Managerial Tradeoff Between Profits and Debt: Evidence from The Basic Survey of Japanese Business Structure and Activities in the late 1990s

Yukinobu Kitamura*
Hitotsubashi University,
Institute of Economic Research

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Abstract

This paper examines whehter corporate finance or market competiton increases performance of the Japanese firms after the burst of the bubble economy in the 1990s. Looking at the corporate finance activities in the 1990s, the firms tend to relay more on internal finance 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 finance variables, debt-asset ratio is significant, but other variables are not. This implies that finance choice is relevant to the firm's profitability and thus performance as many firms suffering debt overhang, as opposed to the Modigliani and Miller theorem. Proxy variables for market competiotn truns out significant. This implies that market competion seems to be functioning as a corproate governance instrument to promote the firms' performance.

Key words: firm, corporate finance, corprate governance.
JLE classification: G3, L1, L2.

*Address: Hitotsubashi University, Institute of Economic Research, Naka 2-1, Kunitachi, Tokyo 186-8601, Japan. E-mail: kitamura@ier.hit-u.ac.jp. This paper is to be presented at International Workshop on Micro Data and Microeconometric Methodology, organized by Research Centre for Information and Statistics of Social Science, Institute of Economic Research, Hitotsubashi University, on February 6, 2003. I am grateful for efficient statistical assistance from Yuko Fujiki, Michiko Baba and Miki Hara.

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 firm, monitors its activities and ensures that the funds loaned are sensibly invested. If the firm encounters problems, the maim bank can discipline management where necessary and provide the funds needed to see the firm through difficult times or liquidate it. Financial deregulation in the 1970s and 1980s increasingly allowed large Japanese firms 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 firms."(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 first time to see a series of bankruptcies of the major firms, including Sanyo Securities, Hokkaido Takushoku Bank, Yamaichi Securities, Nippon Credit Bank, Long-Term Credit Bank, and many manufacturing, construction, and retail firms. 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 fiscal 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 firm 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 firm investment has been fluctuating widely and the firms have suffered a critical balance sheet problem. We diagnose overall problem stems from the sluggishness of the firm behavior.

This paper investigates changes in the firm 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 firms face severe price competition and reduce its profit margins. Second, because of bad loan problems of the banks and financial deregulation, the firms do not borrow from the banks and finance their investment internally. These factors lead to changes in nature of corporate governance and firms' activity itself.

The following sections investigate how changes in corporate finance and market competition affect the firm behavior by using the large panel data of the

Japanese firms.

2 Historical Change of Corporate Finance

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

Annual changes in shares of corporate finance in the 1990s indicate that external finance has dropped sharply from 44.8% in 1991 to -26% in 1999. In this period, equity and corporate bond finance shrank as well. Internal finance 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 firms declined to invest mostly for depreciation and not much for new equipment and machineries. It is important to note that total financial demand itself has declined from 47.7 trillion yen in 1991 to 37.7 trillion yen in 1999 and that internal finance has remained more or less constant, namely 46.8 trillion yen in 1991 and 47.5 trillion yen in 1999. It is external finance that has dropped sharply from 37.9 trillion yen in 1991 to -9.7 trillion yen in 1999. Among external finance, 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 financial disintermediation along with heavy reliance on internal finance à la Anglo-America[1]. It may be too early to judge which is the case. However as I mentioned above, total financial demand decreased about 10 trillion yen in the 1990s and no strong evidence of substitution between internal and external finance can be found as the absolute amount of internal finance remains constant. Nevertheless shrinkage of external finance definitely weakens external monitoring on the firms' 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 firms in the late 1990s. Perhaps this lack of governance and leadership, together with the balance sheet problem of banking and non-banking firms may contribute to this long recession. As long as the firms do not borrow money from the banks, credit channel does not function

[1]Mayer (1988,1990) and Corbett and Jenkinson (1996,1997) find that firms are mostly internaly financed and external financial 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) define corporate governance as "the ways in which the suppliers of finance 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.

properly and thus monetary policy of the Bank of Japan may not be effective, if not at all.

3 Firm Behavior and Corporate Finance

The firm is facing both market competition and financial constraints. Both factors affect the firm behavior in many ways. In this section, we examine these effects 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 firms from agriculture, forestry, fishery, mining, manufacturing, wholesale and retail trade, and other service industries that employ more than 50 employees with the minimum initial capital 30million yen and accounts above 26,000 firms. Industrial code used in this paper is shown in Table 1 compiled by Applied Research Institute (this industrial code is called ARI code in this paper). Table 2 shows distribution of firms 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 affiliations. The survey started in 1991 and conducted annually from 1994 onwards. The data after 1994 until 2000 can be used as a 7 year panel data. Definitions of variables and its summary statistics used are given in Table 3 and Table 4.

Variables from d47 to d97 are raw data in this survey[3]. Size distribution of these variables are quite diversified. Ordinary income and net income after tax are negative for many firms. Some firms sell off their fixed capital as d58 and d66 are negative for these firms.. In case of empirical works below, nominal variables are converted into real ones by industry-specific GDP deflators. In addition, income data are based on the standard accounting practice of income statement shown in Table 5.

Corporate finance variables such as liquidity ratio (liquidity asset/short-term debt), own capital ratio (shareholder's equity ratio), debt equity ratio, return on assets (ROA), debt asset ratio and specials (spacial accounting adjustment) are constructed from the data set. From the view point of corporate governance, own capital ratio (shareholder's equity ratio) is classified as governance variables from shareholders, liquidity ratio, debt equity ratio, and debt asset ratio are those from debtholders. Special accounting adjustments fluctuate widely and mean of these adjustments is about a half of ordinary income and exceeds that of net income after tax[4]. Debt equity ratio fluctuates wildly, perhaps because the value of equity change substantially.

[3]Unit of data is 1 million yen in case of monetary amount. Total full time employees are number of people.

[4]Special acounting adjustments include sales profits or losses of fixed assets, sales profits or losses of securities, losses from disaster, and accounting adjustments from the previous years.

Correlation matrix is reported in Table 6. The real economy variables are correlated positively, although degrees of correlation differ from variable to variable. Among market competition variables, sales share is strongly correlated with the real economy variables than Herfindahl-Hirschuman Index. Corporate finance variables reveal very weak correlations if not zero. For example, ROA, effective tax rate and square of effective tax rate, speratio (specials/ordinary income), dqratio, square of dqratio, liqratio reveal virtually no correlation with other variables. 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.

Table 7 calculates the standard financial indicators by industrial sectors and by year. Considering debt asset ratio, average value is about 0.69, industries such as petroleum and coal products, transportation and communication, finance and insurance and real estate exhibit very high debt asset ratios, being above 0.8, while industries such as mining, chemicals, transport equipment, precision instruments, and others reveal low ratios below 0.55. In general, low indebtedness implies sound financial conditions, thus reveals high profitability and reasonable cashflows. High indebtedness, on the other hand, implies risky financial conditions if firms do not have sufficient cashflows. Petroleum and coal products, finance and insurance and real estate are the case in point.

Table 8 shows complementary information to Table 7. High ROAs come from mining, alcohol, feed and tobacco, chemicals, precision instruments, services that overlap more or less with low indebted industries. Low ROAs include textiles, wearing apparel and clothing accessories, wood and wooden products, leather, fur products and miscellaneous leather products, iron and steel, and restaurants. These industries are caught up mainly by the newly industrialized Asian countries and new entries to the markets. Profit margins dropped sharply as a result of tough market competition. The case remains, more or less, the same even if outliers are excluded in Table 9. See histogram of ROA by all sample (Fig.1) and by industry (Fig.2). In most cases, ROAs are distributed normally. Agriculture, forestry and fishery (1), electricity, gas and water supply (350), finance and insurance (620), and real estate (700) are apparently not normally distributed.

Time series change of ROA is reported in Tables 10. Of course, ROA changes over time within and across industries. Nevertheless the general trend remains the same as in Tables 8 and 9.

Table 11 provides time series estimates of effective corporate tax rate[5]. General perception would be either that firms with higher profits face higher tax rates or that with a single statutory tax rate, effective tax rates must be, more or less, the same, given very small differences in local business and property taxes. In reality, that is not the case. Take chemical industries as example, from Table 10, chemicals earn constantly higher profits than publishing and

Ambiguity exists between non-operating income and costs (IV and V in Table 1) and speicial income and costs (VI and VII in Table 2), thus accounting manipulation can be conducted on these items.

[5]Unfortunately, tax data are not collected for 1991 and 1994.

printing, effective tax rates for chemicals are substantially lower that those of publishing and printing. Why? There must be tax saving instruments for some industries or firms such as debt issues, while other industries or firms do not have. But as far as financial indicators are concerned in Table 7, chemicals and publishing and printing are not so different. This is a very interesting empirical question. We will come back to this question in Section 4 where the tradeoff between debt and tax is discussed.

3.1 Microeconomic Model [6]

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

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

The profit π_i of firm i is given

$$\pi_i = p(Q)q_i - C_i(q_i) \tag{1}$$

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

The first order condition with respect to production is the following.

$$\frac{\partial \pi_i}{\partial q_i} = \frac{\partial p}{\partial Q}(1 + \lambda_i)q_i + p(Q) - \frac{\partial C_i}{\partial q_i} = 0 \tag{2}$$

where $\lambda_i \equiv \frac{\partial Q_{-i}}{\partial Q}$, $Q_{-i} = Q - q_i$, i.e. output made by all other firms

λ_i implies the conjectural variation, i.e. firm i's expectation on the reaction of firm j to a change in the output of firm i. If $\lambda_i = 0$, then firm i expects no reaction to its change in output (the Cournot case). If $\lambda_i = -1$, firm i expects a change in output of firm j which exactly compensates its own, so as to leave the price unchanged (the perfect competition case). If $\lambda_i = 1$, then changes in the output of firm i will be matched by firm j and the market shares of the firms will be constant (the collusion case). The conjectural variation model encompasses different types of competition according to the terms λ_i. The market outcome depends on the perceptions of the reaction of the firms.

Market structure is sometimes captured by the degree of concentration. The most simple measure is given, by the market share, S_i[7]

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

[7] In practice, many firms produce multiple products due to diversification, market share is calculated as a weighted average of major sales items.

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

Alternative measure is the Herfindahl-Hirschman Index (H)

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

In order to understand H, define average of the market share, μ and variance σ^2 in the industry.

$$\mu \equiv \frac{\Sigma S_i}{n} = \frac{1}{n} \quad (\because \Sigma S_i = 1) \tag{5}$$

$$\sigma^2 \equiv \frac{\Sigma (S_i - \mu)^2}{n} = \frac{\Sigma S_i^2 - n\mu^2}{n} = \frac{H}{n} - \frac{1}{n^2} \tag{6}$$

From (6),

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

That is , H may increase both because the number of active firms decreases and because firms have more unequal shares. This is so since the share of the firms are squared and larger firms 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 difficulties 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 different. Second, with firms' diversification, many firms produce a variety of goods, so that the market share must be a weighted average of each good's sales share in the market. Third, 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.

Eq (2) can be written as follows,

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

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

Under perfect competition framework, profit maximization coincides with cost minimization. Under imperfect competition framework, however, both demand and inputs are constrained by activities of the other firms. The case in point is shown in Fig.3. As average revenue coincides with demand curve, the optimal level of output is realized where marginal revenue and marginal costs intersect and the equiribrium point is given at $C(q^*, p^*)$. Average cost for output q^* is ED, total profits are ABCD. Under perfect competition, output is determined at $F(\bar{q}, \bar{p})$ where marginal cost and demand curve intersect. Compared $C(q^*, p^*)$ with $F(\bar{q}, \bar{p})$, output is lower and price is higher than those under imperfect competition (i.e. Pareto inefficient).

Under either perfect or imperfect competition, microeconomic theory assumes that the firm produces goods and services until marginal profits become zero and no firm is supposed to keep business under negative revenue. That is, the firm operate at a positive level of output as long as it can cover variable costs. According to Varian (1984, p.84), the equilibrium market price is determined such that total amount of output that the firm wish to supply is equal to the total amount of output that the consumers wish to demand. Once the equilibrium price is determined, the individual supply schedules of each firm is determined. The cases in the three firms are depicted in Fig 4.- Fig 6 (corresponds to Fig 2.3 in Varian (1984, p.84)). Fig 4 has positive profits, Fig 5 has zero profits, and Fig 6 has negative profits. The third case of negative profits in Fig 6 may make sense for it to continue to produce as long as its revenues cover its variable costs. Of course, in the long run, such a firm will go out of business. Bear in mind that the data we are handling, as shown earlier, contain a lot of firms with negative profits. A theoretical model with long run equilibrium solution may not be appropriate to analyse the data at hand.

Equation (9) implies that, if $\lambda_i = \lambda \forall_i$, then $MC_i < MC_j$ implies $S_i > S_j$, the firm 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 defined 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,

$$\begin{aligned} \frac{pq_i - AC_i \cdot q_i}{pq_i} &= \frac{SA - VC}{SA} \\ &= \frac{PR + FC}{SA} \end{aligned} \tag{10}$$

where SA=Sales, VC=variable cost, PR=profit and FC=fixed cost.

This is profit plus fixed costs-sales ratio (a measure of profitability). Eq(9) and Eq(10) show that PCM and market share S_i are positively correlated. Fur-

thermore, if PCM is replaced by a profitability measure, such as ROA (return on assets), we can conduct an empirical test of Eq(9) or Eq(10) in the following panel analysis

$$ROA_{it} = \alpha_i + \beta S_{it} + \gamma_i \sum_i X_{it} \tag{11}$$

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

$\beta > 0$ implies that a high market share induces a higher profitability. This result depends highly on adequacy of measurement of S_{it}. If individual firm'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,

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

for $\lambda_i = \lambda$, $\forall_i$ and $\sum_{i=1} q_i = Q$.

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

$$ROA_t = \delta + \phi H + \omega_j \sum_j Y_{jt} \tag{13}$$

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

$\phi > 0$ implies that a high Herfindahl-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 profits, 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 firms of different efficiencies, welfare is enhanced if low-cost firms gain market share at the expense of high cost firms. 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 $\triangle Q/Q + \frac{1}{2}(\triangle H/H) > 0$. In other words, for a given percentage change in total output, welfare is more likely to rise if H increases.

3.2 Managerial Tradeoff between Profits and Debt

Alternative explanation of the firm behavior comes from the corporate finance literature. This literature, at least a part of it, is concerned with the question of the optimal capital structure. According to Myers (1984, 1986), there are three lines of research about the capital structure.

(1) **The tradeoff theory** in which the firm is viewed as setting a target debt ratio and gradually moving towards it. A firm's optimal debt ratio is usually viewed as determined by a tradeoff of the costs and benefits of debt, holding the firm's assets and investment plans constant. The firm is portrayed as balancing the value of interest tax shields against various costs of bankruptcy or financial distress. The firm is supposed to substitute debt for equity, or equity for debt, until the value of the firm is maximized. Fig.7 illustrates the profits and debt tradeoff and shows an existence of the optimum level of debt.

With large adjustment costs, the firms cannot immediately offset the random events that bump them away from the optimum. This can explain the observed wide variation in actual debt ratios. If, on the other hand, adjustment costs are small, and each firm in the sample is at, or close to its optimum, then the in-sample dispersion of debt ratios must be attributed to differences in risk or in other variables affecting optimal capital structure. All the previous empirical works, using cross-section regressions, faced with difficulties in controlling risk and other factors[8].

Myers (1984) argues that "if adjustment costs are small, and firms stay near their target debt ratios, I find it hard to understand the observed diversity of capital structures across firms that seem similar in the static tradeoff framework. If adjustment costs are large, so that some firms take extended excursions away from their targets, then we ought to give less attention to refining our static tradeoff stories and relatively more to understanding what the adjustment costs are, why they are so important, and how rational managers would respond to them".

I find Myers' problem can be solved by extending the static framework to the dynamic one. Fig.8 demonstrates how the dynamic tradeoff theory works. With panel data, a dynamic tradeoff theory can be tested empirically as demonstrated in the following section[9].

An extremely opposite view come from Miller (1977) that firms fall into some financing patterns which have no material effect on firm value (Myers calls this neutral mutation hypothesis). In his framework, the equilibrium determines

[8]Modigliani and Miller (1966) is concerned with the cost of capital for the electric utility industry. Their theory states that the firm valus is irrelevant of capital structure except for the value added by the present value of interest tax shields. Tax paying firms would be expected to substitute debt for equity, at least up to the point where the probability of finanical distress becomes important. However, the regulated firms like the electric utility industry had little tax incentive to use debt, because their interest tax shields were passed through to consumers. Modigliani and Miller finds that their theory works well with the data of electric utility industry in 1950s.

[9]A departure from cross-section analyses to panel data analyses would provide a great step forward for empirical undestanding in this literature.

aggregates, debt policy should not matter for any single tax-paying firm. So this model can explain the dispersion of actual debt policies. Problem is that, this explanation works only if all firms face, more or less, the same marginal tax rate. As seen in Table 11, we can empirically reject this. The extensive trading of depreciation tax shields and investment tax credits, through financial leases and other devices, provides that plenty of firms face low marginal rates.

Costs of financial distress include the legal and administrative costs of bankruptcy, agency costs, moral hazard, monitoring and contracting costs. These costs can erode trim value even if the firm does not go bankrupt. The literature on costs of financial distress supports the following two statements. (a) Risky firms ought to borrow less. Risk is defined here as the variance rate of the market value of the firm's assets. The higher the variance rate, the greater the probability of default. Since the costs of financial distress are caused by threatened or actual default, firms ought to be able to borrow more before expected costs of financial distress offset the tax advantages of borrowing. (b) Firms holding valuable tangible assets will borrow more than firms holding specialized, intangible assets or valuable growth opportunities. The expected cost of financial distress depends not just on the probability of default, but the value lost if trouble comes. Specialized, intangible assets and growth opportunities are more likely to lose value in financial distress (Myers (1984)).

(2) **The pecking order theory** in which the firm prefers internal to external financing and debt to equity if it issues securities. Donaldson (1961) wrote as early as in 1961 that "management strongly favored internal generation as a source of new funds"(p.67). Empirical facts suggest that the heavy reliance on internal finance and debt is prevalent. Recent development of asymmetric information literature reinforces the pecking order theory. In general, managers know more about their companies' prospects, risks and values than outside investors. Asymmetric information affects the choice between internal and external financing and between new issues of debt and equity securities. This leads to a pecking order, in which investment is financed first with internal funds, reinvested earnings primarily, then by new issues of debt, and finally with new issues of equity. New equity issues are a last resort when the company runs out of debt capacity, that is, when the threat of costs of financial distress brings regular insomnia to existing creditors and to the financial manager (Brealey and Myers (2000, p.524). In this theory, there is no well defined target debt-equity ratio, because there are two kinds of equity, internal and external. Each firm's observed debt ratio reflects its cumulative requirements for external finance. The pecking order theory explains why the most profitable firms generally borrow less, not because they have low target debt ratios but because they don't need outside money. Less profitable firms issue debt because they do not have internal funds sufficient for their capital investment programs and because debt financing is first on the pecking order of external financing (ibid., p.527).

In the pecking order theory, the attraction of interest tax shields is assumes to be a second-order effect. Debt ratios change when there is an imbalance of internal cash flow, net of dividends, and real investment opportunities. Highly

profitable firms with limited investment opportunities work down to low debt ratios. Firms whose investment opportunities outrun internally generated funds are driven to borrow more and more.

This theory explains the inverse *intra*industry relationship between profitability and financial leverage. Suppose firms generally invest to keep up with the growth of their industries. Then rates of investment will be similar within an industry. Given sticky dividend payouts, the least profitable firms will have less internal funds and will end up borrowing more.

The pecking order is less successful in explaining *inte*rindustry differences in debt ratios. For example, debt ratios tend to be low in high growth industries, even when the need for external capital is great. There are also mature, stable industries in which ample cashflow is not used to pay down debt. High dividend payout ratios give the cashflow back to investors instead (ibid, p.527).

Myers and Majluf (1985) develop the model under asymmetric information. Two propositions are made; (a) issue safe securities before risky ones, (b) issue debt when investors undervalue the firm, and equity or some other risky securities, when they overvalue it. The trouble with (b) is obvious once you know the firm will issue equity only when it is overpriced, and debt otherwise, you will refuse to buy equity unless the firm has exhausted its debt capacity. Investors would effectively force the firm to follow a pecking order.

(3) **The managerial theory**. This literature can be divided into three sub-groups; (a) descriptions of managerial capitalism, in which the separation of ownership and control is taken as a central fact, e.g. Berle and Means (1932), (b) agency theory by Jensen and Mecking (1976) and (c) the detailed analysis of the personal risks and rewards facing managers and how their responses affect firms' financing or investment choices, e.g. Ross (1973, 1977, 1978).

In this paper, we are particularly interested in the agency theory or the role of agency costs. This theory emphasizes the structure of debt equity ratios that may have roots in the existence of conflicts of interest among agents within the firms. Conflicts may happen between managers and shareholders and between shareholders and debtholders.

Amaro de Matos(2001, Chap.3) provides a useful summery of these two conflicts. First, "the nature of the conflict between managers and shareholders is based on the assumption that managers have no shares and the owners of the firm are shareholders. Any effort from the managers to improve the firm's profit will benefit the shareholders but not the managers. On the other hand, the managers will bear all the cost of the effort. Then the managers do not have any incentive to work in the best interest of the shareholders. The fact that managers have different goals from shareholders may generate a cost, namely, the cost to the shareholders of monitoring the managers. The existence of these conflicts of interest may lower the value of the firms due to the extra costs incurred. The monitoring problem can be solved, assuming that there is an optimal *fee schedule* to be paid to the management for its services. With this mechanism, the performance of the managers will be related to the debt-equity ratio. The higher this ratio, the higher the risk of bankruptcy, and therefore

the more efficient the managers should be in order to avoid the penalty. Hence, the cost of monitoring, reflected in the fee schedule, has a direct relationship to the optimal capital structure."(ibid., pp.62-63)

Second, "a different type of conflict, known as *risk shifting*, exists between shareholders and debtholders. For instance, when debt is issued at very high levels, there is a clear conflict between the owners of the firm and the debt issuers. This happens because the choice of any investment project is at the risk of the creditholders. Actually, the best interest of shareholders is to invest in projects that may yield very high payoffs, even if they have a low probability. If it works, the shareholders will pay the debt and keep the residual claim. If it does not work, the debtholders bear the cost. In other words, the value of equity increases with the riskiness of investments. The search for risky investments, however, is not necessarily equivalent to the search for the best, positive net present value projects. This incentive that equityholders have to choose risky investments may lead to an *overinvestment* problem, which includes the acceptance of negative net present value projects. This lowers the value of the firm, representing an agency cost of debt".(ibid., p.63)

"Another sort of agency cost of debt reflects the fact that equityholders have no incentive to invest new capital, not even in positive net present value projects when the firm is highly levered. This is known as the *underinvestment* problem. The reason is that when leverage is very high, the residual claim will probably be zero and those who are most likely to benefit from any investments are the creditholders".(ibid., p.63) This case may apply to the firms in Japan after the burst of the bubble economy in the 1990s.

"The total agency costs of raising external funds may be decomposed into two main streams. There are costs associated with debt and costs associated with equity. As the leverage level of the firm increases, the former increases monotonically as the latter decreases. These effects should add to the tax benefits of debt when looking for an optimal capital structure"(ibid., pp.63-64).

To sum up the above three approaches from the corporate finance literature, it seems empirically very difficult to distinguish strictly among the three theories. In particular, the data at hand do not include detailed information on equity, shareholders, debtholders, the main banks, management rewards, and so on. We can summarize the main messages in the following way. (1) Even with interest tax shields, considering the bankruptcy costs, there must be some optimal debt ratios. (2) These ratios can be changed over time and across firms because economic environments also change. (3) There is a managerial preference order from internal finance, debt and equity, if conditions allow. In general, good performance firms do not rely on debt even if there are interest tax shields. (4) Managers may not always maximize the shareholders' value. However ,as long as managers are concerned with ordinary income before tax on which ROA is based, to maximize ordinary income by increasing sales or by minimizing costs and tax payments would not contradict the interest of shareholders. (5) Shareholders and debtholders may face conflicts over the choice of investment projects. When the debt ratio is very high, the firm tends to face

the underinvestment problem.

4 Empirical Results

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 significantly higher rate of total factor productivity growth. According to the standard economic theory, perfect competition leads to efficient allocation of resources. In fact, recent competition policy and deregulation are based on this theory. Nevertheless, as Nickell (1995,1996) recognizes, firms 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 effectively and that, however, despite this lack of outside discipline and monitoring, most firms seem to operate fairly efficiently. 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 firms must have entrepreneurial management teams that do more than cost minimize. They must make good decisions about the future directions the firms 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.

To examine these properties empirically, we have to compromize with the data availability and end up with simply adding effective tax rate, debt asset ratio, debt equity ratio to the microeconomic model in Eq.(11). Nevertheless, in so doing, we can examine jointly the tax neutrality, the Modigliani-Miller theorem of irrelevance of finance on the firm's value, and the effect of market competition on firm's performance with the aid of a large panel data. With this model, we can capture the essence of the managerial tradeoff between profits and finance choice, paying attention to the capital structure (via the debt equity retio and the debt asset ratio) and tax factors. Risk factor, usualy measured by volatility of profits, is deviced to capture in the fixed effects from the panel data analysis.

Empirical specification for Eq(11) is as follows.

$$
\begin{aligned}
ROA_{it} = {} & \alpha + \rho_i + \beta d \ln K_{it} + \gamma d \ln L_{it} + \delta taxrate_{it} \\
& + \zeta (taxrate_{it})^2 + \theta Debt/Asset_{it} + \eta (Debt/Asset_{it})^2 \\
& + \xi Debt/Equity_{it} + \nu (Debt/Equity_{it})^2 + \phi S_{it} + \epsilon_{it} \qquad (14)
\end{aligned}
$$

where α=constant, ρ_i=fixed or random effect, K=real capital stock, L=number of full-time employees, $taxrate$=effective tax rate, $(taxrate)^2$=square of effective tax rate, $Debt/Asset$=debt/asset ratio, $(Debt/Asset)^2$=square of debt/asset ratio, $OwnCapRatio$=Shareholder's equity/asset ratio, $LiquidityRatio$= liquidity asset/liquidity debt ratio, $Debt/Equity$=debt/equity ratio, $(Debt/Equity)^2$=square of debt/equity ratio and S_i=$SalesShare$=the share of firm i's output in total output.

The result for all sample is given in Table 12. Panel A provides results of the general model and Panel B does those of the specific model. Diagnostic tests indicate fixed effect model is preferred in both Panel A and Panel B. Values of coefficients also remain more or less the same in both Panel A and Panel B. Compared the fixed effect model with the between estimator model, significance levels of coefficients are much higher in the fixed effect model. The between estimator model is a cross section regression over averages of individual firms. The coefficients of the between estimator model differ substantially from the other two models. This implies that results from the cross section analysis are different from those from the panel data analysis.

Market competition effect by sales share is significantly positive. Tax effect is not so clear in this sample while the debt asset ratio and its square term have very significantly negative effects. Together with a negatively significant effect of real capital stock growth, the most firms are in the position of overinvestment and overborrwing from the early period (i.e. the bubble period in the late 1980s). Employment growth factor is still significantly positive.

In case of all sample, tax shields are not a major issue, but market competition and debt ratio adjustment play important roles. Compared with its significance level, debt ratio adjustment seems more relevant.

Using the values of fixed effects in Table 12, Panel A, Fig 9 is illustrated. Hsiao (1986) convinsingly suggests that "besides the advantage that panel data allow us to construct and test more complicated behavioral models than purely cross-sectional or time-series data, the use of panel data also provides a means of resolving or reducing the magnitude of a key econometric problem that often arises in empirical studies, namely, the often-heard assertion that the real reason one finds (or does not find) certain effects is because of omitted (mismeasured, not observed) variables that are correlated with explanatory variables. By utilizing information on both the intertemporal dynamics and the individuality of the entities being investigated, one is better able to control in a more natural way for the effects of missing or unobserved variables"(ibid., pp.3-4). Indeed,

the virtue of the panel data is to be able to identify a unobservable variable as a fixed effect that in fact influence the output.

Following the discussion in the previous section, the fixed effect in our case is supposed to capture a unobservable risk factor. In order to check whether this is the case, the coefficient of variation of ROA is included in Fig 9. As is clear from Fig 9, the fixed effect is highly (negatively) correlated with risk factor while in general, it follows the same trend as ROA. Good news is that some spikes moves clearly opposite directions as the coefficient of variation of ROA. If the fixed effect reflects the risk factor, the estimations of Table 12 is to test the dynamic tradeoff theory as depicted in Fig 8. The safer industries may enjoy higher debt ratios while the riskier industries face a strict tradeoff between profits and debt ratios.

The result for the normal firms ($0 \leqslant Tax \leqslant 1$ *and* $ROA \geqslant 0$) is reported in Table 13. Panel A provides results of the general model and Panel B does those of the specific model. Diagnostic tests indicate fixed effect model is preferred in both Panel A and Panel B. Values of coefficients also remain more or less the same in both Panel A and Panel B. Compared the fixed effect model with the between estimator model, significance levels of coefficients are much higher in the fixed effect model, although R-square is higher in the between estimator model.

It is noticeable that the coefficient values differ substantially from Table 12. For example, market competition effect changes its signs and reduces its significance levels. Tax effect becomes significant and debt asset ratio indicates clear a nonlinear relationship with ROA. The effects of the real capital stock and employment growth rates remain the same as in Table 12.

In case of normal firms, tax shields and debt ratio adjustment argued in the finance literature seem more relevant.

Using the values of fixed effect in Table 13, Panel A, Fig 10 is illustrated. Since this sample includes only the normal firms with positive profits, the risk factor is very stable over industries although a weaker negative correlation with the fixed effect is still found. It should be noted that the rank order of ROA by industry has changed from Fig 9.

The result for the abnormal firms ($Tax > 1$ *or* $Tax < 0$ *or* $ROA < 0$) is reported in Table 14. Panel A provides results of the general model and Panel B does those of the specific model. Diagnostic tests indicate random effect model is preferred in both Panel A and Panel B[10]. Values of coefficients also remain more or less the same in both Panel A and Panel B. Compared the random effect model with the between estimator model, significance levels of coefficients are much higher in the random effect model, although R-square is higher in the between estimator model.

Coefficients become insignificant with this model, for example, tax factors play no role[11], market competition is also very weak. Real capital stock growth

[10] Due to the result of the random effect estimator, sigma_u becomes zero, so that Hausman test statistics cannot be calculated to compare with the fixed effect model. This implies the random effect model is reasonable.

[11] This may be self-evident because loss making firms are usually not paying taxes.

becomes positive while employment growth rate becomes negative. Here again, debt ratios play a significantly negative effect and reveals a nonlinear relationship with ROA.

5 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, 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, a share of external finance, in particular, borrowing from the bank has been declining sharply in the 1990s as predicted by the pecking order theory. 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, tax plays a significant role in case of the normal firms. In case of the loss making firms, of course, tax does not matter. In case of the normal firms, tax affects in a nonlinear way. Both a simple story of tax saving in debt finance à la Modigliani and Miller and a tax nuetrality story à la Miller do not hold. This result needs a reservation because tax and debt are highly correlated theoretically and empirically (see Table 6), so there could be a endogeneity problem of debt. Note, however, that tax rate rather than tax itself is used in Eq(14) as an explanatory variable(tax rate and debt are not at all correlated in Table 6), endogeneity problem may not be so serious. Thus this fact does not necessarily refute the fact that debt affects profits significantly. Nevertheless, econometric methodology must be improved in this respect.

Third, market competition variable, sales share, plays a very important role. 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 *sufficient* condition. An individual firm's effort for higher production does not guarantee an increase in sales share in the market, depending on the other firms' production activities and market demand in general which are beyond the control of individual firms. Even after taking into account of the above conceptual issue, market competition seems to play a important disciplinary role.

Fourth, 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 profitability being more an instrument than the ultimate goal"(p.4). Results from this paper reinforce Tirole's view. The Japanese firms 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 affect the firm 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 firm 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-specific 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 interesting to investigate how valuable intangible assets such as patents and growth opportunities affect the firm's finance choice and profitability. It is also important to see how the financial market information such as share prices, bond prices, dividends, and corporate rating affects the firm behavior.

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Table 1 Industrial Code by Applied Research Institute

ARI	Description
1	Agriculture, forestry and fishery
50	Mining
90	Construction
	Manufacturing
120	Food and beverages
130	Alcohol, feed and tobacco
140	Textiles
150	Wearing apparel and clothing accessories
160	Wood and wooden products
170	Furniture
180	Pulp, paper and paper products
190	Publishing and printing
200	Chemicals
210	Petroleum and coal products
220	Plastic products
230	Rubber products
240	Leather, fur products and miscellaneous leather produc
250	Non-metallic mineral products
260	Iron and steel
270	Non-ferrous metals
280	Fabricated metal products
290	Machinery
300	Electrical machinery, equipment and supplies
310	Transport equipment
320	Precision instruments
340	Others
350	Electricity, gas and water supply
400	Transportation and communication
	Wholesale and retail trade
480	Wholesale trade
540	Retail trade
600	Restaurants
620	Finance and insurance
700	Real estate
715	Services

Table 2 Number of Firms by Industry

		Total	1991	1994	1995	1996	1997	1998	1999	2000	Share of Listed Company
1	Agriculture, forestry and fishery	90	11	13	15	14	11	9	8	9	8.89
50	Mining	481	53	53	60	63	64	63	62	63	6.24
90	Construction	3,463	242	494	511	488	459	464	418	387	9.70
	Manufacturing										
120	Food and beverages	11,244	1,302	1,325	1,430	1,413	1,420	1,461	1,479	1,414	7.19
130	Alcohol, feed and tobacco	1,754	232	222	227	223	209	216	217	208	13.11
140	Textiles	3,536	626	480	457	428	433	404	375	333	8.14
150	Wearing apparel and clothing accessories	3,894	519	556	563	532	502	457	410	355	2.85
160	Wood and wooden products	1,419	189	172	193	175	184	177	169	160	2.68
170	Furniture	1,584	228	206	200	198	194	192	185	181	5.56
180	Pulp, paper and paper products	3,592	426	452	464	454	458	451	447	440	7.18
190	Publishing and printing	6,288	670	722	785	784	806	848	848	825	4.21
200	Chemicals	7,645	920	942	982	986	956	944	971	944	20.43
210	Petroleum and coal products	463	61	59	57	58	57	59	57	55	14.25
220	Plastic products	5,377	607	639	673	683	692	686	709	688	7.48
230	Rubber products	1,206	152	151	155	154	155	151	145	143	13.10
240	Leather, fur products and miscellaneous leather products	367	58	52	47	43	43	46	38	40	1.91
250	Non-metallic mineral products	4,943	644	647	655	643	624	604	572	554	9.75
260	Iron and steel	3,383	456	421	443	430	426	408	388	411	13.30
270	Non-ferrous metals	2,675	331	336	350	335	323	340	332	328	11.25
280	Fabricated metal products	8,153	997	987	1,052	1,036	1,015	1,043	1,022	1,001	7.98
290	Machinery	13,036	1,555	1,575	1,654	1,662	1,676	1,654	1,628	1,632	12.83
300	Electrical machinery, equipment and supplies	16,410	1,960	1,991	2,104	2,113	2,092	2,069	2,049	2,032	11.36
310	Transport equipment	9,333	1,098	1,154	1,201	1,189	1,188	1,199	1,183	1,121	11.60
320	Precision instruments	2,891	365	337	357	379	365	367	367	354	10.93
340	Others	2,386	292	305	334	333	286	299	270	267	10.73
350	Electricity, gas and water supply	200	2	24	14	13	15	14	14	104	23.00
400	Transportation and communication	613	35	82	88	81	94	77	76	80	5.06
	Wholesale and retail trade										
480	Wholesale trade	55,165	6,838	6,938	7,120	7,122	7,028	6,908	6,803	6,408	6.97
540	Retail trade	28,259	3,197	3,293	3,638	3,735	3,606	3,680	3,587	3,523	6.98
600	Restaurants	1,895	43	72	65	58	383	425	427	422	10.18
620	Finance and insurance	141	7	7	9	11	6	2	3	96	17.02
700	Real estate	224	17	27	27	25	23	31	28	46	12.05
715	Services	6,365	212	544	526	492	484	522	554	3,031	7.49
	Total	208,475	24,345	25,278	26,456	26,353	26,277	26,270	25,841	27,655	8.80

Table 3 Definitions of Variables

Variable	Description
d47	Total Full Time Employees
d58	Fixed Capital
d62	Total Assets
d63	Total Debt
d64	Long-Term Debt
d65	Short-Term Debt
d66	Fixed Capital Investment
d70	Total Sales
d77	Ordinary Income
d78	Net Income After Tax
d86	Depreciation
d87	Total Tax
d96	Interest Payment
d97	Rental Lease Fees
sh1	Sales Share
hi1	Herfindahl-Hirschman Index
roa	Return on Total Assets
tax	Effective Tax Rate
tax2	Square of Effective Tax Rate
specials	Special Income - Special Cost
speratio	Specials / Ordinary Income
daratio	Debt Asset Ratio
daratio2	Square of Debt Asset Ratio
dqratio	Debt Equity Ratio
dqratio2	Square of Debt Equity Ratio
liqratio	Liquidity Ratio = Liquidity Assets / Short-Term Debt
ocratio	Own Capital Ratio = Equity / Total Assets

Table 4 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
d47	208,493	388.64	1,599.84	0.00	82,221.00
d58	183,994	8,297.39	75,421.76	-9.00	13,700,000.00
d62	208,377	18,051.46	134,825.00	0.00	14,300,000.00
d63	184,055	12,281.99	96,432.56	0.00	12,400,000.00
d64	183,619	4,098.89	45,804.85	0.00	9,375,214.00
d65	184,085	8,191.48	57,364.73	0.00	4,540,595.00
d66	203,625	822.44	7,270.55	-9,332.00	788,532.00
d70	208,493	23,023.87	224,838.90	0.00	20,000,000.00
d77	208,490	582.75	5,421.02	-114,920.00	625,640.00
d78	184,130	182.72	4,090.87	-790,064.00	365,140.00
d86	207,804	519.15	5,404.24	0.00	948,547.00
d87	158,042	109.59	1,345.87	0.00	358,101.00
d96	155,652	152.85	1,986.71	0.00	394,553.00
d97	154,627	99.11	633.12	0.00	47,949.00
sh1	202,782	0.00	0.01	0.00	0.74
hi1	202,782	0.03	0.03	0.00	0.74
roa	208,343	0.03	0.14	-20.94	16.51
tax	157,684	0.29	1.93	-162.00	288.00
tax2	157,684	3.80	271.45	0.00	82,944.00
specials	158,040	291.27	3,747.66	-241,429.00	738,481.00
sperratio	157,483	-0.08	17.77	-5,696.00	1,169.38
daratio	183,994	0.77	0.37	0.00	66.19
daratio2	183,994	0.72	10.98	0.00	4,380.79
dqratio	179,214	5.45	91.69	-5,786.50	22,943.00
dqratio2	179,214	8,437.64	1,299,224.00	0.00	526,000,000.00
liqratio	183,860	1.60	25.82	0.00	9,319.00
ocratio	179,242	0.27	0.33	-34.36	10.54

Table 5 Income Statement

I	Sales Revenue	
II	Cost of Goods Sold	
	Gross Margin	(I-II)
III	General, Selling, and Administrative Expenses	
	Operating Income	(I-II-III)
IV	Non-operating Income	
V	Non-operating Costs	
	Ordinary Income	(I-II-III+IV-V)
VI	Special Income	
VII	Special Costs	
	Net Income Before Tax	(I-II-III+IV-V+VI-VII)
VIII	Corporate Tax, Residents' Tax and Business Tax	
	Net Income After Tax	(I-II-III+IV-V+VI-VII-VIII)

Table 6 Correlation Matrix

	d47	d58	d62	d63	d64	d65	d66	d70	d77	d78	d86	d87	d96	d97	sh1	hi1	roa	tax	tax2	specials	speratio	daratio	daratio2	dqratio	dqratio2	liqratio	ocratio
d47	1.00																										
d58	0.65	1.00																									
d62	0.70	0.92	1.00																								
d63	0.58	0.86	0.96	1.00																							
d64	0.48	0.90	0.86	0.92	1.00																						
d65	0.60	0.73	0.92	0.95	0.75	1.00																					
d66	0.66	0.79	0.74	0.66	0.67	0.57	1.00																				
d70	0.48	0.62	0.82	0.83	0.68	0.87	0.42	1.00																			
d77	0.57	0.67	0.69	0.51	0.44	0.51	0.59	0.49	1.00																		
d78	0.27	0.33	0.30	0.17	0.15	0.16	0.32	0.18	0.67	1.00																	
d86	0.63	0.85	0.76	0.69	0.75	0.56	0.87	0.39	0.59	0.32	1.00																
d87	0.43	0.81	0.65	0.64	0.77	0.45	0.66	0.31	0.52	0.32	0.79	1.00															
d96	0.31	0.70	0.67	0.75	0.80	0.62	0.46	0.56	0.31	0.11	0.54	0.64	1.00														
d97	0.57	0.48	0.50	0.44	0.38	0.43	0.46	0.34	0.31	0.04	0.44	0.32	0.27	1.00													
sh1	0.38	0.40	0.42	0.38	0.34	0.37	0.38	0.29	0.38	0.18	0.36	0.31	0.23	0.28	1.00												
hi1	0.04	0.08	0.07	0.06	0.07	0.05	0.08	0.03	0.06	0.03	0.08	0.07	0.05	0.05	0.30	1.00											
roa	0.02	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.09	0.06	0.01	0.01	-0.01	0.01	0.02	0.02	1.00										
tax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00									
tax2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	1.00								
specials	0.37	0.30	0.41	0.32	0.19	0.39	0.25	0.40	0.49	-0.27	0.20	0.04	0.08	0.29	0.22	0.02	0.06	-0.01	0.00	1.00							
speratio	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.01	-0.01	0.00	0.04	1.00						
daratio	-0.06	-0.03	-0.04	0.00	0.00	0.00	-0.04	-0.02	-0.09	-0.07	-0.03	-0.03	0.01	-0.03	-0.05	-0.05	-0.28	0.00	0.00	-0.04	0.01	1.00					
daratio2	-0.01	-0.01	-0.01	0.00	0.00	0.00	-0.01	0.00	-0.01	-0.01	-0.01	0.00	0.00	0.00	-0.01	-0.01	-0.20	0.00	0.00	0.00	0.01	0.56	1.00				
dqratio	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.02	0.00	1.00			
dqratio2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.70	1.00		
liqratio	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	1.00	
ocratio	0.07	0.04	0.04	0.00	0.00	0.00	0.06	0.02	0.09	0.07	0.04	0.03	-0.01	0.03	0.05	0.05	0.28	0.00	0.00	0.04	-0.01	-0.98	-0.55	-0.02	-0.01	0.02	1.00

Table 7 Financial Indicators

	year	Debt / Asset	Equity / Asset	Debt / Equity	Cashflow / Asset
Agriculture, forestry and fishery	1991	n.a.	n.a.	n.a.	0.036
	1994	0.896	0.167	5.353	0.026
	1995	0.738	0.342	2.157	0.068
	1996	0.767	0.284	2.696	0.064
	1997	0.717	0.390	1.837	0.058
	1998	0.764	0.357	2.141	0.099
	1999	0.895	0.126	7.119	0.045
	2000	0.713	0.304	2.348	0.033
Mining	1991	n.a.	n.a.	n.a.	0.141
	1994	0.574	0.470	1.222	0.079
	1995	0.537	0.540	0.994	0.080
	1996	0.411	0.634	0.648	0.150
	1997	0.408	0.677	0.603	0.131
	1998	0.396	0.664	0.597	0.102
	1999	0.366	0.712	0.514	0.122
	2000	0.370	0.658	0.562	0.183
Construction	1991	n.a.	n.a.	n.a.	0.077
	1994	0.752	0.273	2.754	0.065
	1995	0.691	0.338	2.046	0.046
	1996	0.691	0.333	2.077	0.045
	1997	0.645	0.381	1.694	0.046
	1998	0.625	0.399	1.565	0.041
	1999	0.622	0.396	1.571	0.044
	2000	0.634	0.367	1.729	0.046
Food and beverages	1991	n.a.	n.a.	n.a.	0.083
	1994	0.607	0.441	1.378	0.066
	1995	0.614	0.439	1.400	0.067
	1996	0.597	0.460	1.297	0.068
	1997	0.612	0.445	1.377	0.067
	1998	0.627	0.421	1.488	0.071
	1999	0.600	0.446	1.344	0.079
	2000	0.607	0.430	1.412	0.070
Alcohol, feed and tobacco	1991	n.a.	n.a.	n.a.	0.088
	1994	0.555	0.503	1.103	0.085
	1995	0.571	0.481	1.189	0.077
	1996	0.565	0.490	1.152	0.076
	1997	0.555	0.493	1.126	0.080
	1998	0.550	0.499	1.102	0.085
	1999	0.561	0.490	1.146	0.092
	2000	0.570	0.477	1.196	0.071
Textiles	1991	n.a.	n.a.	n.a.	0.051
	1994	0.703	0.331	2.124	0.025
	1995	0.682	0.359	1.898	0.026
	1996	0.671	0.372	1.802	0.039
	1997	0.669	0.365	1.833	0.043
	1998	0.667	0.366	1.820	0.030
	1999	0.638	0.394	1.618	0.041
	2000	0.649	0.366	1.771	0.039
Wearing apparel and clothing accessories	1991	n.a.	n.a.	n.a.	0.054
	1994	0.757	0.261	2.906	0.022
	1995	0.613	0.404	1.516	0.039
	1996	0.586	0.431	1.358	0.037
	1997	0.587	0.433	1.356	0.037
	1998	0.614	0.401	1.529	0.028
	1999	0.612	0.399	1.533	0.037
	2000	0.586	0.382	1.534	0.040
Wood and wooden products	1991	n.a.	n.a.	n.a.	0.073
	1994	0.572	0.451	1.268	0.052
	1995	0.693	0.356	1.945	0.051
	1996	0.706	0.346	2.039	0.063
	1997	0.704	0.379	1.857	0.033
	1998	0.677	0.349	1.937	0.019
	1999	0.651	0.374	1.742	0.055
	2000	0.678	0.324	2.091	0.045
Furniture	1991	n.a.	n.a.	n.a.	0.079
	1994	0.620	0.409	1.516	0.051
	1995	0.677	0.355	1.910	0.046
	1996	0.633	0.399	1.587	0.063
	1997	0.606	0.434	1.395	0.052
	1998	0.615	0.412	1.492	0.019
	1999	0.589	0.437	1.346	0.040
	2000	0.573	0.427	1.341	0.053
Pulp, paper and paper products	1991	n.a.	n.a.	n.a.	0.078
	1994	0.724	0.314	2.305	0.040
	1995	0.730	0.339	2.154	0.065
	1996	0.733	0.354	2.073	0.065
	1997	0.731	0.367	1.991	0.064
	1998	0.724	0.353	2.051	0.051
	1999	0.705	0.340	2.071	0.061
	2000	0.713	0.337	2.115	0.072
Publishing and printing	1991	n.a.	n.a.	n.a.	0.089
	1994	0.631	0.411	1.536	0.078
	1995	0.602	0.438	1.374	0.084
	1996	0.578	0.472	1.224	0.090
	1997	0.601	0.451	1.331	0.086
	1998	0.589	0.457	1.290	0.081
	1999	0.578	0.466	1.240	0.085
	2000	0.544	0.484	1.123	0.085
Chemicals	1991	n.a.	n.a.	n.a.	0.085
	1994	0.582	0.453	1.286	0.069
	1995	0.571	0.476	1.199	0.082
	1996	0.561	0.485	1.155	0.087
	1997	0.549	0.504	1.090	0.087
	1998	0.522	0.536	0.975	0.088
	1999	0.519	0.526	0.987	0.094
	2000	0.494	0.541	0.914	0.097
Petroleum and coal products	1991	n.a.	n.a.	n.a.	0.047
	1994	0.810	0.244	3.318	0.054
	1995	0.816	0.241	3.392	0.042
	1996	0.826	0.227	3.645	0.040
	1997	0.832	0.204	4.088	0.036
	1998	0.838	0.197	4.257	0.032
	1999	0.838	0.203	4.133	0.046
	2000	0.825	0.195	4.225	0.044
Plastic products	1991	n.a.	n.a.	n.a.	0.094
	1994	0.662	0.392	1.692	0.062
	1995	0.660	0.401	1.647	0.074
	1996	0.659	0.397	1.659	0.080
	1997	0.641	0.424	1.514	0.075
	1998	0.629	0.428	1.469	0.070
	1999	0.618	0.426	1.451	0.080
	2000	0.629	0.413	1.523	0.085

	year	Debt Asset	Equity Asset	Debt Equity	Cashflow Asset
	1991	n.a.	n.a.	n.a.	0.079
Rubber products	1994	0.604	0.432	1.399	0.065
	1995	0.569	0.482	1.179	0.082
	1996	0.558	0.509	1.097	0.094
	1997	0.545	0.519	1.051	0.090
	1998	0.534	0.527	1.013	0.079
	1999	0.511	0.531	0.962	0.084
	2000	0.496	0.536	0.924	0.088
	1991	n.a.	n.a.	n.a.	0.050
Leather, fur products and miscellaneous leather products	1994	0.706	0.312	2.266	0.029
	1995	0.719	0.296	2.431	0.034
	1996	0.691	0.328	2.110	0.048
	1997	0.707	0.313	2.260	0.036
	1998	0.710	0.302	2.351	0.036
	1999	0.635	0.375	1.692	0.046
	2000	0.631	0.336	1.879	0.049
	1991	n.a.	n.a.	n.a.	0.077
Non-metallic mineral products	1994	0.669	0.377	1.771	0.035
	1995	0.663	0.397	1.668	0.059
	1996	0.649	0.420	1.547	0.062
	1997	0.640	0.425	1.506	0.054
	1998	0.635	0.431	1.471	0.045
	1999	0.638	0.405	1.573	0.051
	2000	0.625	0.419	1.494	0.065
	1991	n.a.	n.a.	n.a.	0.068
Iron and steel	1994	0.724	0.321	2.253	0.018
	1995	0.711	0.354	2.005	0.043
	1996	0.701	0.352	1.992	0.050
	1997	0.699	0.349	2.002	0.047
	1998	0.719	0.327	2.198	0.026
	1999	0.707	0.338	2.089	0.039
	2000	0.694	0.343	2.024	0.053
	1991	n.a.	n.a.	n.a.	0.054
Non-ferrous metals	1994	0.715	0.328	2.178	0.046
	1995	0.707	0.354	1.998	0.058
	1996	0.696	0.361	1.925	0.069
	1997	0.735	0.338	2.174	0.056
	1998	0.722	0.349	2.067	0.046
	1999	0.722	0.338	2.137	0.047
	2000	0.702	0.360	1.948	0.059
	1991	n.a.	n.a.	n.a.	0.079
Fabricated metal products	1994	0.627	0.415	1.511	0.055
	1995	0.623	0.426	1.465	0.063
	1996	0.616	0.438	1.406	0.065
	1997	0.618	0.433	1.428	0.052
	1998	0.603	0.443	1.363	0.051
	1999	0.611	0.430	1.419	0.057
	2000	0.604	0.424	1.424	0.056
	1991	n.a.	n.a.	n.a.	0.066
Machinery	1994	0.636	0.393	1.618	0.039
	1995	0.637	0.390	1.631	0.054
	1996	0.628	0.404	1.555	0.062
	1997	0.625	0.416	1.500	0.059
	1998	0.599	0.441	1.360	0.045
	1999	0.596	0.437	1.365	0.044
	2000	0.586	0.441	1.328	0.066

	year	Debt Asset	Equity Asset	Debt Equity	Cashflow Asset
	1991	n.a.	n.a.	n.a.	0.081
Electrical machinery, equipment and supplies	1994	0.617	0.427	1.447	0.068
	1995	0.614	0.455	1.349	0.081
	1996	0.611	0.457	1.337	0.085
	1997	0.605	0.464	1.305	0.083
	1998	0.611	0.445	1.373	0.060
	1999	0.601	0.450	1.335	0.071
	2000	0.594	0.468	1.270	0.089
	1991	n.a.	n.a.	n.a.	0.100
Transport equipment	1994	0.593	0.447	1.325	0.073
	1995	0.579	0.484	1.196	0.081
	1996	0.576	0.483	1.193	0.094
	1997	0.565	0.502	1.126	0.096
	1998	0.562	0.499	1.127	0.082
	1999	0.547	0.504	1.085	0.080
	2000	0.542	0.507	1.068	0.080
	1991	n.a.	n.a.	n.a.	0.070
Precision instruments	1994	0.605	0.428	1.413	0.047
	1995	0.578	0.451	1.280	0.061
	1996	0.597	0.444	1.344	0.077
	1997	0.587	0.460	1.276	0.082
	1998	0.565	0.477	1.184	0.071
	1999	0.566	0.465	1.218	0.068
	2000	0.537	0.489	1.099	0.089
	1991	n.a.	n.a.	n.a.	0.116
Others	1994	0.518	0.514	1.008	0.077
	1995	0.522	0.514	1.016	0.099
	1996	0.511	0.529	0.966	0.114
	1997	0.491	0.543	0.905	0.117
	1998	0.493	0.541	0.910	0.099
	1999	0.473	0.574	0.825	0.063
	2000	0.461	0.583	0.791	0.118
	1991	n.a.	n.a.	n.a.	-0.078
Electricity, gas and water supply	1994	0.675	0.422	1.601	0.089
	1995	0.690	0.388	1.778	0.087
	1996	0.704	0.384	1.836	0.082
	1997	0.690	0.378	1.828	0.079
	1998	0.691	0.436	1.586	0.094
	1999	0.669	0.409	1.636	0.088
	2000	0.815	0.250	3.259	0.066
	1991	n.a.	n.a.	n.a.	0.070
Transportation and communication	1994	0.873	0.251	3.478	0.071
	1995	0.891	0.192	4.634	0.027
	1996	0.881	0.205	4.300	0.043
	1997	0.882	0.223	3.958	0.075
	1998	0.843	0.279	3.024	0.098
	1999	0.802	0.318	2.522	0.112
	2000	0.838	0.238	3.528	0.066
	1991	n.a.	n.a.	n.a.	0.034
Wholesale trade	1994	0.792	0.223	3.558	0.027
	1995	0.795	0.221	3.596	0.032
	1996	0.788	0.231	3.408	0.036
	1997	0.776	0.242	3.209	0.035
	1998	0.770	0.247	3.118	0.033
	1999	0.759	0.257	2.949	0.039
	2000	0.750	0.251	2.985	0.042

	year	Debt / Asset	Equity / Asset	Debt / Equity	Cashflow / Asset
	1991	n.a.	n.a.	n.a.	0.038
Retail trade	1994	0.776	0.259	2.998	0.039
	1995	0.771	0.273	2.826	0.041
	1996	0.767	0.279	2.752	0.048
	1997	0.765	0.282	2.712	0.041
	1998	0.763	0.285	2.682	0.041
	1999	0.755	0.286	2.636	0.050
	2000	0.738	0.297	2.489	0.048
	1991	n.a.	n.a.	n.a.	0.105
Restaurants	1994	0.656	0.421	1.558	0.069
	1995	0.634	0.441	1.440	0.075
	1996	0.571	0.493	1.158	0.088
	1997	0.571	0.496	1.151	0.081
	1998	0.626	0.448	1.396	0.086
	1999	0.614	0.457	1.343	0.094
	2000	0.634	0.427	1.486	0.094
	1991	n.a.	n.a.	n.a.	0.018
Finance and	1994	0.861	0.147	5.848	0.018
insurance	1995	0.827	0.176	4.707	0.032
	1996	0.792	0.236	3.357	0.032
	1997	0.767	0.261	2.935	0.041
	1998	0.765	0.260	2.936	0.040
	1999	0.775	0.252	3.075	0.040
	2000	0.950	0.065	14.673	0.008
	1991	n.a.	n.a.	n.a.	0.000
Real estate	1994	0.809	0.208	3.892	0.017
	1995	0.853	0.173	4.924	0.002
	1996	0.816	0.199	4.101	0.027
	1997	0.853	0.166	5.142	0.025
	1998	0.861	0.214	4.031	0.020
	1999	0.770	0.259	2.973	0.051
	2000	0.854	0.184	4.633	0.018
	1991	n.a.	n.a.	n.a.	0.091
Services	1994	0.731	0.334	2.192	0.059
	1995	0.726	0.343	2.116	0.067
	1996	0.703	0.350	2.007	0.071
	1997	0.649	0.409	1.588	0.079
	1998	0.627	0.421	1.491	0.090
	1999	0.595	0.449	1.326	0.098
	2000	0.835	0.279	2.996	0.118
	1991	n.a.	n.a.	n.a.	0.063
Total	1994	0.695	0.339	2.052	0.048
	1995	0.690	0.353	1.958	0.056
	1996	0.682	0.362	1.884	0.062
	1997	0.674	0.372	1.814	0.060
	1998	0.666	0.377	1.768	0.054
	1999	0.655	0.383	1.709	0.060
	2000	0.692	0.348	1.987	0.067

Table 8 Descriptive Statistics of ROA (All Sample)

		Obs	Mean	Std. Dev.	Min	Max
1	Agriculture, forestry and fishery	90	0.0215	0.0413	-0.0795	0.1581
50	Mining	481	0.0418	0.0823	-0.2165	0.6386
90	Construction	3,463	0.0333	0.0543	-0.4372	1.1171
	Manufacturing					
120	Food and beverages	11,234	0.0293	0.1298	-6.1612	4.6667
130	Alcohol, feed and tobacco	1,754	0.0466	0.0756	-0.4807	0.9622
140	Textiles	3,535	0.0087	0.0771	-1.2473	0.7108
150	Wearing apparel and clothing accessories	3,890	0.0093	0.1437	-2.8889	4.8434
160	Wood and wooden products	1,418	0.0153	0.1359	-2.9990	1.6737
170	Furniture	1,582	0.0175	0.0780	-1.3185	0.4710
180	Pulp, paper and paper products	3,589	0.0253	0.0550	-0.7697	0.9748
190	Publishing and printing	6,287	0.0382	0.0938	-2.7813	2.1107
200	Chemicals	7,642	0.0493	0.0703	-1.1672	1.6042
210	Petroleum and coal products	463	0.0326	0.0481	-0.1008	0.4944
220	Plastic products	5,373	0.0325	0.0671	-1.4261	1.0066
230	Rubber products	1,203	0.0359	0.0988	-1.2393	2.3939
240	Leather, fur products and miscellaneous leather products	367	0.0151	0.1022	-1.0630	0.5302
250	Non-metallic mineral products	4,941	0.0232	0.1501	-9.3225	1.0169
260	Iron and steel	3,383	0.0170	0.0602	-1.3344	1.1349
270	Non-ferrous metals	2,675	0.0280	0.0876	-2.3775	1.6579
280	Fabricated metal products	8,144	0.0292	0.1684	-13.2788	2.4209
290	Machinery	13,031	0.0292	0.1255	-11.5120	1.1693
300	Electrical machinery, equipment and supplies	16,399	0.0338	0.1168	-4.5833	3.5484
310	Transport equipment	9,329	0.0275	0.2346	-20.9367	3.3239
320	Precision instruments	2,889	0.0445	0.1348	-0.8732	6.0697
340	Others	2,384	0.0374	0.0969	-0.9682	2.1442
350	Electricity, gas and water supply	200	0.0340	0.0351	-0.0673	0.1994
400	Transportation and communication	613	0.0338	0.0798	-0.5207	0.6986
	Wholesale and retail trade					
480	Wholesale trade	55,127	0.0270	0.1639	-7.9513	16.5051
540	Retail trade	28,228	0.0217	0.1307	-7.2359	6.1546
600	Restaurants	1,895	0.0148	0.2485	-6.4545	0.4839
620	Finance and insurance	141	0.0275	0.0428	-0.1274	0.1961
700	Real estate	224	0.0251	0.0387	-0.0689	0.2639
715	Services	6,362	0.0476	0.1254	-4.3226	1.3905
	Total	208,343	0.0287	0.1401	-20.9367	16.5051

Table 9 Descriptive Statistics of ROA (Excluding Outliers)

		Obs	Mean	Std. Dev.	Min	Max
1	Agriculture, forestry and fishery	90	0.0215	0.0413	-0.0795	0.1581
50	Mining	479	0.0394	0.0733	-0.2165	0.5476
90	Construction	3,460	0.0326	0.0489	-0.4372	0.4270
	Manufacturing					
120	Food and beverages	11,199	0.0287	0.0668	-0.5298	0.5770
130	Alcohol, feed and tobacco	1,747	0.0438	0.0614	-0.4807	0.5542
140	Textiles	3,529	0.0096	0.0694	-0.4630	0.5520
150	Wearing apparel and clothing accessories	3,860	0.0111	0.0773	-0.5161	0.5631
160	Wood and wooden products	1,414	0.0187	0.0654	-0.5185	0.5714
170	Furniture	1,580	0.0188	0.0683	-0.4191	0.4710
180	Pulp, paper and paper products	3,586	0.0254	0.0498	-0.4034	0.5721
190	Publishing and printing	6,266	0.0392	0.0622	-0.5105	0.5871
200	Chemicals	7,630	0.0493	0.0609	-0.4785	0.5825
210	Petroleum and coal products	463	0.0326	0.0481	-0.1008	0.4944
220	Plastic products	5,368	0.0324	0.0610	-0.4952	0.5446
230	Rubber products	1,200	0.0355	0.0591	-0.4363	0.3117
240	Leather, fur products and miscellaneous leather products	365	0.0196	0.0801	-0.3844	0.5302
250	Non-metallic mineral products	4,932	0.0250	0.0625	-0.4545	0.5344
260	Iron and steel	3,381	0.0171	0.0521	-0.3293	0.4867
270	Non-ferrous metals	2,669	0.0287	0.0519	-0.5084	0.3883
280	Fabricated metal products	8,130	0.0309	0.0620	-0.5168	0.5638
290	Machinery	13,016	0.0303	0.0675	-0.5073	0.5843
300	Electrical machinery, equipment and supplies	16,351	0.0351	0.0758	-0.5282	0.5870
310	Transport equipment	9,307	0.0294	0.0581	-0.4368	0.5315
320	Precision instruments	2,886	0.0431	0.0709	-0.4612	0.5044
340	Others	2,378	0.0355	0.0765	-0.5291	0.5437
350	Electricity, gas and water supply	200	0.0340	0.0351	-0.0673	0.1994
400	Transportation and communication	612	0.0327	0.0752	-0.5207	0.4006
	Wholesale and retail trade					
480	Wholesale trade	55,038	0.0260	0.0524	-0.5284	0.5788
540	Retail trade	28,136	0.0212	0.0667	-0.5289	0.5859
600	Restaurants	1,883	0.0285	0.0773	-0.5032	0.4839
620	Finance and insurance	141	0.0275	0.0428	-0.1274	0.1961
700	Real estate	224	0.0251	0.0387	-0.0689	0.2639
715	Services	6,330	0.0516	0.0797	-0.5057	0.5796
	Total	207857	0.0289	0.06345	-0.5298	0.5871

Note: ROA is restricted within the range of by mean ±4, i.e. $-0.53 \leq ROA \leq 0.59$.

Table 10 Time Series of ROA

		1991	1994	1995	1996	1997	1998	1999	2000
1	Agriculture, forestry and fishery	0.002	-0.001	0.025	0.027	0.032	0.033	0.049	0.015
50	Mining	0.065	0.039	0.039	0.050	0.042	0.023	0.032	0.047
90	Construction	0.066	0.039	0.031	0.034	0.026	0.026	0.027	0.031
	Manufacturing								
120	Food and beverages	0.056	0.026	0.026	0.015	0.019	0.028	0.034	0.031
130	Alcohol, feed and tobacco	0.058	0.050	0.046	0.046	0.041	0.044	0.043	0.043
140	Textiles	0.037	-0.004	-0.012	0.010	0.014	-0.007	0.013	0.007
150	Wearing apparel and clothing accessories	0.055	-0.005	-0.003	0.006	0.008	-0.000	0.009	0.005
160	Wood and wooden products	0.027	0.029	0.010	0.029	0.004	-0.010	0.027	0.006
170	Furniture	0.032	0.015	0.005	0.029	0.020	-0.002	0.015	0.023
180	Pulp, paper and paper products	0.038	0.024	0.017	0.026	0.026	0.022	0.027	0.023
190	Publishing and printing	0.048	0.032	0.035	0.040	0.040	0.034	0.039	0.037
200	Chemicals	0.053	0.049	0.048	0.048	0.047	0.041	0.052	0.055
210	Petroleum and coal products	0.039	0.033	0.033	0.029	0.025	0.014	0.047	0.041
220	Plastic products	0.055	0.030	0.026	0.032	0.030	0.020	0.032	0.036
230	Rubber products	0.061	0.034	0.033	0.037	0.032	0.015	0.038	0.038
240	Leather, fur products and miscellaneous leather products	0.063	0.000	-0.015	0.010	0.003	0.002	0.023	0.027
250	Non-metallic mineral products	0.046	0.022	0.020	0.025	0.008	0.011	0.021	0.032
260	Iron and steel	0.050	0.009	0.014	0.021	0.018	-0.006	0.005	0.021
270	Non-ferrous metals	0.046	0.019	0.023	0.030	0.029	0.014	0.022	0.041
280	Fabricated metal products	0.054	0.012	0.030	0.034	0.030	0.016	0.026	0.032
290	Machinery	0.058	0.011	0.016	0.033	0.041	0.017	0.020	0.038
300	Electrical machinery, equipment and supplies	0.034	0.024	0.035	0.035	0.040	0.018	0.036	0.049
310	Transport equipment	0.044	0.036	0.029	0.033	0.026	-0.002	0.025	0.032
320	Precision instruments	0.061	0.024	0.037	0.046	0.052	0.030	0.045	0.060
340	Others	0.051	0.031	0.035	0.046	0.038	0.026	0.033	0.039
350	Electricity, gas and water supply	-0.030	0.051	0.034	0.030	0.036	0.045	0.047	0.028
400	Transportation and communication	0.070	0.015	0.027	0.039	0.041	0.025	0.036	0.038
	Wholesale and retail trade								
480	Wholesale trade	0.046	0.024	0.023	0.027	0.022	0.018	0.025	0.031
540	Retail trade	0.033	0.023	0.020	0.026	0.011	0.015	0.022	0.026
600	Restaurants	0.056	0.003	0.026	0.030	-0.001	-0.015	0.031	0.038
620	Finance and insurance	0.018	0.029	0.064	0.050	0.079	0.089	0.029	0.017
700	Real estate	0.033	0.017	0.015	0.032	0.021	0.020	0.040	0.025
715	Services	0.048	0.032	0.041	0.047	0.049	0.052	0.053	0.050

Table 11 Time Series of Tax Rate

		1991	1994	1995	1996	1997	1998	1999	2000
1	Agriculture, forestry and fishery			0.106	0.375	0.236	0.306	0.338	0.272
50	Mining			0.479	0.332	1.219	0.325	0.369	0.258
90	Construction			0.284	0.327	0.347	0.421	0.269	0.272
	Manufacturing								
120	Food and beverages			0.327	0.333	0.322	0.499	0.298	0.338
130	Alcohol, feed and tobacco			0.491	0.179	0.289	0.228	0.372	0.097
140	Textiles			0.231	0.256	0.219	0.301	0.407	0.303
150	Wearing apparel and clothing accessories			0.259	0.256	0.245	0.273	0.200	0.284
160	Wood and wooden products			0.148	0.304	0.243	0.358	0.288	0.439
170	Furniture			0.118	0.431	0.302	0.154	0.232	0.189
180	Pulp, paper and paper products			0.278	0.662	0.357	0.393	0.468	0.440
190	Publishing and printing			0.445	0.339	0.440	0.431	0.302	0.340
200	Chemicals			0.284	0.289	0.328	0.267	0.074	0.162
210	Petroleum and coal products			0.888	0.400	0.321	0.125	0.493	0.306
220	Plastic products			0.318	0.187	0.386	0.294	0.282	0.258
230	Rubber products			0.268	0.412	0.435	0.150	0.251	0.176
240	Leather, fur products and miscellaneous leather products			1.645	-0.819	0.336	0.211	0.394	0.209
250	Non-metallic mineral products			0.254	0.366	0.166	0.308	0.359	0.231
260	Iron and steel			0.318	0.438	0.449	0.159	0.279	0.184
270	Non-ferrous metals			0.388	0.354	0.357	0.306	0.369	0.159
280	Fabricated metal products			0.579	0.349	0.347	0.373	0.260	0.191
290	Machinery			0.280	0.288	0.211	0.238	0.178	0.259
300	Electrical machinery, equipment and supplies			0.222	0.314	0.251	0.258	0.269	0.190
310	Transport equipment			0.373	0.339	0.339	0.258	0.182	0.180
320	Precision instruments			0.248	0.294	0.263	0.258	0.356	0.233
340	Others			0.227	0.331	0.548	0.297	0.311	0.248
350	Electricity, gas and water supply			0.493	0.494	0.533	0.459	0.294	0.394
400	Transportation and communication			0.535	0.436	0.396	0.569	0.341	0.298
	Wholesale and retail trade								
480	Wholesale trade			0.329	0.354	0.345	0.286	0.278	0.214
540	Retail trade			0.269	0.294	0.257	0.257	0.238	0.219
600	Restaurants			0.266	0.384	0.216	0.456	0.280	0.162
620	Finance and insurance			0.364	0.110	0.267	0.075	0.145	0.236
700	Real estate			0.306	0.226	0.319	0.390	1.578	0.446
715	Services			0.248	0.318	0.245	0.371	0.171	0.170

Table 12 ROA Estimations (All Sample)

Panel A : General Model

Dependent Variable: ROA	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
dlnk	-0.0015	-9.81	-0.0015	-9.85	-0.0074	-2.75
dlnemp	0.0025	9.48	0.0025	9.62	0.0335	5.21
tax	0.0003	1.86	0.0003	1.89	0.0287	1.87
tax2	0.0000	-1.98	0.0000	-1.99	0.0003	0.74
daratio	-0.0810	-78.78	-0.0810	-78.89	-0.0779	-2.35
daratio2	-0.0022	-30.88	-0.0022	-30.87	-0.0270	-3.32
dqratio	0.0000	0.02	0.0000	0.02	0.0001	0.13
dqratio2	0.0000	-0.05	0.0000	-0.05	0.0000	-0.65
sh1	0.0527	2.46	0.0561	2.66	0.2220	2.48
_cons	0.0899	111.62	0.0886	65.72	0.0933	4.45
Diagnostic Test						
Number of observation	92,202		92,202		92,202	
Number of groups (ari)	33		33		33	
R-sq: within	0.1388		0.1388		0.0703	
between	0.3522		0.3541		0.7290	
overall	0.1414		0.1414		0.0713	
F test that all u_i=0:	F(32, 92160) = 17.65		----------		----------	
sigma_u	0.0096		0.0056		----------	
sigma_e	0.0806		0.0806		----------	
rho	0.0139		0.0049		----------	
Breusch and Pagan Lagrangian multiplier test for random effects:	chi2(1) = 677.43		Prob > chi2 = 0.0000		----------	
Hausman specification test	chi2(9) = 23.31		Prob > chi2 = 0.0055		----------	

Panel B : Specific Model

Dependent Variable: ROA	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
dlnk	-0.0015	-10.29	-0.0015	-10.33	-0.0063	-2.28
dlnemp	0.0026	10.00	0.0026	10.13	0.0296	4.61
tax	0.0003	1.93	0.0003	1.94	0.0247	1.57
tax2	0.0000	-2.03	0.0000	-2.03	0.0004	0.82
daratio	-0.0797	-79.07	-0.0798	-79.17	-0.0630	-1.94
daratio2	-0.0023	-31.55	-0.0023	-31.54	-0.0239	-2.94
sh1	0.0527	2.47	0.0558	2.66	0.2064	2.25
_cons	0.0889	112.51	0.0877	61.71	0.0812	3.75
Diagnostic Test						
Number of observation	94,340		94,340		94,340	
Number of groups (ari)	33		33		33	
R-sq: within	0.1374		0.1374		0.0625	
between	0.3594		0.3611		0.6602	
overall	0.1400		0.1400		0.0635	
F test that all u_i=0:	F(32, 94300) = 18.09		----------		----------	
sigma_u	0.0094		0.0062		----------	
sigma_e	0.0801		0.0801		----------	
rho	0.0136		0.0060		----------	
Breusch and Pagan Lagrangian multiplier test for random effects:	chi2(1) = 709.88		Prob > chi2 = 0.0000		----------	
Hausman specification test	chi2(7) = 19.29		Prob > chi2 = 0.0073		----------	

Table 13 ROA Estimations (0 ≤ Tax ≤ 1 and ROA ≥ 0)

Panel A : General Model

Dependent Variable: ROA	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
dlnk	-0.0015	-13.43	-0.0015	-13.53	-0.0003	-0.14
dlnemp	0.0010	5.08	0.0010	5.28	0.0095	2.34
tax	-0.1866	-72.48	-0.1868	-72.58	-0.3290	-1.63
tax2	0.1201	44.32	0.1203	44.40	0.2824	1.18
daratio	-0.0586	-45.59	-0.0588	-45.77	-0.0707	-1.24
daratio2	0.0112	22.38	0.0112	22.49	0.0149	0.48
dqratio	0.0000	-2.72	0.0000	-2.74	-0.0015	-2.00
dqratio2	0.0000	2.46	0.0000	2.48	0.0000	1.90
sh1	-0.0229	-1.58	-0.0216	-1.51	0.0521	0.65
_cons	0.1248	149.74	0.1268	113.93	0.1578	6.37
Diagnostic Test						
Number of observation	72,940		72,940		72,940	
Number of groups (ari)	33		33		33	
R-sq: within	0.2044		0.2044		0.0513	
between	0.5132		0.5145		0.8037	
overall	0.2118		0.2118		0.0564	
F test that all u_i=0:	F(32, 72898) = 24.58		----------		----------	
sigma_u	0.0066		0.0038		----------	
sigma_e	0.0512		0.0512		----------	
rho	0.0164		0.0056		----------	
Breusch and Pagan Lagrangian multiplier test for random effects:	chi2(1) = 36866.24		Prob > chi2 = 0.0000		----------	
Hausman specification test	chi2(9) = 38.33		Prob > chi2 = 0.0000		----------	

Panel B : Specific Model

Dependent Variable: ROA	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
dlnk	-0.0015	-13.52	-0.0015	-13.61	-0.0016	-0.83
dlnemp	0.0010	5.34	0.0010	5.52	0.0117	3.05
tax	-0.1872	-74.04	-0.1874	-74.13	-0.2889	-1.54
tax2	0.1209	45.44	0.1211	45.51	0.2636	1.17
daratio	-0.0588	-46.47	-0.0590	-46.63	-0.1371	-3.23
daratio2	0.0113	22.88	0.0114	22.98	0.0262	0.84
sh1	-0.0231	-1.60	-0.0220	-1.55	0.0691	0.81
_cons	0.1248	152.15	0.1267	112.21	0.1804	7.49
Diagnostic Test						
Number of observation	74,611		74,611		74,611	
Number of groups (ari)	33		33		33	
R-sq: within	0.2060		0.2060		0.1367	
between	0.5117		0.5129		0.7756	
overall	0.2132		0.2132		0.1479	
F test that all u_i=0:	F(32, 74571) = 25.92		----------		----------	
sigma_u	0.0067		0.0041		----------	
sigma_e	0.0509		0.0509		----------	
rho	0.0169		0.0064		----------	
Breusch and Pagan Lagrangian multiplier test for random effects:	chi2(1) = 42273.12		Prob > chi2 = 0.0000		----------	
Hausman specification test	chi2(7) = 36.70		Prob > chi2 = 0.0000		----------	

Table 14 ROA Estimations (Tax > 1 or Tax < 0 or ROA < 0)

Panel A : General Model

Dependent Variable: ROA	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
dlnk	0.0040	8.23	0.0037	7.91	0.0130	3.84
dlnemp	-0.0012	-1.45	-0.0012	-1.43	-0.0093	-1.34
tax	0.0001	0.57	0.0001	0.61	0.0018	0.30
tax2	0.0000	0.68	0.0000	0.61	0.0000	-0.06
daratio	-0.0572	-22.62	-0.0558	-22.34	-0.0339	-0.87
daratio2	-0.0030	-23.43	-0.0031	-24.01	-0.0058	-1.43
dqratio	0.0000	1.07	0.0000	1.34	0.0003	0.95
dqratio2	0.0000	0.32	0.0000	0.50	0.0000	0.93
sh1	0.1530	1.54	0.1209	1.35	0.1653	1.36
_cons	0.0194	8.20	0.0182	7.79	-0.0070	-0.22
Diagnostic Test						
Number of observation	19,950		19,950		19,950	
Number of groups (ari)	33		33		33	
R-sq: within	0.1576		0.1576		0.0441	
between	0.6194		0.6217		0.7292	
overall	0.1576		0.1576		0.0450	
F test that all u_i=0:	F(32, 19908) =	4.08	----------		----------	
sigma_u	0.0123		0.0000		----------	
sigma_e	0.1234		0.1234		----------	
rho	0.0098		0.0000		----------	
Breusch and Pagan Lagrangian multiplier test for random effects:	chi2(1) =	747.83	Prob > chi2 =	0.0000	----------	
Hausman specification test			n.a.		----------	

Panel B : Specific Model

Dependent Variable: ROA	Fixed		Random		Between	
	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics	Estimated Coefficient	t-statistics
dlnk	0.0039	8.18	0.0036	7.79	0.0132	3.75
dlnemp	-0.0010	-1.22	-0.0010	-1.17	-0.0078	-1.18
tax	0.0001	0.58	0.0001	0.60	0.0016	0.31
tax2	0.0000	0.70	0.0000	0.64	0.0000	0.14
daratio	-0.0552	-22.40	-0.0538	-22.10	-0.0109	-0.31
daratio2	-0.0031	-24.22	-0.0032	-24.80	-0.0076	-1.91
sh1	0.1499	1.53	0.1191	1.34	0.1492	1.29
_cons	0.0180	7.84	0.0169	7.41	-0.0215	-0.74
Diagnostic Test						
Number of observation	20,463		20,463		20,463	
Number of groups (ari)	33		33		33	
R-sq: within	0.1558		0.1558		0.1354	
between	0.5704		0.5698		0.6896	
overall	0.1556		0.1557		0.1354	
F test that all u_i=0:	F(32, 20423) =	4.27	----------		----------	
sigma_u	0.0126		0.0000		----------	
sigma_e	0.1223		0.1223		----------	
rho	0.0106		0.0000		----------	
Breusch and Pagan Lagrangian multiplier test for random effects:	chi2(1) =	826.49	Prob > chi2 =	0.0000	----------	
Hausman specification test			n.a.		----------	

Fig 1 Histogram of ROA (Excluding Outliers)

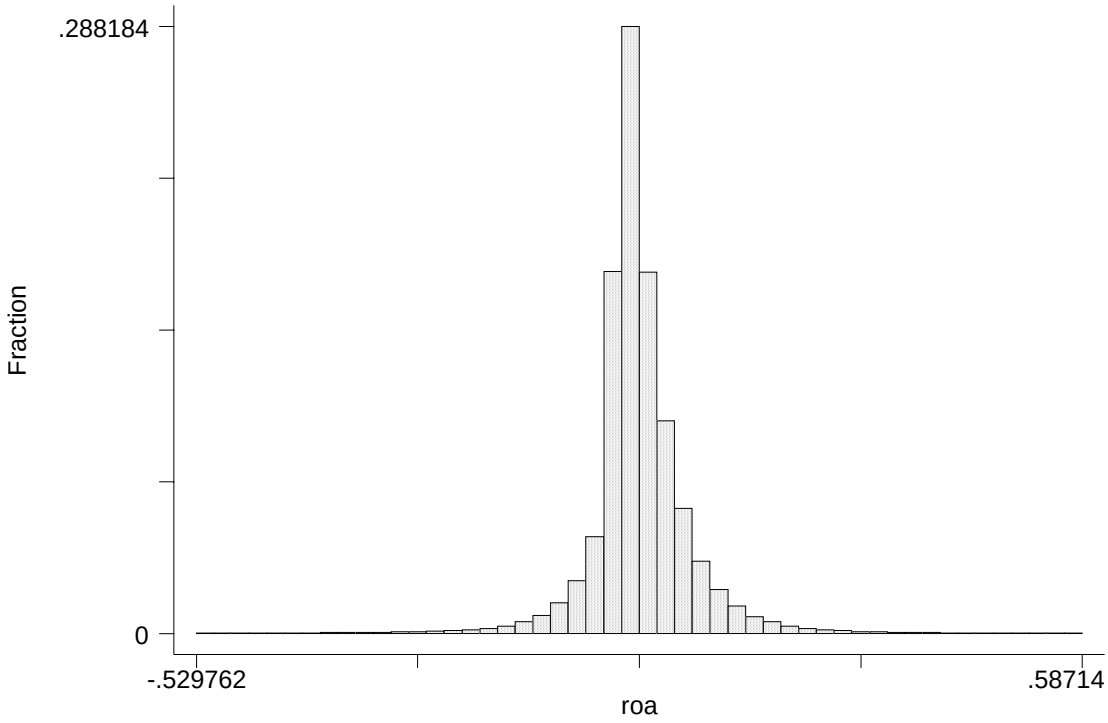
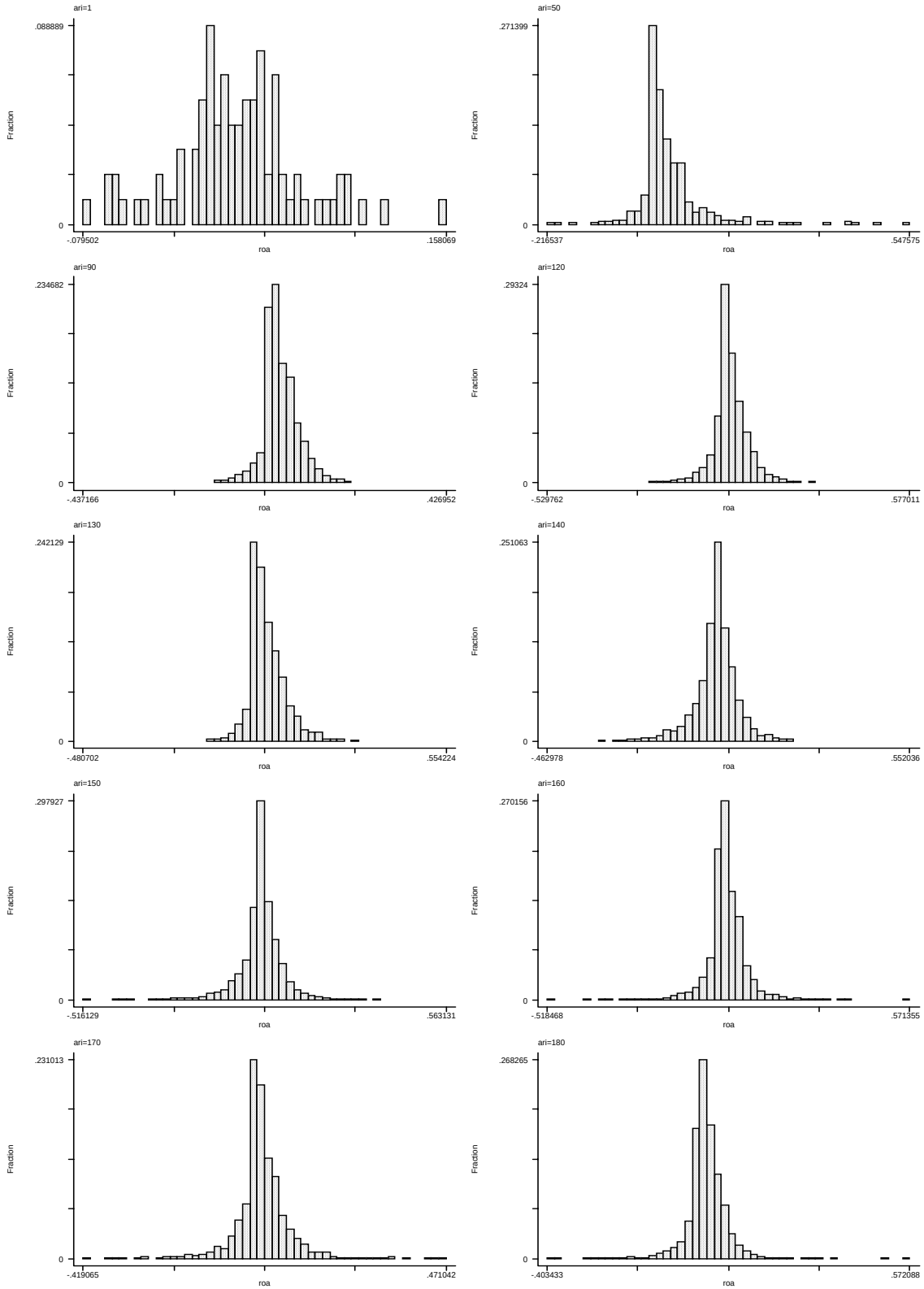
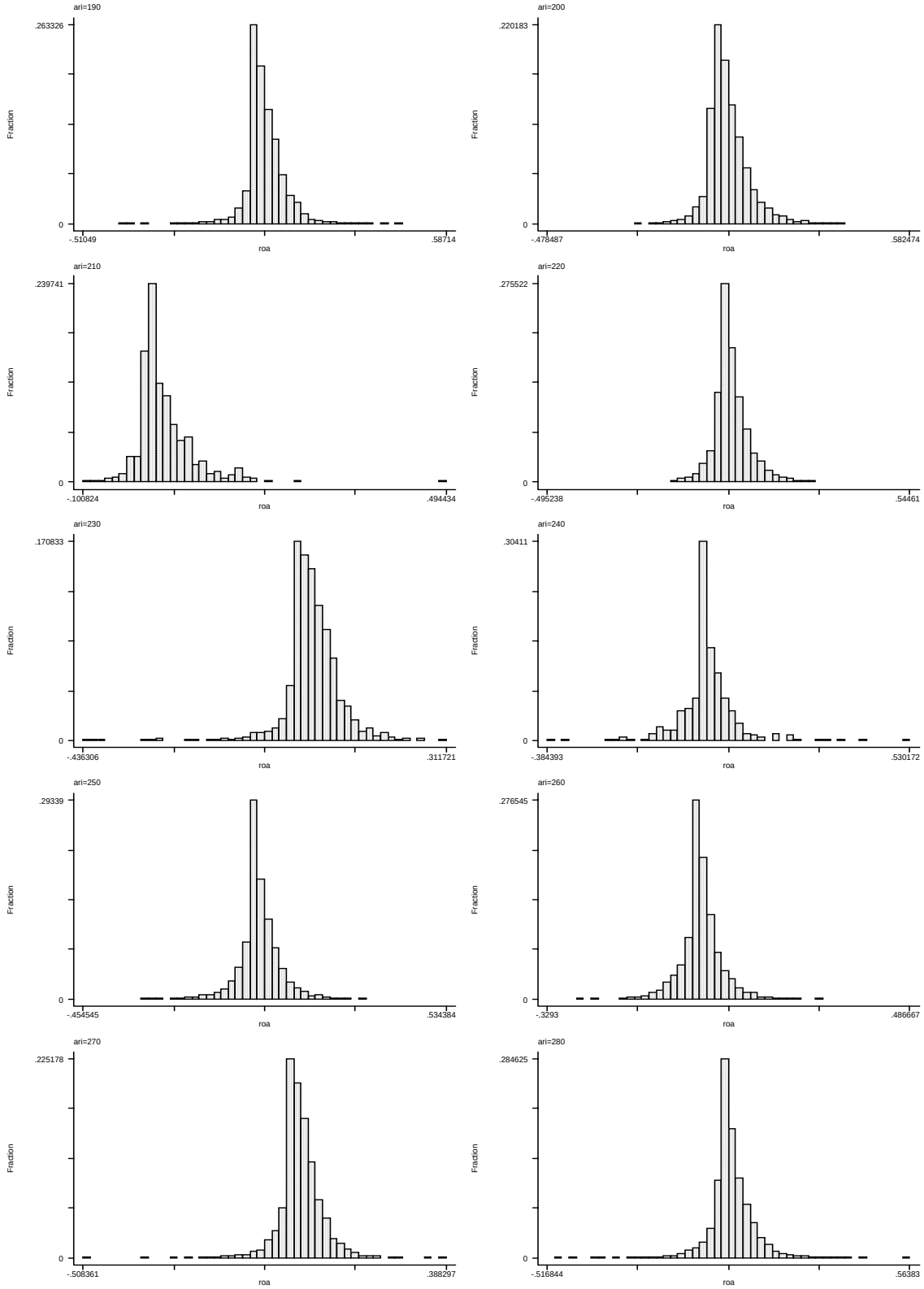


Fig 2 Histogram of ROA by Industry

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Fraction
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.58714
roa
ari=200
.220183
0
Fraction
-.478487
.582474
roa
ari=210
.239741
0
Fraction
-.100824
.494434
roa
ari=220
.275522
0
Fraction
-.495238
.54461
roa
ari=230
.170833
0
Fraction
-.436306
.311721
roa
ari=240
.30411
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Fraction
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.530172
roa
ari=250
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0
Fraction
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.534384
roa
ari=260
.276545
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Fraction
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ari=270
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.388297
roa
ari=280
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Fraction
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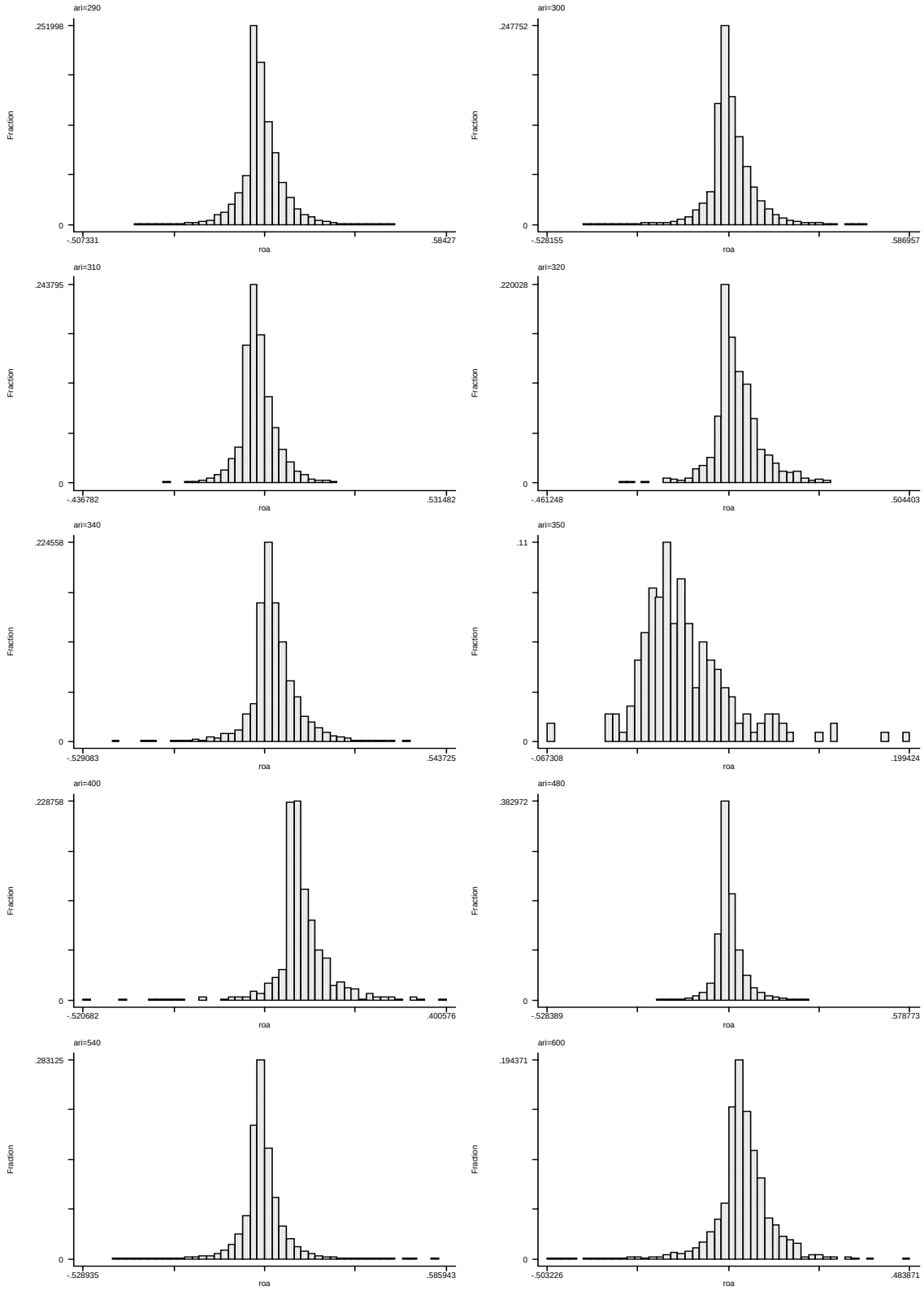
.56383
roa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Fraction
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.58427
roa
ari=300
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Fraction
-.528155
.586957
roa
ari=310
.243795
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Fraction
-.436782
.531482
roa
ari=320
.220028
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ari=340
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.199424
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ari=400
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ari=480
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roa
ari=540
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roa
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0
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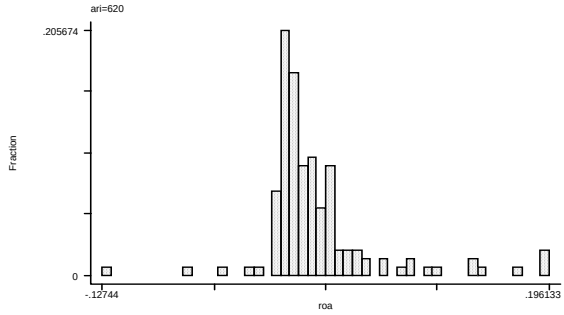
roa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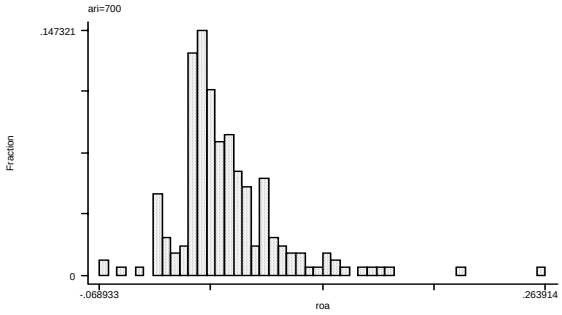
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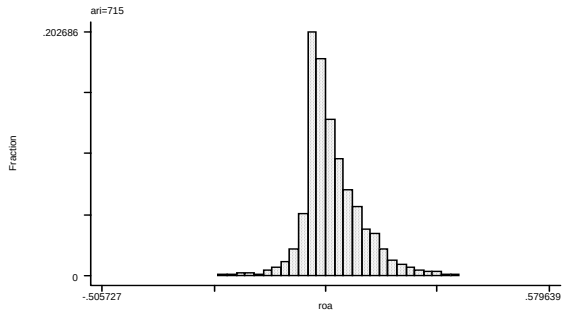
roa


ari=715
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Fraction
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.579639
roa

Fig 3 Imperfect Competition

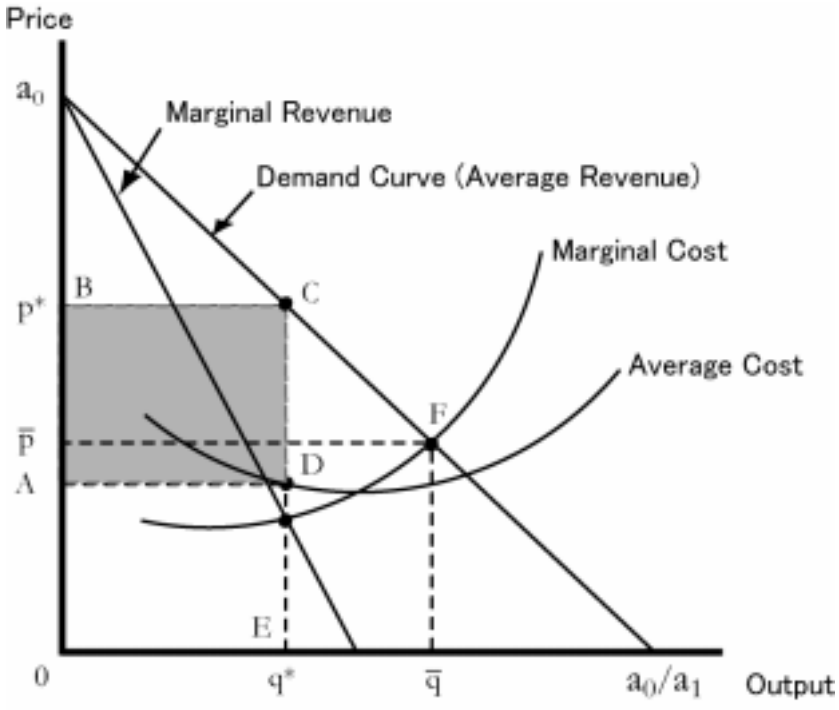


Fig 4 Positive Profits

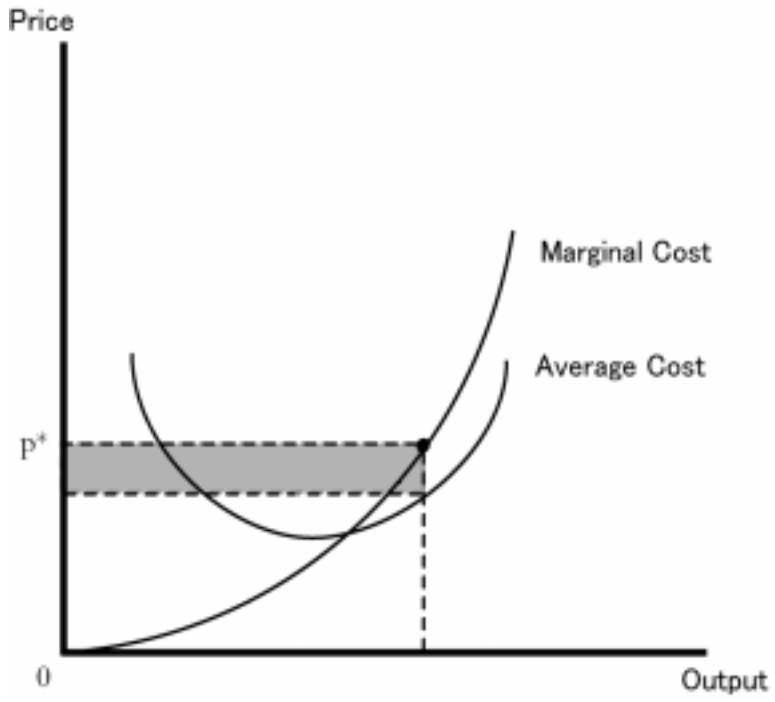


Fig 5 Zero Profits

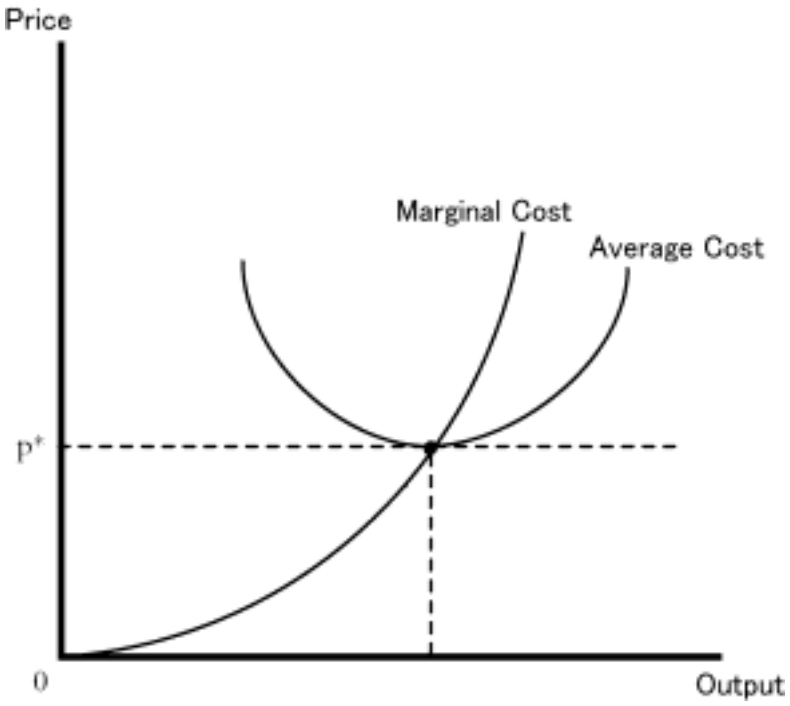


Fig 6 Negative Profits

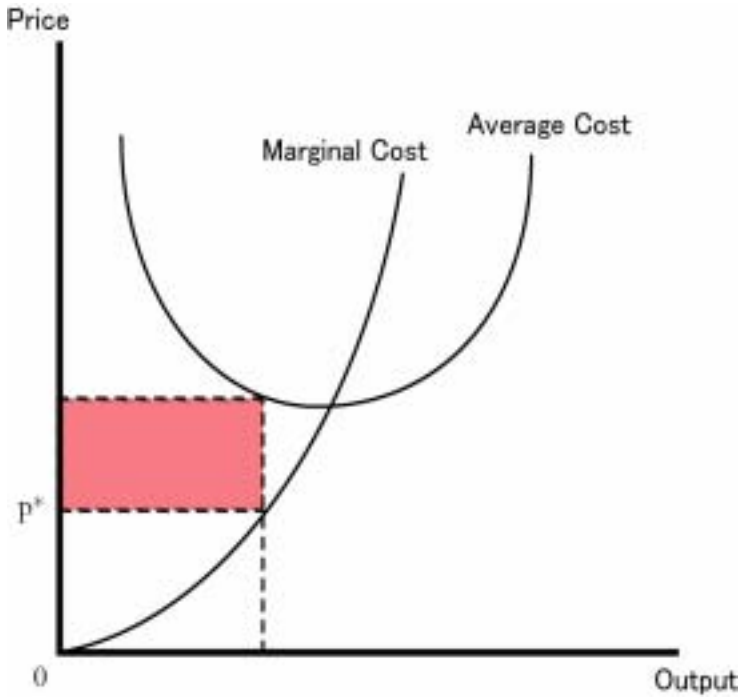


Fig 7　　Static Tradeoff between Profits and Debt

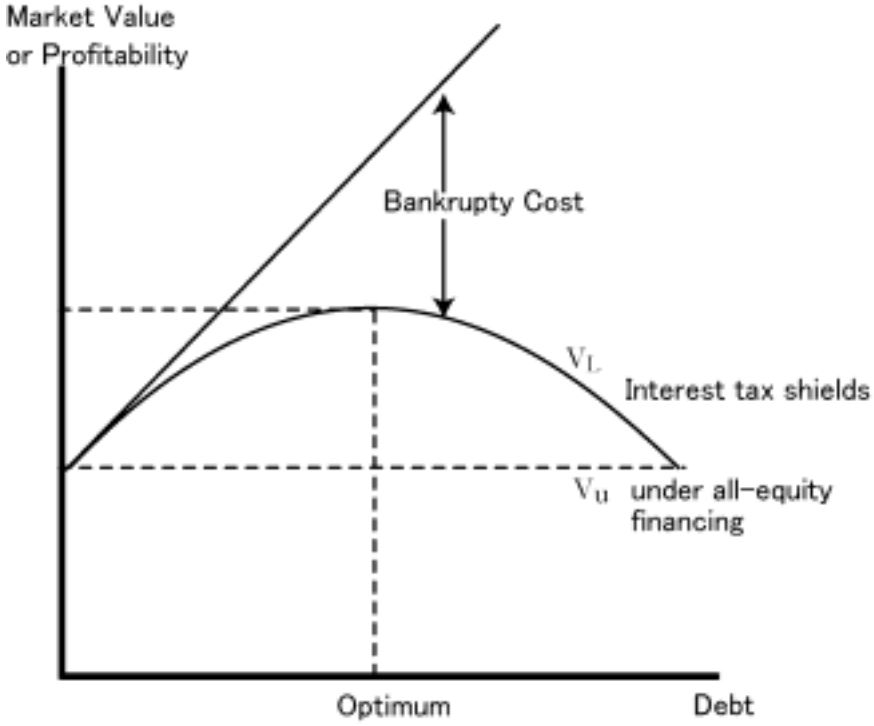


Fig 8 Dynamic Tradeoff between Profits and Debt

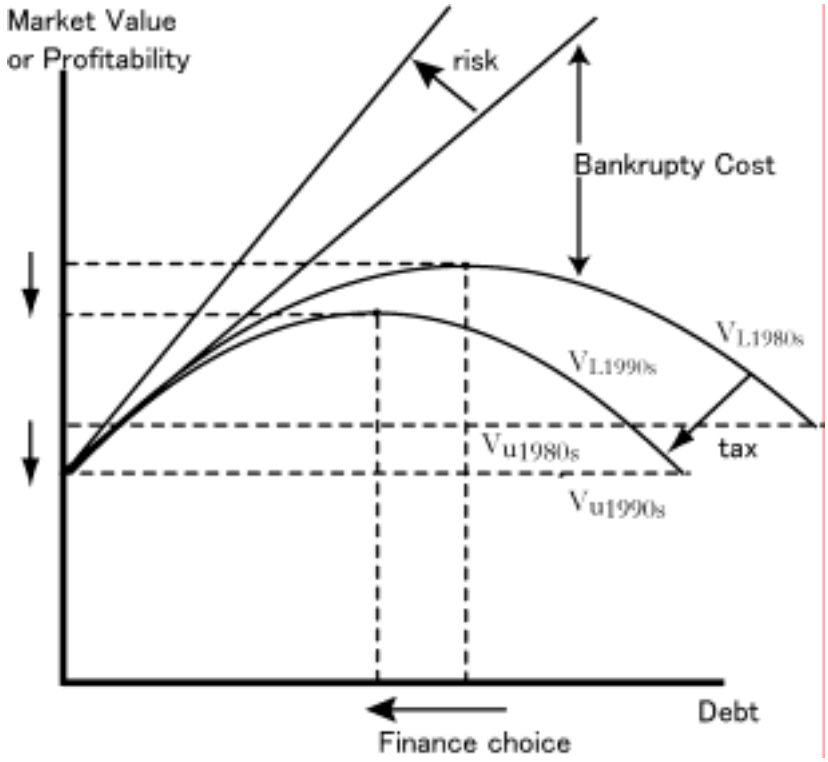
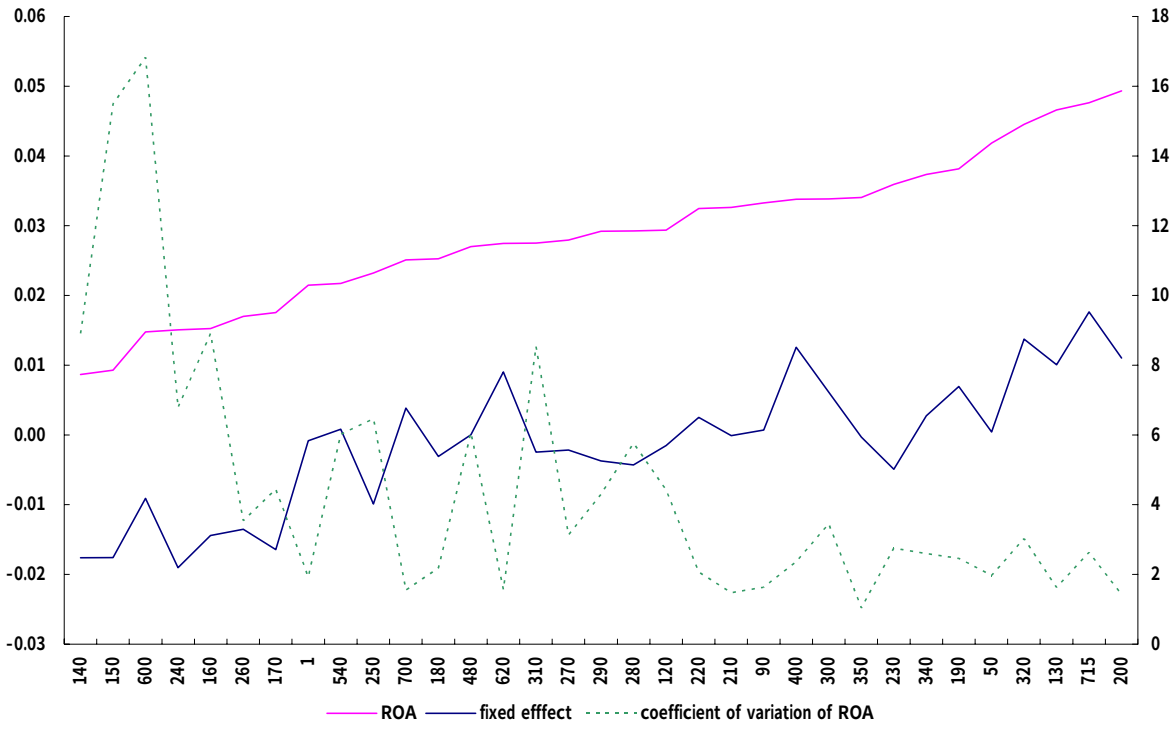
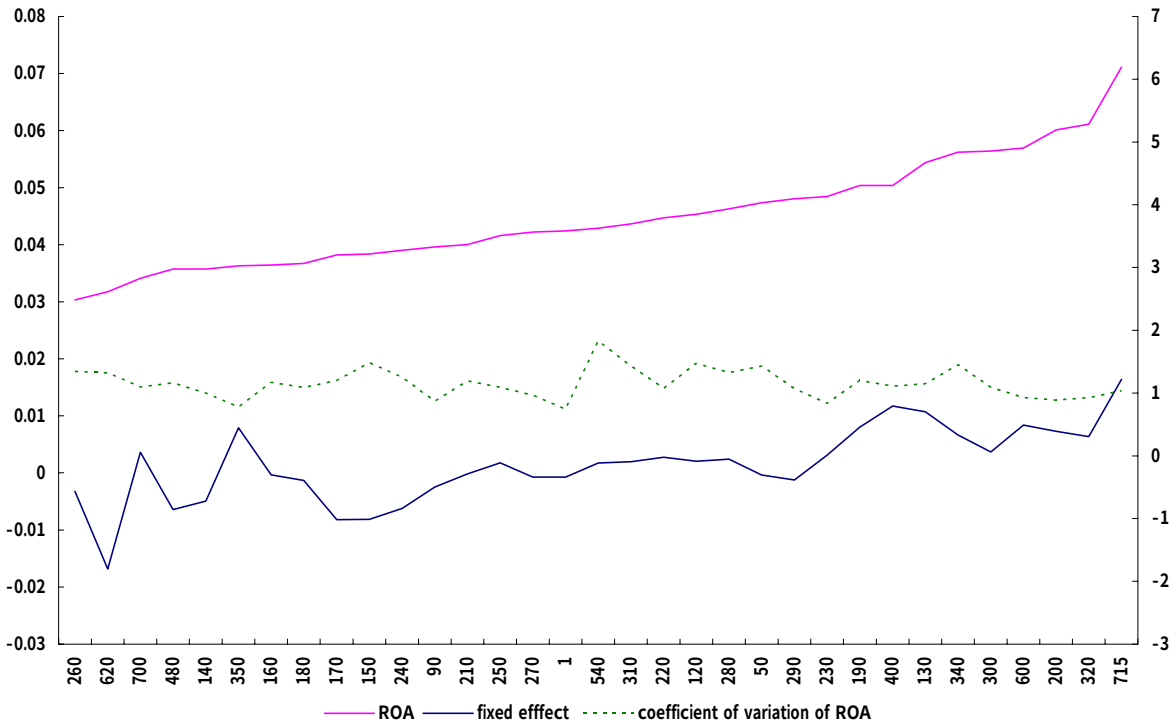


Fig 9 ROA, Fixed Effects and Risk (All Sample)



Note: Correlation between coefficient of variation of ROA and fixed effect is -0.608526.

Fig 10 ROA, Fixed Effects and Risk (0 ≤ Tax ≤ 1 and ROA ≥ 0)



Note: Correlation between coefficient of variation of ROA and fixed effect is -0.247262.