Corporate Finance and Market Competition: Evidence from the Basic Survey of Japanese Business Structure and Activities in the late 1990s

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Abstract

This paper examines whehter corporate governance or market competiton increases performance of the Japanese …rms after the burst of the bubble economy in the 1990s. Looking at the corporate …nance activities in the 1990s, the …rms tend to relay more on internal …nance for their investment than on external borrowing, such as bank loans and new issues in shares and corporate bonds. As a result, the main bank system has been rapidly collapsing. Among corporate …nance variables, debt-asset ratio is signi…cant, but other variables are not. Proxy variables for market competiotn; Hir…ndahl-Hirschman Index and market share trun out signi…cant. These results imply that market competion seems to be the only functioning corproate governance instrument to promote the …rms' performance.

Key words: …rm, corporate …nance, corprate governance.
JLE classi…cation: G3, L1, L2.

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1 Introduction

Allen and Gale (2000b) nicely summarize the history of the Japanese corporate governance. They argue, "[in Japan] the operation of the standard corporate governance mechanisms of the board of directors and the market for corporate control are such that the objective of implementing value creation for shareholders is not pursued. The boards of directors are typically large, unwieldy groups dominated by insiders. The prevalence of cross-holdings of shares in Japan means that even though there are no legal impediments to hostile takeovers, they do not occur. It has been widely argued that the main bank system has substituted for the standard Anglo-American corporate governance systems. In this system, a large bank, which is a major provider of funds to the …rm, monitors its activities and ensures that the funds loaned are sensibly invested. If the …rm encounters problems, the maim bank can discipline management where necessary and provide the funds needed to see the …rm through di¢cult times or liquidate it. Financial deregulation in the 1970s and 1980s increasingly allowed large Japanese …rms to obtain funds from the bond market. As a result, the main bank system no longer seems to be as important for many of these …rms."(p.80)

After the burst of the bubble economy, the Japanese economy has fallen into a long process of readjustments. In fact, since the Second World War, this is the …rst time to see a series of bankruptcies of the major …rms, including Sanyo Securities, Hokkaido Takushoku Bank, Yamaichi Securities, Nippon Credit Bank, Long-Term Credit Bank, and many manufacturing, construction, and retail …rms. As a result, unemployment rate has risen the record high level at around 5%. The nominal discount rate has been kept at the rock bottom near 0%. Fiscal policy expansion as extra public expenditure accounted over 130 trillion yen in less than 10 years. Nevertheless …scal and monetary policy measures so far have failed to stimulate the economy.

A natural question is what factors have made the Japanese economy so sluggish. Considering two major demand components of the private sector, the household consumption and the …rm investment, the household consumption has been rather stable or at least downwardly rigid and the households have maintained sound asset-liability balance, i.e. no balance sheet problem, the …rm investment has been ‡uctuating widely and the …rms have su¤ered a critical balance sheet problem. We diagnose overall problem stems from the sluggishness of the …rm behavior.

This paper investigates changes in the …rm behavior in the late 1990s. We identify at least two changes. First, because of deregulation and globalization, the market competition becomes more and more intense, many …rms face severe price competition and reduce its pro…t margins. Second, because of bad loan problems of the banks and …nancial deregulation, the …rms do not borrow from the banks and …nance their investment internally. These factors lead to changes in nature of corporate governance and …rms' activity itself.

The following sections investigate how changes in corporate …nance and market competition a¤ect the …rm behavior by using the large panel data of the

Japanese …rms.

2 Historical Change of Corporate Finance

One of the most notable changes in the Japanese …rm behavior in the 1990s was a signi…cant shift in corporate …nance. Historically the Japanese …rms rely its investments on external debt, especially on bank loans (borrowing). This trend continued until the mid 1980s (see Table 1). After the bubble started growing in the mid 1980s, equity and corporate bond …nance increased all of a sudden while short and long term bank borrowing shrank (so called disintermediation).

Tables 2 shows annual changes in shares of corporate …nance in the 1990s. External …nance has dropped sharply from 44.8% in 1991 to -26% in 1999. In this period, equity and corporate bond …nance shrank as well. Internal …nance has increased from 55.2% to 126% in the same period. In particular, the share of depreciation has risen from 43.7% to 106.6%. In other words, the Japanese …rms declined to invest mostly for depreciation and not much for new equipment and machineries. It is important to note that total …nancial demand itself has declined from 47.7 trillion yen in 1991 to 37.7 trillion yen in 1999 and that internal …nance has remained more or less constant, namely 46.8 trillion yen in 1991 and 47.5 trillion yen in 1999. It is external …nance that has dropped sharply from 37.9 trillion yen in 1991 to -9.7 trillion yen in 1999. Among external …nance, both long and short term bank borrowings were the major factors behind this sharp fall.

Some monetary economists describe this as a result of credit clunch, other economists insist that this is a result of …nancial disintermediation along with heavy reliance on internal …nance à la Anglo-America[1]. It may be too early to judge which is the case. However as I mentioned above, total …nancial demand decreased about 10 trillion yen in the 1990s and can be found no strong evidence of substitution between internal and external …nance can be found as the absolute amount of internal …nance remains constant. Nevertheless shrinkage of external …nance de…nitely weakens external monitoring on the …rms' activity and thus corporate governance mechanism in general[2].

As a result, a vacuum of corporate governance emerges. It is not at all clear who governs the Japanese …rms in the late 1990s. Perhaps this lack of governance and leadership, together with the balance sheet problem of banking

[1] Mayer (1988,1990) and Corbett and Jenkinson (1996,1997) …nd that …rms are mostly internaly …nanced and external …nancial markets are fairly unimportant in major industrial countries.

[2] There are several views of corporate governance. Berle and Means (1932) refers to the defense of shareholders' interests, Shleifer and Vishny (1997) de…ne corporate governance as "the ways in which the suppliers of …nance to corporations asure themselves of getting a return on their investment.", and Tirole (2001) provides the borader concept of the stakeholder society in which the interests of noninvesting parties would be better represented.

and non-banking …rms may contribute to this long recession. As long as the …rms do not borrow money from the banks, credit channel does not function properly and thus monetary policy of the Bank of Japan may not be e¤ective, if not at all.

3 Firm Behavior and Corporate Finance

The …rm is facing both market competition and …nancial constraints. Both factors a¤ect the …rm behavior in many ways. In this section, we examine these e¤ects by using the panel data from the Basic Survey of Japanese Business Structure and Activities (Ministry of Economy, Trade and Industry).

This survey covers all …rms from agriculture, forestry, …shery, mining, manufacturing, wholesale and retail trade, and other service industries that employ more than 50 employees and accounts above 26,000 …rms. Table 3 shows distribution of …rms over 33 industrial categories. Manufacturing industries account above 50%, wholesale and retail industries account 40%, and the rest less than 10%. The survey collects information on (1) types and year of establishment, (2) number of employees and organization, (3) assets, liabilities, capital stock, and investment, (4) intra-industry trade and international trade, (5) research and development, (6) holding and use of patents and licenses, and (7) parent company, subsidiaries and a¢liations. The survey started in 1992 and conducted annually from 1995 onwards. The data after 1995 until 1998 can be used as a 4 year panel data. Summary statistics used in this paper is given in Table 4. Real sales, real investment, real capital, labor, and real wage remain relatively stable[3], Observations for real investment are about 20% smaller than those of other variables because 20 % of …rms do not invest or have negative investment. Her…ndahl-Hirschman Index and sales share as proxies for market competition also show stability.

In contrast, corporate …nance variables such as liquidity ratio (liquidity asset/liquidity debt), own capital ratio (shareholder's equity ratio), debt/equity ratio, return on equity (ROE), return on assets (ROA) and debt/asset ratio ‡uctuate widely and some observations become outliers in a sense of statistical distribution. From the view point of corporate governance, own capital ratio (shareholder's equity ratio) and return on equity (ROE) are classi…ed as governance variables from shareholders, liquidity ratio, debt/equity ratio, and debt/asset ratio are those from debtholders.

As seen in the empirical results later, debt/asset ratio and own capital ratio (the resudual of debt/asset ratio), are statistically signi…cant and all other corporate …nance variables do not have any signi…cant explanatory powers.

Correlation matrix is reported in Table 5. The real economy variables are correlated positively, although degrees of correlation di¤er from variable to variable. Among market competition variables, sales share is strongly correlated

[3] To order to convert nominal variables into real variables, GDP de‡ators by industries are used.

with the real economy variables than Her…ndahl-Hirschuman Index. Corporate …nance variables reveal very weak correlations if not zero. Only own capital ratio and debt/asset ratio show some correlations. Note, in particular, debt/asset ratio shows negative correlations with the real economy variables.

3.1 The Model [4]

Before conducting empirical analysis, we would like to discuss some theoretical aspects of market competition. In practice, oligopolistic competition seems a reasonable description of the most Japanese …rms because neither perfect competition nor monopolistic competition is valid.

Assume an oligopolistic industry with n …rms and homogeneous product, without entry and exist.

The pro…t $¼_i$ of …rm i is given

$$¼_i = p(Q)q_i ¡ C_i(q_i) \tag{1}$$

where q_i is the output of …rm i, $Q = \sum_{i=1} q_i$, p(Q) is the price level for inverse demand, and C_i is the cost of production

the …rst order condition with respect to production is the following.

$$\frac{@¼_i}{@q_i} = \frac{@p}{@Q}(1 + ¸_i)q_i + p(Q) ¡ \frac{@C_i}{@q_i} = 0 \tag{2}$$

where $¸_i ´ \frac{@Q_{¡i}}{@Q}$, $Q_{¡i} = Q ¡ q_i$, i.e. output made by all other …rms

$¸_i$ implies the conjectural variation, i.e. …rm i's expectation on the reaction of …rm j to a change in the output of …rm i. If $¸_i = 0$, then …rm i expects no reaction to its change in output (the Cournot case). If $¸_i = ¡1$, …rm i expects a change in output of …rm j which exactly compensates its own, so as to leave the price unchanged (the perfect competition case). If $¸_i = 1$, then changes in the output of …rm i will be matched by …rm j and the market shares of the …rms will be constant (the collusion case). The conjectural variation model encompasses di¤erent types of competition according to the terms $¸_i$. The market outcome depends on the perceptions of the reaction of the …rms.

Market structure is sometimes captured by the degree of concentration. the most simple measure is given, by the market share, S_i[5]

$$S_i = \frac{q_i}{Q} \tag{3}$$

Alternative measure is the Her…ndahl-Hirschman Index (H)

[4] The model is based on Vives, Xavier (1999, chap 7) and Odagiri (2001).

[5] In practice, many …rms produce multiple products due to diversi…cation, market share is calculated as a weighted average of major sales items.

$$H = \sum_{i=1}^{n} S_i^2 \tag{4}$$

In order to understand H, de…ne average of the market share, $\bar{1}$ and variance σ^2 in the industry.

$$\bar{1} = \frac{\sum S_i}{n} = \frac{1}{n} \quad (* \sum S_i = 1) \tag{5}$$

$$\sigma^2 = \frac{\sum (S_i - \bar{1})^2}{n} = \frac{\sum S_i^2 - n\bar{1}^2}{n} = \frac{H}{n} - \frac{1}{n^2} \tag{6}$$

From (6),

$$H = n\sigma^2 + \frac{1}{n} \tag{7}$$

That is, H may increase both because the number of active …rms decreases and because …rms have more unequal shares. This is so since the share of the …rms are squared and larger …rms carry more weight.

As $\sigma^2 \geq 0$ and $H \leq 1$,

$$\frac{1}{n} \leq H \leq 1 \tag{8}$$

There are some empirical di¢culties in measurement of market share. First, output can be measured either by quantity or by market value. With price variances, the choice can make the result di¤erent. Second, we have to calculate markets share in terms of domestic production or total sales. Globalization implies the weight of import and export become larger, so that the market share should be measured by total sales.

Equation (2) can be rewitten as follows,

$$\frac{p - MC_i}{p} = \frac{S_i(1 + \gamma_i)}{\varepsilon} \tag{9}$$

where $MC_i = \frac{\partial C_i}{\partial q_i}$ (marginal costs), $S_i = \frac{q_i}{Q}$ (market share), and $\varepsilon = -\frac{\partial Q}{\partial p} \cdot \frac{p}{Q}$ (price elasticity of demand)

Equation (9) implies that, if $\gamma_i = \gamma \forall i$, then $MC_i < MC_j$ implies $S_i > S_j$, the …rm with lower marginal costs occupies a higher market share. Note, however, Eq(9) does not indicates any causal relationship between MC_i and S_i. LHS of Eq(9) is called marginal price-cost margin (PCM). The average PCM is de…ned as $\frac{p - AC_i}{p}$ where AC_i is the average costs. If we use average PCM instead of marginal PCM, and maltiply it by output q_i in both numerator and denominator, we obtain the following,

$$\frac{pq_i - AC_i \cdot q_i}{pq_i} = \frac{SA - NC}{SA} = \frac{PR + FC}{SA} \quad (10)$$

where SA=Sales, VC=variable cost, PR=pro…t and FC=…xed cost.

This is pro…t plus …xed costs-sales ratio (a measure of pro…tability). Eq(9) and Eq(10) show that PCM and market share S_i are positively correlated. Furthermore, if PCM is replaced by a pro…tability measure, such as ROA (return on assets), we can conduct an empirical test of Eq(9) or Eq(10) in the following panel analysis

$$ROA_{it} = \alpha_i + \beta S_{it} + \gamma_i \sum_i X_{it} \quad (11)$$

where X_{it}=vector of other explanatory variables.

$\beta > 0$ implies that a high market share induces a higher pro…tability. This result depends highly on adequacy of measurement of S_{it}. If individual …rm's sales share is not accurately measured, industry-wide aggregation can be an alternative. Multiply both hand sides of Eq(2) by q_i and aggregate over i,

$$\frac{pQ - \sum_{i=1} MC_i \cdot q_i}{pQ} = \frac{\partial p}{\partial Q}\frac{Q}{p}(1 + \eta) \sum_{i=1} \left(\frac{q_i}{Q}\right)^2 = \frac{(1 + \eta)H}{\varepsilon} \quad (12)$$

for $\eta_i = \eta, \forall i$ and $\sum_{i=1} q_i = Q$.

LHS of Eq(12) is marginal PCM at the industry-level that is positively correlated with the Her…ndahl-Hirschman Index (H), given η and ε. Eq(12) can be tested empirically, substituting marginal PCM by average PCM and linearizing,

$$ROA_t = \delta + \lambda H + \omega_j \sum_j Y_{jt} \quad (13)$$

where Y_{jt}=vector of other explanatory variables.

$\lambda > 0$ implies that a high Her…ndahl-Hirschman Index induces a high profitability at the industry level.

Contrary to a general belief that a higher concentration, as measured by H, translates into lower welfare, as measured by the total (Marshallian) surplus $TS = \int_0^Q p(Z)dZ - \sum_{i=1} C_i(q_i)$, the sum of consumer surplus and pro…ts, the

inverse relationship between concentration and welfare does not necessarily hold in the presence of economies of scale or asymmetric costs (see Vives(1999), p.101). With …rms of di¤erent e¢ciencies, welfare is enhanced if low-cost …rms gain market share at the expense of high cost …rms. This redistribution of total output raises both welfare and concentration. Farrell and Shapiro (1990) show that a small change in total output Q raises total surplus TS_y and only if $\Delta Q/Q + \frac{1}{2}(\Delta H/H) > 0$. In other words, for a given percentage change in total output, welfare is more likely to rise if H increases.

3.2 Production Function and Competition

Nickell (1995,1996) argues that competition improves corporate performance. In particular, he presents evidence that competition, as measured by increased numbers of competitors or by lower levels of rents, is associated with a signi…cantly higher rate of total factor productivity growth. According to the standard economic theory, perfect competition leads to e¢cient allocation of resources. In fact, recent competition policy and deregulation are based on this theory. Nevertheless, as Nickell (1995,1996) recognizes, …rms with higher market share tend to have higher productivity growth. It is not at all clear that market competition improves corporate performance on empirical grounds.

After their extensive literature survey, Allen and Gale (2000a) summarize that the standard corporate governance mechanisms do not appear to work very e¤ectively and that, however, despite this lack of outside discipline and monitoring, most …rms seem to operate fairly e¢ciently. In order to understand this seemingly contradicting phenomena, they argue that a broader perspective than the standard agency view of governance is necessary. In other words, the …rms must have entrepreneurial management teams that do more than cost minimize. They must make good decisions about the future directions the …rms should move in. Managers are more than just stand-ins for shareholders; they must take the initiative. In such circumstances there is likely to be considerable diversity of opinion and the standard agency framework is not valid. Monitoring by potential raiders and managers is not relevant. The best that may be achievable is to allow management teams to compete and see which are successful and survive (pp.77-78). In short, Allen and Gale's view tries to synthesize the standard corporate governance mechanisms and product market competition.

A direct empirical test as to how market competitoin a¤ects …rm's performance is to examine Eq(11). Empirical speci…cation for Eq(11) is as follows.

$$\begin{aligned} ROA_{it} = {} & \alpha + \delta S_{it} + \beta \ln K_{it} + \gamma \ln L_{it} + \theta Debt/Asset_{it} \\ & + \phi (Debt/Asset_{it})^2 + \mu OwnCapRatio_{it} \\ & + \psi LiquidityRatio_{it} + \lambda Debt/Equity_{it} + \varepsilon_{it} \end{aligned} \tag{14}$$

where K = real capital stock, L = number of full-time employees, Debt/Asset = debt/asset ratio, $(Debt/Asset)^2$ = square of debt/asset ratio, OwnCapRatio = Shareholder's

equity/asset ratio, S_i = SalesShare= the share of …rm i's output in total output, LiquidityRatio= liquidity asset/liquidity debt ratio, and Debt=Equity=debt/equity ratio.

All data are adjusted by eliminating outliers (i.e. outside of 4 times of standard deviation from the mean). The result is given in Table 6. It is apparent that sales share has a signi…cantly positive impact on ROA as the model predicts in the previous section. Labor and own capital ratio also have positive e¤ects while capital, debt-asset ratio, liqudity ratio, debt-equity ratio have signi…cantly negative e¤ects on ROA. In terms of the model selection, the …xed e¤ect model is selected by diagnostic tests, although the coe¢cients of the random are, more or less, the same as those of the …xed e¤ect model. The between estimator model is a cross section regression over averaqges of individual …rms. The coe¢cients of the between estimator model di¤er substantially from the other two models. This implies that results from the cross section analysis are di¤erent from those from the panel data analysis.

Then we estimate the following Cobb-Douglas type production function with additional explanatory variables. In so doing, we can distinguish e¤ects of governance mechanisms and market competition. Note that, as our sample includes both manufacturing and non-manufacturing industries, output is measured as sales total. Debt/asset ratio, shareholder's equity/asset ratio, liquidity asset/liquidity debt ratio are all taken from the balance sheet information in the Basic Survey of Business Structure and Activities. Her…ndahl-Hirshman Index and sales share are used as proxy variables for market competition.

$$\begin{aligned} \ln Y_{it} = {} & \alpha + \beta \ln K_{it} + \gamma \ln L_{it} + \delta \text{Debt=Asset}_{it} + \varepsilon (\text{Debt=Asset}_{it})^2 \\ & + \mu \text{OwnCapRatio}_{it} + \eta \text{Herfindahl Index}_{it} + \theta S_{it} \\ & + \phi \text{LiquidityRatio}_{it} + \lambda \text{Debt=Equity}_{it} + \varepsilon_{it} \end{aligned} \tag{15}$$

where, Y = real output and Her…ndahl Index = $\sum_{i=1}^{n} S_i^2$ in which S_i = SalesShare= the share of …rm i's output in total output.

The result is shown in Table 7. Coe¢cients of capital and labor add up to 1.034 which is more or less equivalent to a constant return to scale à la Cobb-Douglas. Debt/asset ratio, square of debt/asset ratio, shareholder's equity/asset ratio, and shales share turn out to be signi…cant explanatory variables. On the other hand, liquidity ratio and debt/equity ratio are not signi…cant. The fact that debt/asset ratio is signi…cantly negative implies that heavily indebted …rms produced less in the late 1990s.

As to the panel data analysis, the …xed e¤ect model is selected by diagnostic tests. The between estimator model, a cross section regression over averages of

individual …rms, shows very di¤erent coe¢cient values and indicates that coef-…cients are statistically insigni…cant in many governance variables while these are signi…cant in the panel estimators.

A higher sales share implies higher production. As Nickell (1996) points out, it does not means that oligopolistic …rms tend to produce more. In fact, a higher market share is a result of higher production, that is, the causality ‡ows from production to a market share[6]. Nevertheless, this result implies that a market competition may a¤ect the production activity in a positive way and that market deregulation and competition policy can be very important in stimulating the economy.. As a proxy variable for market competition, we prefer sales share to Her…ndahl-Hirshuman Index on the statistical ground.

3.3 Employment Adjustment and Corporate Finance

Relationship between investment (as capital adjustment) and corporate …-nance has been extensively discussed, while that between employment adjust-ment and corporate …nance has not been discussed well (exceptions are Nickell (1995) and Funk, Wolf and Holger (1999)). On the other hand, as Allen and Gale (2000b) correctly pointed out, in Japan, managers' expressed goal is to pursue employment stability for workers rather than dividends for shareholders (p.80). It is of great interest to identify how employment adjustment is a¤ected by corporate governance variables as well as market competition.

$$\begin{aligned} \ln L_{it} = {} & \alpha + \beta \ln L_{it-1} + \gamma \ln Y_{it} + \delta \ln w_{it} + \zeta \mathrm{Debt/Asset}_{it} + \eta (\mathrm{Debt/Asset}_{it})^2 \\ & + \mu \mathrm{OwnCapRatio}_{it} + \nu \mathrm{Herfindahl Index}_{it} + \xi \mathrm{SalesShare}_{it} \\ & + o \mathrm{LiquidityRatio}_{it} + \rho \mathrm{Debt/Equity}_{it} + \varepsilon_{it} \end{aligned} \tag{16}$$

where w=real wedge (=total salary/full time employees), de…nitions of all other variables are the same as above.

Table 8 shows regression results. The speed of employment adjustment turns out very slowly at 0.095 while that in macro time series data is 0.623 (Higuchi(1996))[7]. Our data cover a very short period of time between 1995 and 1998 in which the economy was in recession throughout. This fact reinforces

[6] Of course, a market share is a result of competition among many …rms. It is not neccessarily linked directly with individual …rm's production because other …rms' productions are exogenously given. The use of sales share or Her…ndahl-Hirschuman index in econometric model is not problematic in this sense.

[7] Okazaki and Okuno (1993) estimate the employment adjustment function using the long term time series data. They show the speed of adjustment in 1927-37 was 0.52, that in 1960-73 was 0.35, and that in 1974-85 was 0.17.

Allen and Gales's view that managers' goal is to maintain employment even in the middle of economic recession.

Real output and real wage turn out signi…cant. A higher real output increases employment and a higher real wage decreases it. These results are theoretically consistent.

As to the panel data analysis, the …xed e¤ect model is selected by diagnostic tests. The between estimator model, a cross section regression over averages of individual …rms, shows very di¤erent coe¢cient values and indicates that coef…cients are statistically insigni…cant in many governance variables while these are signi…cant in the panel estimators. Fitness of the model is very high as R^2 reaches as high as 0.97.

Among corporate …nance variables, debt/asset ratio, square of debt/asset ratio, shareholder's equity/asset ratio, and debt/asset ratio turn out signi…cantly positive. Higher these variables become, higher employment would be. In addition, these variables are signi…cantly negative in production function. Further investigation is needed. In Table 5, correlation matrix shows that real output and employment are strongly correlated (correlation coe¢cient is 0.79). Needless to say, eq.(14) treats real output as endogenous and employment as exogenous and eq.(15) treats the other way round. There is an endogeneity problem.

Her…ndahl-Hirschman Index and sales share are signi…cant with opposite signs. If sales share is treated as a proxy for market competition (as in Panel 3), higher sales share implies higher employment. This may re‡ect the size e¤ect.

3.4 Investment Function and Corporate Finance

Fazzari, Hubbard and Petersen (1988) and Bond and Meghir (1994) examine how the hierarchy of …nance a¤ects the investment spending of …rms. Ever since, thousands of papers have been written on this line of research. Our model adopts more or less the same theoretical framework with a log-linear functional form[8].

$$\begin{aligned} \ln I_{it} \;=\; & \alpha + \beta \ln I_{it-1} + \gamma \ln Y_{it-1} + \delta \ln K_{it-1} + \varepsilon \mathrm{Cap/Asset}_{it} \\ & + \zeta \mathrm{LiquidityRatio}_{it} + \eta \mathrm{Debt/Asset}_{it} + \theta \mathrm{SalesShare}_{it} + \nu_{it} \end{aligned} \tag{17}$$

where I = real investment for equipment Cap=Asset = capital stock/asset ratio, de…nitions of all other variables are the same as above.

[8] Currently the most studies employ investment/capital stock ratio Euler equation model. Because of heterogeneity of …rms, the investment/capital stock ratio ‡uctuates widely in our data. A log-linear model is selected. Note that the two models are derived from the same theoretical framework.

Regression results are given in Table 9. Fitness of the model is very low as $R^2 = 0{:}14$. Unlike production and employment adjustment functions, investment function fluctuates from year to year and thus a stock adjustment type of functional form may not fit well. In fact, a lagged investment and a lagged real capital stock are not significant explanatory variables. This implies that investment/capital stock ratio model does not fit either.

A lagged real sales, capital stock/asset ratio, debt/asset ratio, and sales share turn out significant. Note that capital stock/asset ratio is significantly positive in Panel1, it becomes significantly negative in Panel2. With a closer look, coefficient of debt/asset ratio in Panel1 is, more or less, the same as that of capital/asset ratio in Panel2 (i.e. dropping debt/asset ratio in Panel2). Although values of debt and capital differ, the denominator, asset, is the same for both variables. Given the relative size between the numerator and the denominator, these two variables can be considered as a inverse of asset. In this case, both Panel1 and Panel2 indicate that larger asset induces larger investment.

As to the panel data analysis, the fixed effect model is selected by diagnostic tests. The between estimator model, a cross section regression over averages of individual firms, shows very different coefficient values and indicates that coefficients are statistically insignificant in many governance variables while these are significant in the panel estimators.

Sales share is significantly positive. This implies that firms with higher sales shares usually hold more assets and invest more. Here again, it does not means that oligopolistic firms tend to invest more. In fact, a higher market share is a result of higher investment and thus higher production, that is, the causality flows from investment to a market share.

4 Concluding Remarks

This paper investigates how corporate governance mechanism and market competition affect the firm behavior. By adding corporate finance and market competition variables to the standard empirical model, some interesting insights are obtained.

First, among corporate finance variables, equity and liquidity related variables are not significant in general while debt and asset related variables play significant roles. This result may confirm the traditional view that the Japanese corporate governance is mainly conducted through the main bank system and not through the pressure of shareholders and corporate bond holders (creditors). However, as shown in Tables 1 and 2, a share of external finance, in particular, borrowing from the bank has been declining sharply in the 1990s. Because of changes in corporate finance strategy of the firms, no external monitoring system as the major corporate governance mechanism seems to be functioning in the late 1990s.

Second, market competition variables, especially sales share play a very important role in all three equations. Our results show that higher sales share

induces higher production, employment and investment. Someone might argue that this is a tautology because without higher production, higher sales share cannot be achieved. This is necessary but not su¢cient condition. An individual …rm's e¤ort for higher production does not guarantee an increase in sales share in the market, depending on the other …rms' production activities and market demand in general which are beyond the control of individual …rms. Even after taking into account of the above conceptual issue, market competition seems to play the most important disciplinary role.

Third, as Allen and Gale (2000a, 2000b) and Tirole (2001) argue, the focus of corporate governance is shifting from traditional shareholder value to the broader concept of the "stakeholder society" in which the interests of noninvesting parties would be better represented. Tirole (2001) states "it is widely felt in countries such as Germany, Japan and France that corporations should aim to promote growth, longevity and a secure employment relationship, with pro…tability being more an instrument than the ultimate goal"(p.4). Results from this paper reinforce Tirole's view. The Japanese …rms are concerned with employment stability, an increase in market share by investing and producing, and longevity. These activities can be interpreted as an interests adjustment process among the stakeholders. Recent amendments in the corporate law and the accounting system in Japan may a¤ect the …rm behavior in many ways. Nevertheless they may not change new direction of corporate governance from the Anglo-American shareholder value maximization to the stakeholder society.

Lastly, this paper sets only a starting point of my project on analyses of the Japanese …rm behavior by using a large micro panel data. Many aspects should be explored in the future. For example, as heterogeneity of the sample is prevalent, industry-speci…c analysis is called for. We should seek alternative proxy variables for market competition and investigate natures of competition in each product or service market. It is also important to see how the …nancial market information such as share prices, bond prices, dividends, and corporate rating a¤ects the …rm behavior.

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Table 1 Corporate Finance by the Major Firms (I)

(%)

Year	Internal Finance	External Finance					
		Equity	Debt				
			Total	Short-term Borrowing	Long-term Borrowing	Corporate Bonds	Other Borrowing
1960-64	22.9	10.6	66.6	20.3	13.4	5.1	27.7
1965-69	30.6	3.3	66.1	15.7	15.1	4.3	31.0
1970-74	29.2	2.3	68.5	18.3	16.0	4.2	30.0
1975-79	38.8	6.8	54.4	14.4	8.2	9.0	22.8
1980-84	50.5	9.5	40.0	9.0	5.9	7.8	17.4
1985-89	45.9	16.0	38.0	5.3	1.2	17.7	13.9
1990-94	87.6	4.6	7.8	-2.8	7.7	11.2	-8.2
1995	84.0	1.2	14.8	-10.1	-3.4	3.6	24.7

Source: Bank of Japan, *Analysis of Corporate Finance by the Major Firms*, various years.

Table 2 Corporate Finance by the Major Firms (II)

(%)

Year	Internal Finance		External Finance				
	Retention	Depreciation	Equity	Debt			
				Total	Short-term Borrowings	Long-term Borrowings	Corporate Bonds
1991	11.5	43.7	3.2	41.6	17.7	18.4	5.5
1992	4.5	60.8	1.9	32.8	11.1	21.9	-0.2
1993	-3.2	80.5	4.4	18.3	-8.6	21.7	5.2
1994	3.2	82.6	4.4	9.8	14.5	-4.1	-0.6
1995	7.9	84.5	3.8	3.9	6.9	1.4	-4.4
1996	9.8	84.2	7.9	-1.9	5.1	-4.6	-2.4
1997	2.1	85.0	4.6	8.3	9.8	-1.6	0.1
1998	-9.8	101.9	3.5	4.4	-15.8	11.4	8.8
1999	19.4	106.6	7.3	-33.3	-23.1	-7.2	-3.0

Source: Ministry of Finance, *Financial Statements Statistics of Corporations by Industry*, various years.

Table 3 Number of Firms by Sector

	Total	1995	1996	1997	1998
Agriculture, forestry and fishery	53	13	15	14	11
Mining	240	53	60	63	64
Construction	1,952	494	511	488	459
Manufacturing					
Food and beverages	5,588	1,325	1,430	1,413	1,420
Alcohole, feed and tobacco	881	222	227	223	209
Textiles	1,798	480	457	428	433
Wearing apparel and clothing accessories	2,153	556	563	532	502
Wood and of wooden products	724	172	193	175	184
Furniture	798	206	200	198	194
Pulp,paper and paper products	1,828	452	464	454	458
Publishing and printing	3,097	722	785	784	806
Chemicals	3,866	942	982	986	956
Petroleum and coal products	231	59	57	58	57
Plastic products	2,687	639	673	683	692
Rubber products	615	151	155	154	155
Leather, fur products and miscellaneous leather products	185	52	47	43	43
Non-metallic mineral products	2,569	647	655	643	624
Iron and steel	1,720	421	443	430	426
Non-ferrous metals	1,344	336	350	335	323
Fabricated metal products	4,090	987	1,052	1,036	1,015
Machinery	6,567	1,575	1,654	1,662	1,676
Electrical machinery,equipment and supplies	8,300	1,991	2,104	2,113	2,092
Transport equipment	4,732	1,154	1,201	1,189	1,188
Precision instruments	1,438	337	357	379	365
Others	1,258	305	334	333	286
Electricity, gas and water supply	66	24	14	13	15
Transportation and communication	345	82	88	81	94
Wholesale and retail trade					
Wholesale trade	28,208	6,938	7,120	7,122	7,028
Retail trade	14,272	3,293	3,638	3,735	3,606
Restaurants	578	72	65	58	383
Finance and insurance	33	7	9	11	6
Real estate	102	27	27	25	23
Services	2,046	544	526	492	484
Total	104,364	25,278	26,456	26,353	26,277

Table 4 Descriptive Statistics

	Obs	Mean	Std. Dev	Min	Max
ln(real sales)	104,364	4.112	1.307	-4.469	12.006
ln(real investment)	85,472	-0.094	2.025	-4.979	8.983
ln(real capital)	104,068	2.229	1.687	-4.979	9.598
ln(labor)	104,364	5.166	0.970	3.912	11.254
ln(real wage)	104,363	1.487	0.402	-3.850	6.418
Herfindahl-Hirschman Index	104,364	0.028	0.028	0.000	0.667
Sales-Share	104,364	0.003	0.013	0.000	0.721
Liquidity Ratio	104,132	1.895	35.231	0.039	9,743.000
Own Capital Ratio	104,233	0.261	0.316	-13.368	1.526
Debt Equity Ratio	104,216	5.843	105.857	-5,786.500	22,943.000
Return on Equity	104,216	0.039	3.132	-368.500	301.000
Debt-Asset Ratio	104,132	0.777	0.306	0.013	14.395

Table 5 Correlation Matrix

	ln(real sales)	ln(real investment)	ln(real capital)	ln(labor)	ln(real wage)	Herfindahl-Hirschman Index	Sales-Share	Liquidity Ratio	Own Capital Ratio	Debt Equity Ratio	Return on Equity	Debt-Asset Ratio
ln(real sales)	1.00											
ln(real investment)	0.60	1.00										
ln(real capital)	0.67	0.75	1.00									
ln(labor)	0.79	0.64	0.70	1.00								
ln(real wage)	0.33	0.18	0.20	0.07	1.00							
Herfindahl-Hirschman Index	0.01	0.08	0.08	0.04	0.09	1.00						
Sales-Share	0.32	0.26	0.29	0.34	0.11	0.31	1.00					
Liquidity Ratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00				
Own Capital Ratio	0.06	0.26	0.18	0.13	0.08	0.06	0.06	0.01	1.00			
Debt Equity Ratio	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.01	-0.02	1.00		
Return on Equity	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	-0.22	1.00	
Debt-Asset Ratio	-0.07	-0.15	-0.14	-0.12	-0.10	-0.05	-0.05	-0.02	-0.97	0.02	0.00	1.00

Table 6 Corporate Performance and Market Share

Dependent Variable : ROA	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
Sales-Share	0.261	5.47	0.250	5.35	0.354	1.27
ln(labor)	0.003	13.68	0.004	13.88	0.028	5.99
ln(capital)	-0.004	-25.10	-0.004	-25.04	-0.007	-3.14
Debt-Asset Ratio	-0.030	-7.55	-0.029	-7.47	0.931	4.39
Debt-Asset Ratio Squared	-0.020	-11.70	-0.020	-11.75	-0.538	-5.22
Own Capital Ratio	0.051	19.18	0.051	19.27	0.312	3.38
Liquidity Ratio	-0.003	-17.52	-0.003	-17.54	0.014	3.26
Debt Equity Ratio	0.000	-1.53	0.000	-1.49	0.003	3.82
constant	0.043	13.03	0.042	12.18	-0.598	-4.38
Diagnostic Test						
Number of Observation	101,755		101,755		101,755	
Number of Groups	33		33		33	
R-sq: within	0.18		0.18		0.05	
R-sq: between	0.34		0.34		0.84	
R-sq: overall	0.19		0.19		0.05	
F test that all u_i=0:	F(32, 101714) = 47.26					
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects	chi2(1) = 6918.74					
Hausman specification test	chi2(8)=36.03					

Table 7 Production Function

Panel 1

Dependent Variable : ln(real sale	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
ln(capital)	0.163	98.630	0.163	98.700	0.522	4.300
ln(labor)	0.871	303.160	0.871	303.170	0.876	3.580
Debt-Asset Ratio	-0.732	-22.050	-0.733	-22.070	-12.979	-1.710
Debt-Asset Ratio Squared	-0.017	-9.330	-0.017	-9.330	-0.243	-0.290
Own Capital Ratio	-0.837	-26.280	-0.837	-26.300	-12.760	-2.110
Herfindahl-Hirschman Index	0.320	3.480	0.315	3.440	-0.220	-0.120
Sales-Share	6.857	39.560	6.846	39.520	0.151	0.030
Liquidity Ratio	0.000	1.190	0.000	1.190	-0.044	-0.810
Debt Equity Ratio	0.000	2.230	0.000	2.230	-0.002	-0.260
constant	0.021	0.570	-0.327	-4.760	11.830	1.700
Diagnostic Test						
Number of Observation	103,956		103,956		103,956	
Number of Groups	33		33		33	
R-sq: within	0.73		0.73		0.29	
R-sq: between	0.42		0.42		0.68	
R-sq: overall	0.62		0.62		0.27	
F test that all u_i=0:	F(32, 103914) = 1889.41					
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects			chi2(1) = 159717622.71			
Hausman specification test			12.79			

Panel 2

Dependent Variable : ln(real sale	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
ln(capital)	0.167	100.520	0.167	100.580	0.522	4.400
ln(labor)	0.897	318.160	0.897	318.150	0.875	3.660
Debt-Asset Ratio	-0.760	-22.710	-0.760	-22.730	-12.995	-1.750
Debt-Asset Ratio Squared	-0.016	-9.070	-0.016	-9.080	-0.240	-0.300
Own Capital Ratio	-0.864	-26.960	-0.865	-26.980	-12.774	-2.170
Herfindahl-Hirschman Index	1.313	14.760	1.309	14.760	-0.187	-0.140
Liquidity Ratio	0.000	1.200	0.000	1.200	-0.044	-0.830
Debt Equity Ratio	0.000	2.130	0.000	2.130	-0.002	-0.270
constant	-0.103	-2.820	-0.421	-6.210	11.847	1.740
Diagnostic Test						
Number of Observation	103,956		103,956		103,956	
Number of Groups	33		33		33	
R-sq: within	0.73		0.73		0.29	
R-sq: between	0.47		0.47		0.68	
R-sq: overall	0.62		0.62		0.26	
F test that all u_i=0:	F(32, 103915) = 1859.96					
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects			chi2(1) = 159498892.09			
Hausman specification test			chi2(8) = 8.44			

Panel 3

Dependent Variable : ln(real sales)	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
ln(capital)	0.163	98.740	0.163	98.810	0.518	4.510
ln(labor)	0.870	303.510	0.870	303.540	0.874	3.660
Debt-Asset Ratio	-0.735	-22.140	-0.735	-22.150	-13.246	-1.850
Debt-Asset Ratio Squared	-0.017	-9.340	-0.017	-9.340	-0.226	-0.280
Own Capital Ratio	-0.839	-26.370	-0.840	-26.390	-12.982	-2.300
Sales Share	7.022	42.120	7.010	42.080	-0.269	-0.070
Liquidity Ratio	0.000	1.180	0.000	1.180	-0.045	-0.830
Debt Equity Ratio	0.000	2.230	0.000	2.230	-0.002	-0.260
constant	0.035	0.970	-0.307	-4.550	12.098	1.870
Diagnostic Test						
Number of Observation	103,956		103,956		103,956	
Number of Groups	33		33		33	
R-sq: within	0.73		0.73		0.28	
R-sq: between	0.42		0.42		0.68	
R-sq: overall	0.62		0.62		0.26	
F test that all u_i=0:	F(32, 103915) = 1921.39					
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects			chi2(1) = 167959221.74			
Hausman specification test			chi2(8) = 13.77			

Table 8 Employment Adjustment Function

Panel 1

Dependent Variable : ln(labor)	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
ln(labor-1)	0.905	772.750	0.906	778.260	1.046	67.180
ln(real sales)	0.075	78.190	0.074	77.670	0.006	0.520
ln(real wage)	-0.112	-56.690	-0.112	-56.680	-0.056	-1.780
Debt-Asset Ratio	0.201	20.510	0.203	20.740	0.323	1.050
Debt-Asset Ratio Squared	0.004	8.230	0.004	8.160	-0.201	-2.700
Own Capital Ratio	0.261	27.810	0.263	28.040	0.001	0.000
Herfindahl-Hirschman Index	-0.168	-5.890	-0.142	-5.250	-0.135	-1.440
Sales-Share	0.219	4.300	0.225	4.470	0.659	2.540
Liquidity Ratio	0.000	0.500	0.000	0.490	-0.001	-0.390
Debt Equity Ratio	0.000	4.390	0.000	4.400	-0.001	-1.660
constant	0.127	11.540	0.136	11.920	-0.293	-0.980
Diagnostic Test						
Number of Observation	89,997		89,997		89,997	
Number of Groups	33		33		33	
R-sq: within	0.97		0.97		0.89	
R-sq: between	0.99		0.99		1.00	
R-sq: overall	0.97		0.97		0.90	
F test that all u_i=0:	F(32, 89954) =	65.20				
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects			chi2(1) = 137568.87			
Hausman specification test			chi2(10) = 95.66			

Panel 2

Dependent Variable : ln(labor)	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
ln(labor-1)	0.905	776.810	0.906	781.130	1.047	60.470
ln(real sales)	0.075	79.150	0.075	78.720	0.002	0.180
ln(real wage)	-0.112	-56.610	-0.112	-56.620	-0.050	-1.440
Debt-Asset Ratio	0.201	20.460	0.202	20.650	0.284	0.830
Debt-Asset Ratio Squared	0.004	8.270	0.004	8.210	-0.199	-2.400
Own Capital Ratio	0.261	27.770	0.263	27.950	-0.051	-0.170
Herfindahl-Hirschman Index	-0.133	-4.860	-0.110	-4.260	0.017	0.210
Liquidity Ratio	0.000	0.500	0.000	0.490	-0.001	-0.330
Debt Equity Ratio	0.000	4.380	0.000	4.390	-0.001	-1.430
constant	0.122	11.160	0.133	11.650	-0.251	-0.760
Diagnostic Test						
Number of Observation	89,997		89,997		89,997	
Number of Groups	33		33		33	
R-sq: within	0.97		0.97		0.89	
R-sq: between	0.99		0.99		1.00	
R-sq: overall	0.97		0.97		0.90	
F test that all u_i=0:	F(32, 89955) =	65.63				
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects			chi2(1) = 140627.43			
Hausman specification test			chi2(9) = 73.31			

Panel 3

Dependent Variable : ln(labor)	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
ln(labor-1)	0.905	774.070	0.906	779.270	1.047	65.670
ln(real sales)	0.075	78.060	0.074	77.600	0.005	0.410
ln(real wage)	-0.112	-56.620	-0.112	-56.680	-0.062	-1.930
Debt-Asset Ratio	0.202	20.620	0.204	20.790	0.123	0.440
Debt-Asset Ratio Squared	0.004	8.280	0.004	8.200	-0.202	-2.650
Own Capital Ratio	0.263	27.930	0.264	28.090	-0.178	-0.740
Sales Share	0.133	2.730	0.143	2.980	0.420	2.060
Liquidity Ratio	0.000	0.510	0.000	0.500	-0.001	-0.480
Debt Equity Ratio	0.000	4.400	0.000	4.400	-0.001	-1.660
constant	0.120	10.950	0.129	11.390	-0.082	-0.310
Diagnostic Test						
Number of Observation	89,997		89,997		89,997	
Number of Groups	33		33		33	
R-sq: within	0.97		0.97		0.89	
R-sq: between	0.99		0.99		1.00	
R-sq: overall	0.97		0.97		0.89	
F test that all u_i=0:	F(32, 89955) =	64.11				
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects			chi2(1) = 137955.32			
Hausman specification test			chi2(9) = 16984.69			

Table 9 Investment Function

Panel 1

Dependent Variable : ln(real investment)	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
ln(real investment-1)	0.004	0.840	0.004	0.860	0.355	0.570
ln(real sales-1)	0.017	2.070	0.016	2.030	0.414	1.400
ln(real capital-1)	0.004	0.630	0.005	0.690	-0.205	-0.220
Capital Asset Ratio	2.596	62.630	2.596	62.680	3.369	3.300
Liquidity Ratio	0.000	-0.200	0.000	-0.210	-0.319	-2.820
Debt-Asset Ratio	-0.964	-39.520	-0.966	-39.580	-8.111	-3.820
Sales-Share	42.289	78.780	42.080	78.670	11.227	1.380
constant	-0.346	-9.680	-0.600	-6.660	4.343	1.420
Diagnostic Test						
Number of Observation	70,402		70,402		70,402	
Number of Groups	33		33		33	
R-sq: within	0.14		0.14		0.01	
R-sq: between	0.25		0.25		0.70	
R-sq: overall	0.15		0.15		0.01	
F test that all u_i=0:	F(32, 70362) =	155.42				
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects			chi2(1) = 300816.14			
Hausman specification test			chi2(7) = 29.02			

Panel 2

Dependent Variable : ln(real investment)	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
ln(real investment-1)	0.005	1.150	0.005	1.190	0.455	1.590
ln(real sales-1)	0.020	3.050	0.019	3.050	0.450	1.380
ln(real capital-1)	2.597	62.690	2.598	62.730	3.182	2.940
Capital Asset Ratio	-0.964	-39.550	-0.965	-39.600	-5.697	-2.670
Sales-Share	42.311	78.840	42.133	78.750	12.503	1.950
constant	-0.348	-9.820	-0.608	-6.190	1.311	0.720
Diagnostic Test						
Number of Observation	70,430		70,430		70,430	
Number of Groups	33		33		33	
R-sq: within	0.14		0.14		0.03	
R-sq: between	0.25		0.25		0.61	
R-sq: overall	0.15		0.15		0.05	
F test that all u_i=0:	F(32, 70392) =	156.06				
Breusch and Pagan Lagrangian multiplier test for random effects vs fixed effects			chi2(1) = 313546.27			
Hausman specification test			chi2(5) = 22.31			