	0.076	-0.022[b] (-2.24)	0.001 (0.02)	-0.315[b] (-2.10)	7.907[a] (4.17)	0.206[a] (4.80)	0.16 (0.34)	244
8	-0.336	-0.038[b] (-2.51)	-0.046 (-0.63)	-0.584[b] (-2.58)	3.932[c] (1.66)	-0.273[a] (-4.06)	0.17 (10.13)	242
9	-2.012	0.019[b] (2.14)	0.039 (0.92)	0.382[a] (2.81)	4.940[b] (2.22)	0.016 (0.40)	0.11 (6.28)	241
10	-0.733	0.016 (1.55)	-0.031 (-0.76)	0.326[b] (2.18)	-0.625 (-0.42)	0.007 (0.16)	0.03 (1.67)	241
11	0.791	0.006 (0.87)	-0.054[b] (-2.11)	0.057 (0.51)	3.428[b] (2.15)	0.038 (1.10)	0.05 (2.52)	241
12	-0.381	-0.002 (-0.75)	0.024[b] (2.35)	0.007 (0.13)	3.023[b] (2.46)	0.029 (1.63)	0.07 (3.54)	240

See notes in Table 3.

Table 8. The Determinants of the Rate of Change in Markup: Regression with Interactive Terms

Period	Estimated coefficients of									R^2 (F)	Number of Samples
	constant	CR4	CR4×GS	KR	KR×GS	ADP	ADP×GS	GS	IM		
1	-2.804	0.030[b] (2.39)	-0.080[b] (-2.06)			1.139[a] (3.66)	-5.570[a] (-3.55)	11.988[a] (3.53)	-0.004 (-0.10)	0.10 (3.60)	191
2	2.176	-0.021 (-0.92)	0.009 (0.13)	-0.454 (-0.93)	10.093[a] (2.66)	-1.961[a] (-3.49)	4.590[b] (2.22)	1.426 (0.30)	0.124 (1.32)	0.16 (4.68)	192
3	-1.537	0.019 (1.26)	0.029 (0.34)	0.718[c] (1.86)	-3.443[c] (-1.89)	0.367 (0.96)	-0.574 (-0.27)	1.060 (0.22)	-0.004 (-0.11)	0.08 (2.23)	203
4	-3.683	0.058[a] (2.63)	-1.108[a] (-13.09)	-0.096 (-0.28)	-0.727 (-0.23)	-1.135[a] (-3.03)	8.682[a] (3.65)	78.261[a] (11.72)	-0.042 (-0.51)	0.73 (68.64)	204
5	-0.036	0.012 (1.35)	-0.083[c] (-1.82)	0.435[c] (1.97)	-2.187[b] (-2.02)	-0.396[a] (-2.86)	2.093[b] (2.00)	2.404 (0.82)	0.013 (0.65)	0.12 (3.50)	203
6	-1.161	0.059[a] (3.21)	-0.108 (-0.97)	-0.983[a] (-2.87)	1.318 (0.67)	-0.032 (-0.11)	0.337 (0.27)	16.494[b] (2.07)	-0.098 (-1.44)	0.30 (12.78)	245
7	1.017	-0.035[a] (-2.65)	0.111 (1.32)	-0.075 (-0.56)	0.823 (0.63)	-0.426[c] (-1.96)	0.792 (0.47)	0.387 (0.08)	0.211[a] (4.79)	0.18 (6.51)	244
8	-0.313	-0.034[b] (-2.26)	0.189[b] (2.35)	-0.173 (-1.30)	-1.619 (-1.49)	-0.824[a] (-3.24)	-4.697[b] (-2.41)	0.848 (0.17)	-0.269[a] (-3.96)	0.20 (7.73)	242
9	-1.691	0.017[c] (1.74)	0.118 (1.23)	-0.002 (-0.03)	0.221 (0.34)	0.235 (1.26)	2.508 (1.26)	-4.238 (-0.76)	-0.001 (-0.04)	0.13 (4.45)	241
10	-0.712	0.021[c] (1.89)	-0.108 (-1.51)	-0.195[c] (-1.75)	0.820[c] (1.67)	0.050 (0.23)	2.319 (1.65)	4.145 (0.72)	0.029 (0.63)	0.06 (2.01)	241
11	0.427	0.024[a] (2.74)	-0.097 (-1.35)	-0.007 (-0.25)	-0.883[a] (-3.49)	-0.326[b] (-2.53)	8.603[a] (5.19)	-0.196 (-0.03)	0.001 (0.03)	0.24 (9.53)	241
12	-0.297	0.001 (0.29)	-0.113[b] (-2.03)	-0.015 (-0.93)	0.651[a] (3.35)	-0.124[c] (-1.96)	2.815[a] (3.56)	1.833 (0.49)	0.037[b] (2.13)	0.15 (5.24)	240

See notes in Table 3.