Tax law asymmetries and income shifting:
Evidence from Japanese capital *keiretsu*

Kazuki Onji · David Vera

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Abstract The asymmetric treatment of positive and negative income can create a tax incentive to engage in within-jurisdiction income shifting under a corporate income tax (CIT) that does not allow for the consolidation of group income. This paper aims to provide a justification for a group tax system by offering systematic evidence on the effects of taxes on within-group transfers. In the setting of the Japanese CIT of the early 1990s, we develop a model of a corporate group that predicts different optimal shifting schedules for subsidiaries with the size of paid-in capital above and below 100 million yen, due to the progressively in the CIT. Using a company-level data on 33,340 subsidiary-time pairs from 1988, 1990, and 1992, we find evidence consistent with the prediction. The finding underscores the importance of accounting for the group behavior in the design of CIT.

Keywords Tax avoidance · Business group · Corporate income tax

1 Introduction

It is common practice for a firm to organize its businesses as legally distinct corporations for several efficiency reasons; to tie managers' pay to performance, separate entities may be preferable to internal divisions (Holemström and Roberts 1998); to avoid negative synergy, it may be necessary to separate conflicting business activities (John and Ofek 1995); to control the risk of

Kazuki Onji
Australia-Japan Research Centre, Building No. 13, Australian National University, Canberra, ACT0200, Australia
Tel.: +61-2-6125-0134
Fax: +61-2-6125-0767
E-mail: Kazuki.Onji@anu.edu.au

David Vera
Department of Economics, Box 5190, Kent State University, Kent, OH 44242-0001, USA

new ventures, investors may utilize the limited liability status of corporations. Despite the efficiency grounds for organizing activities in separate entities, in the vast majority of nations, there is a tax penalty for forming a corporate group. Of 121 countries listed in PricewaterhouseCoopers (2002), 92 countries tax corporations separately from group members; only 29 countries allow for group taxation.[1] Since a stand-alone entity can only partially offset its own profit with losses made by its affiliates in the absence of group provisions, the tax liability of a corporate group would be greater than that of a conglomerate when some member companies are making losses.[2] There are loss-offset provisions moderating the degree of penalty but they are known to be imperfect (Altshuler and Auerback 1990). As a result, there are concerns about the behavioral response to avoid the penalty and about the consequences on efficiency: firms may waste resources through engineering transactions of which the sole aim is to shift income from profitable to unprofitable corporations; firms may choose a suboptimal form of organization.

To highlight the perverse incentives under a tax system that lacks group provisions, this paper aims to provide evidence from a large-scale dataset on the behavioral response to tax penalties, taking the Japanese tax system of the early 1990s as a setting. The focus is on the incentives to shift income among domestic affiliates, a type of behavior under-studied in the field. Certainly, there is extensive evidence on income shifting in the international context (Grubert and Mutti 1991; Hines and Rice 1994; Grubert and Slemrod 1998), where the differences in tax rates across countries create opportunity for tax avoidance. Here, the differences in marginal tax rates between profitable and unprofitable corporations create the incentives to shift income.

The key distinction between these two types of income shifting is that, unlike the tax shelters involving offshore tax havens, which is a problem in itself, the income shifting among domestic affiliates can be viewed as a symptom of problems with the tax system, provided that the shifting takes place in groups where there are efficiency grounds for organizing businesses in multiple entities.[3] In this view, the policy implication is that rather than to strengthen enforcement, the tax law should be amended to account for business practices.

Our examination of within-jurisdiction income shifting adds to a relatively small number of previous empirical studies (Giudici and Paleari 1998; Gramlich et al. 2004; Jung et al. 2007). In a closely related study, Gramlich et al. (2004) examine the income shifting among the members of bank-centered corporate groups, or horizontal *keiretsu*, in Japan. Our setting is also on Japan but our study focuses on a different type of grouping, sometimes referred to as a capital *keiretsu*, which is a group of businesses consisting of a parent company,

[1] 29 countries include those that adopt a consolidated filing or fiscal unity of affiliated corporations, even if the allowance is restricted to certain industries.

[2] See the simulation by Majd and Myers (1987) on the impact of tax asymmetry on the after-tax net present value of a stand-alone project and of a profitable firm.

[3] Corporate groups may be formed by pervasive reasons, such as to take advantage of the preferential treatment of small businesses (Onji 2007).The income shifting in such contexts is problematic in exacerbating the existing problem.

subsidiaries and affiliates. [4] The latter type of grouping is tightly integrated: the members of capital *keiretsu* reports consolidated financial statements since 1978; the members of horizontal *keiretsu* do not. The focus on capital *keiretsu* is conducive to the examination of tax-motivated income shifting since there would be smaller transaction costs in sharing the benefits of tax saving.

The context of the study is the Japanese corporate income tax (CIT) prior to the introduction of group taxation in April 2002. One advantage of the Japanese setting is that an available data on corporate groups, *Affiliated Company Data*, contains a large number of individual observations on parents and their domestic subsidiaries, a type of data that is relatively rare.[5] Naturally, the diversity of CIT around the world preclude the direct extrapolation of the results from this study, but there is a number of generic features of the Japanese CIT that make the discussion relevant to the policy debate in countries that do not adopt group taxation.

Another advantage of the Japanese setting is on its institutional features that provide a "natural experiment." The previous empirical studies on income shifting by multi-national corporations utilize the variation in tax rates across jurisdictions. Such an identification strategy is not readily applicable in the context of within-jurisdiction income shifting. We suggest and implement an identification strategy that utilizes the progressive feature of the Japanese CIT in detecting the ubiquity of income shifting. The intuition underlying the test is as follows.

For "large" corporations with paid-in capital above 100 million yen, the corporate tax is proportional to profit, with at best only a partial offset for losses. For groups containing some large corporations with losses but making overall profits, there is an incentive to shift enough profits to the large corporations with losses to the extent possible, thereby raising profits to zero. Any further shifting creates no tax saving yet involves real costs. On the other hand, for "small" corporations with paid-in capital of 100 million yen or less, the tax rate is reduced on the first 8 million yen of profit, and the remaining profit is taxed at the same rate as that of large corporations. Because of this progressive tax schedule, there is an incentive to shift more than the amount of the losses that small corporations make, so as to exploit the rate reduction. Thus, the income shifting hypothesis implies a higher propensity for large corporations to report zero profit when other factors are held constant.

We test the implications with a company-level data on subsidiaries based on survey that covers over 1,700 corporate groups headed by large corporations. The sample consists of 33,340 subsidiary-time pairs from 1988, 1990, and 1992. Controlling for company characteristics in a binary response model, large subsidiaries have higher propensity to report zero profit, consistent with

[4] See Westney (1998) for a descriptive study of capital *keiretsu*, referred to as vertical *keiretsu* in his paper. Shimotani (1993) provides a through documentation in Japanese. On horizontal *keiretsu*, see for instance, Flath (2005) and Kester (1989). Granovetter (1995) offers a review of international corporate groupings.

[5] Samphantharak (2003) uses the entity-level data from Thailand to study the internal capital market in business groups.

the prediction based on the tax institution that puts a cap on shifting for large corporations at zero profit but not on that for small corporations. The difference is modest, however; after several specification tests, we put the bound to 0.5 - 2.7 percentage points. The difference in the propensities to report zero profit in the financial-insurance sector is two to three times as large as in the other sectors of the economy; the regulation in the sector restricts an alternative avoidance strategy and renders income shifting highly relevant in the sector. Tightly controlled subsidiaries tend to report zero profit, consistent with the notion that the costs of shifting are affected by the degree of control. Excluding profitable groups increases the point estimates; at least part of the increase is attributable to the tax incentives. As a further analysis, we compare the profitability distribution of wholly-owned subsidiaries and partially-owned group members and find lower variance for the wholly-owned subsidiaries. The attrition rate of loss-making subsidiaries is also lower for a higher level of ownership. Thus, there seem sufficient indications to conclude that the income shifting was pervasive among large Japanese capital *keiretsu* over the period of our study.

The literature on horizontal *keiretsu* emphasizes the risk sharing as one of the main function of the grouping (Nakatani 1984).[6] The empirical strategy to test the risk sharing hypothesis is based on the comparison of the variance of profitability between group members and non-group members, interpreting the low variance of group-affiliated companies as due to risk sharing. Notice that some of the documented low variances may be attributable to tax-motivated income shifting but the hypotheses are not necessarily mutually exclusive. If, for instance, a dollar of financial assistance to a group member in distress reduces the tax liability of the group by t dollars, the tax motive re-enforces the risk sharing motive. In a recent survey of business groups by Khanna and Yafeh (2007) for instance, little attention is given to tax considerations. Our paper adds to the literature by indicating the influences of taxes on the degree of intra-group transfers.

The paper is organized as follows. Section 2 discusses the tax incentives generated by the Japanese CIT of 1988-92. Section 3 examines the tax incentives with a model of a corporate group. Section 4 outlines the empirical approach. Section 5 presents the analysis. Section 6 considers other evidence of income shifting. Section 7 draws conclusions.

2 Institutional background

2.1 Tax incentives

There are two generic features of tax institutions that give rise to the tax penalty in forming corporate groups: the separate tax filing of group members and the asymmetric treatment of positive and negative income. Corporations

[6] See Khanna and Yafeh (2005) for an updated review of the literature. Hoshi and Kashyap (2001) document several examples of "rescue operations" in the post-war Japan.

are generally taxed on their positive income but they do not receive full credit on negative income. The deductibility of loss is partial, in that corporations with negative income do not receive tax credits immediately. If group members are taxed separately, they cannot offset profits made by some members with losses incurred by others. Thus, in a given year, the tax base under separate filing is no smaller than that under consolidated filing where the group is taxed on the combined income.[7] Under the Japanese CIT of 1988, the effective tax rate was 56 percent, so that a dollar of income shifted from profitable corporations to unprofitable corporations reduces the tax liability by 56 cents.[8] Therefore, the tax penalty can be a significant disincentives to the formation of corporate groups.

There are various complementary institutional arrangements that alleviate the degree of tax penalties, including the deductibility of losses across years.[9] Under the Japanese CIT, qualified corporations may carry back losses for one year and receive a commensurate tax refund for that year. They may choose to carry forward losses up to five years, and receive tax credits in future years.[10] Since the disadvantage of carrying losses forward is that they are carried with zero nominal interest and may expire unused (Altshuler and Auerbach 1990), these provisions reduce the incentives for income shifting but not entirely. Another institutional arrangement is the deductibility of intra-group contribution. The Scandinavian nations have formal allowances: Norway treats the contribution to companies in which parents hold more than ninety percent of the direct or indirect common ownership as deductible expense.[11] Japan has no such formal allowance, but donations, which include intra-group transfers, are deductible up to a limit.[12] This form of shifting transaction is legal and can be arranged with minor transaction costs.[13]

To shift income beyond the amount of tax-deductible contributions, a firm would need to arrange intra-group transactions that are analogous to the income shifting strategies in the international setting; carefully setting transfer pricing and arranging intra-company loans (Grubert 2003). The strategy may

[7] For simplicity, the statement assumes that the law determining the tax base is common regardless of corporate size.

[8] The rate is for non-dividend income of corporation with paid-in capital exceeding 100 million yen. Unlike the CIT in the U.S., the tax rate is flat for this category of income. Taxes include the corporate income tax, the corporate inhabitant tax, and the corporate enterprise tax. See Ishi (2001) for a nice overview of the Japanese tax system.

[9] For a detailed discussion, see Altshuler and Auerbach (1990).

[10] To qualify for these benefits, corporations need to file their tax return in a specific format, known as blue form, but nearly all corporations do so in recent years. There was a temporary disallowance between April 1992 and March 2000 (Ishi 2001, p168).

[11] PricewaterhouseCoopers (2002). Some countries allow profitable companies to take over the losses of another group company. In New Zealand, a profitable company can make subvention payment to an unprofitable company and deduct the expense.

[12] The limit varies by company and is computed as the simple average of 2.5 percent of income and 0.25 percent of paid-in capital.

[13] Since the deduction for intra-group contribution is aggregated with other contributions, there is a concern about the crowding out of charitable donation.

also involve changing the timing of transaction.[14] These means would be costly given the accounting costs and the risk of being found in audit.[15]

2.2 To merge or not to merge

By merging a subsidiary, the group may save on taxes when losses arising from the subsidiary's business can offset the profit made by the merging company. Since the group does not incur further costs of shifting income, for the purpose of tax planning, it may seem attractive to merge a loss-making subsidiary rather than to retain a separate organizational form. There would certainly be cases where tax-motivated mergers being a superior tax planning strategy. When tax-motivated mergers are widely practiced, income shifting would be an irrelevant consideration. But this begs a question: for the purpose of avoiding the tax penalty, why do not firms do business as a conglomerate rather than as separate entities?

To the extent that corporate groups considered in this study overlap with business groups studied extensively, the reasons for the group formation can be found in the various hypotheses explored in the literature on business groups (Khanna and Yafeh 2007), such as risk sharing, costly contracting environment, expropriation of minority shareholders, and family considerations. Our data, for instance, included a group where the founder's two sons are heads of two different group companies; perhaps the arrangement facilitate the management of family relations as well as businesses. When there are business reasons for maintaining separate entities, the tax advantage of a conglomerate may not justify mergers, since a firm would weigh the tax advantage with transaction costs (Scholes et al. 2002).

In addition, there are several institutional hindrances to tax-motivated mergers in Japan. Perhaps the clearest is the regulation. Under the banking law and the insurance business law, financial and insurance parents are prevented from directly undertaking periphery activities including leasing, credit card operation, and credit guarantee but are allowed to establish subsidiaries and to conduct such activities through them. Thus, a tax-motivated merger is not a feasible option for finance and insurance parents. Further, the tax consequence of merger is not necessarily favorable. First, there are various small business provisions under the Japanese CIT, and because subsidiaries are taxed separately from their parents in most cases, the tax base can increase from a merger. Second, some of the well-known tax avoidance strategies utilize the group structure.[16] Third, out of concern about abusive tax planning,

[14] In a recent high-profile case involving subsidiaries of Marubeni, a major general trading company, a gasoline wholesaler is found shifting the timing of rebates totalling around 300 million yen paid to five gas station operators to utilize losses made in them (*Yomiuri Shinbun (Daily Yomiuri)*, July 2, 2005, p.19).

[15] Strictly speaking, the tax law in general permits these types of transactions so long as the amount of income shifted is treated as contribution.

[16] As an example, there is a strategy on the compensation of executives. Since bonuses to executives are not tax deductible but severance payments are deductible, firms have

merging companies are not permitted to take over losses carried forward by merged companies (Kaneko 2003).[17] Since any unused credits accumulated by merged companies are lost in the process, the rule reduces the incentives to merge.[18] In sum, the relevance of income shifting as a strategy to avoid tax penalty is somewhat diminished by the possibility of merger but not to the extent of rendering the strategy irrelevant.

3 Theoretical model

This section outlines the tax incentives generated by the Japanese CIT with a model of a corporate group. For tractability, we focus on the static setting to abstract away from loss-carry provisions and assume that the group's choice of organizational form as exogenous. We also consider the case of two-member group. The focus on two-member groups are not overly unrealistic since for the population of corporations surveyed under the *2001 Establishment and Enterprise Census* in Japan, the average number of members is 3.5. Our data however contains large corporate groups with the number of members reaching up to 342 for Mitsui & Co. Ltd.; we discuss a consideration at the end of the section.

Let us define a firm consisting of two corporations, Company 1 ("parent") and Company 2 ("subsidiary"). Their underlying incomes (y_1, y_2) are determined exogenously and the parent is profitable and the subsidiary is running at a loss ($y_1 > 0 > y_2$). Their incomes are taxed separately; hence unless the firm shifts income, there is a tax penalty. Further, let us focus on the case where the amount of shifting is not capped by the parent's profit. The following condition on overall income,

$$(1 - \tau_H)y_1 + y_2 > m \tag{1}$$

rules out such a corner solution, whether the subsidiary is "small" or "large." m is the tax threshold to be defined below and τ_H is a flat tax on parent's profit. The following are after-tax profits of the parent and subsidiary.

$$\pi_1 = y_1 - s - g(s) - T(y_1 - s - g(s); k_1) \tag{2}$$

$$\pi_2 = y_2 + s - T(y_2 + s; k_2) \tag{3}$$

$s \geq 0$ is the amount of income shifted from the parent to the subsidiary. $g(s)$ is the cost of shifting income. The parent is assumed to incur the transaction

incentives to reward executives in form of severance pay rather than paying them bonuses. By making senior executives "hop around" affiliated companies, making severance payments each time, the group tax liability is lowered.

[17] Certain exceptions were made under the tax reform of 2001, which is well after our sample period, to facilitate business restructuring much needed during the prolonged recession.

[18] Since merging company retains losses carried forward, the merger may be an option, if so-called "up-side-down merger," an operation referring to a loss-making company merging a profit-making company, is feasible.

costs, which are tax deductible. $g(s)$ is a quadratic function of the amount shifted based on the standard formulation in the literature (Hines and Rice 1994).

$$g(s) = \frac{s^2}{2\overline{y}\psi} \tag{4}$$

In our application, shifting costs are high if the amount shifted is large relative to the average size ($y = \frac{1}{2}(y_1 + |y_2|)$). It also depends on the degree of control exerted by the parent, which is represented by $\psi > 0$. The tax liability $T(.)$ is a function of before-tax profit (π_i^b) and the level of paid-in capital (k_i, in million yen). In practice, there are two different tax schedules, and their applicability depends on the level of paid-in capital.

$$T(\pi_i^b; k_i > 100) = max[0, \tau_H \pi_i^b] \tag{5}$$

$$T(\pi_i^b; k_i \leq 100) = max[0, \tau_L \pi_i^b, \tau_H(\pi_i^b - m) + \tau_L m] \tag{6}$$

Like a payoff function of a call option (Majd and Myers 1987), large corporations pay proportional tax on their positive income (5). Small corporations pay at the reduced rate τ_L on their first m million yen of income and at τ_H on the amount exceeding m million yen (6). Under the 1989 law, $\tau_H = 0.560$, $\tau_L = 0.405$ and $m = 8$.[19] In this analysis, the parent is assumed to be a large corporation. The subsidiary may be small or large. Here, we will focus on the case where the subsidiary is small, since the case of large subsidiary is a special case where $\tau_H = \tau_L$.

Under the income shifting hypothesis, the group chooses the amount of shifting to maximize the after-tax group profit ($\pi_1 + \pi_2$). The optimization problem is equivalent to the following.

$$\max_s \left\{ -g(s) - \max[\ 0,\ \tau_H \pi_1^b(s)] - \max[\ 0,\ \tau_L \pi_2^b(s),\ \tau_H(\pi_2^b(s) - m) + \tau_L m] \right\} \tag{7}$$

Simply put, the firm chooses the amount of shifting by weighing tax savings versus shifting costs. The objective function is not readily differentiable, but by imposing appropriate constrains on s, sub-problems can be solved algebraically. Appendix 1 details the derivation of the solution (8).

$$s^* = \min \left\{ \max \left[\min \left(|y_2|, \frac{\tau_H}{1 - \tau_H} \overline{y}\psi \right), \frac{\tau_H - \tau_L}{1 - \tau_H} \overline{y}\psi \right],\ m + |y_2| \right\} \tag{8}$$

Figure 1 illustrates the relationship between the optimal level of shifting and the parameters affecting the ease of shifting. The solution function for small subsidiaries has two steps as shown by the solid line. The solution function for large subsidiaries is flat at $|y_2|$ as shown by the dotted line. In general, the optimal shifting is weakly decreasing in shifting costs ($1/\psi$) and in relative size ($|y_2|/\overline{y}$). In addition, the solution is a weakly increasing function of the

[19] In practice, income below 4 million yen is taxed at 38.9 percent. This is ignored for simplicity.

tax rate facing the parent and the progressiveness of the tax system (i.e., $\tau_H - \tau_L$).

The model illustrates the difference in the optimal shifting schedules by subsidiary size. For large subsidiaries, the amount of shifting is capped at $|y_2|$, indicating the natural limit; at the amount $|y_2|$, where the subsidiary reports zero profit, the subsidiary faces the tax rate of τ_H at the margin, the same rate as that faced by the parent. Small subsidiaries, in contrast, face the marginal rate of τ_L at zero profit. Shifting beyond $|y_2|$ is optimal when the underlying shifting costs are sufficiently low. Therefore, the amount of income shifted into small subsidiaries is not necessarily limited to the amount of losses, unlike that for large subsidiaries.

One insight from the model is that there is a range of shifting costs for which the zero profit is optimal for small subsidiary. This implies that the clustering of small corporations at zero profit is a possibility. Further, if there are other loss-making subsidiaries in group, losses in another company shelter remaining income for higher tax saving, thus rendering shifting beyond $|y_2|$ into a small subsidiary unattractive.[20] Because of these theoretical possibilities, it may be difficult to observe the differences in reported profits across size groups in practice, but in the absence of knowledge about the parameters of the cost function, this is an empirical question.

As a preliminary examination, we plot histograms of profits around zero by the size of corporation to see if there are differences in profit reporting pattern (Figure 2). The left-hand side is for corporations at and below 100 million yen in paid-in capital. Recall that this group has no unambiguous incentive to restrict shifting up to zero profit. The profit distribution is half-pyramid shaped; the highest fraction of samples occurs in the zero-profit bin, with progressively declining fractions on the right and with a sharp decline on the left. The right-hand panel is for large corporations. Unlike in the histogram for small corporations, the distribution is much flatter with an apparent clustering at zero. It seems natural to observe the high fraction of zero-profit corporations in the sample of small corporations. But there does not seem to be an apparent non-tax reason to expect causing the clustering at the zero profit for the large corporations. This pattern is in line with the model that predicts a cap to the income shifting at zero-profit for larger corporations but not for smaller corporations.[21]

[20] A consideration in a model with more than two members is the possibility of parcelling out of profit by small amount to numerous subsidiaries. Depending on the cost function assumed, such a strategy would reduce the overall incidence of zero-profit reporting, but it would not change the limits to the amount of shifting.

[21] There is no apparent clustering on the after-tax profit equivalent to 8 million yen in before-tax income, but this might be due to the presence of multiple small companies as discussed.

4 Empirical approach

4.1 Basic framework

Our empirical approach focuses on a particular aspect of the profit distribution: the incidence of zero profit. The choice is based on theoretical as well as practical considerations. First, the theoretical model predicts that the shifting is capped at the zero profit for large corporations but not necessarily capped for small corporations. Thus, the extent to which corporations report zero profit would be affected by the corporate size, if tax considerations are important. Second, it would be ideal to compare the observed distribution of profit with what would have prevailed had there been no tax discontinuity at m. In the absence of a proper counter-factual, we are forced to make comparison with the profit distribution of small corporations.[22] Naturally, large corporations are likely to report larger profit since most of them would not have became large unless their business was successful. Thus, to properly compare the pattern of profit reporting, the analysis would require a control for the corporate size, along with controls for other company characteristics. We chose to focus on the incidence of zero-profit reporting since it allows us to frame the analysis in a transparent way; the assumptions underlying the identification would be apparent in a simple binary response model.

Put differently, our analysis is a generalization of the visual inspection presented above. The visual inspection indicated what seems to be an unusual distribution of large corporations' profits: the fraction of corporations reporting zero profit seems unnaturally high. We test to see whether there is a statistically significant difference and whether the pattern remains after controlling for company characteristics. Further, to the extent that the tax incentives have significant influence on reported profits, we would expect to observe correlation between the shifting costs and the incidence of zero profits. The binary response model allows us to incorporate such considerations in a simple manner.

4.2 Data

We use the *Affiliated Company Data*, a survey of large corporations conducted by a private publishing company, Toyo Keizai. It contains information on group companies including after-tax book profit, paid-in capital, number of workers, sales and contact details. Ideally, we would like to observe the tax income filed with the National Tax Agency, but the available data is after-tax accounting profit. The discrepancies between these two notions of corporate income arise from, among other things, the differences in the definitions of costs and in

[22] It might appear that the effects of the tax threshold can be better analyzed by the regression discontinuity design. However, for corporations just above the threshold to forego the preferential tax treatments, there must be some business reasons that analysts cannot observe in the dataset.

the treatment of timing.[23] To account for this issue, we define "zero profit" in several ways to assess the sensitivity of estimates. The dataset is constructed from three surveys conducted in 1989, 1991, and 1993. We omit subsidiaries deemed to be inactive at the time of survey from the dataset to ensure that zero profit is not due to inactivity. Some observations are reported twice in the same year because some sub-groups of larger groups are surveyed separately. We removed overlapping observations from the larger group and retained the sub-groups. Table 1 presents summary statistics.

4.3 Empirical Model

The following model (9) postulates that the probability of subsidiary i reporting zero profit is a function of observable characteristics $\mathbf{X}_i$.

$$\Pr(\pi_i = 0) = f(\mathbf{X}_i'\beta) \tag{9}$$

$\mathbf{X}_i'$=$(LARGE_i, HOLDING_i, RELATIVESIZE_i, \mathbf{Z}_i')$. $f(.)$ is assumed to be a normal density in the main analysis but logistic density is tried. The dependent variable is the indicator for subsidiary i reporting "zero profit." In the main analysis, "zero profit" is defined as accounting profit in the range (-1 million yen, 1 million yen).[24]

$LARGE_i$ is a dummy for paid-in capital of i being larger than 100 million yen. Other things held constant, the income shifting hypothesis implies that there would be higher propensity for large subsidiaries to report zero profit, so the sign on this coefficient is expected to be positive. It is, however, natural for small corporations to report, on average, smaller profits than large corporations. We control for the size effect by including the natural logarithm of paid-in capital.

$HOLDING_i$ is a proxy for shifting costs (ψ) in the theoretical model and is the percent of voting stock held within a group, or the sum of voting stock held directly by its parent and indirectly by other members. Intuitively, we would expect that the tight control would facilitate financial arrangements to shift income and to share the benefit of tax savings. Under the theory, the propensity to report zero profit is expected to be higher for tightly controlled corporations. The sign on the coefficients on $HOLDING$ and the interaction term of $LARGE$ and $HOLDING$ is expected to be positive.

One concern with measuring control with the reported level of stock holding is window dressing; a parent may artificially keep the stock holding of certain members below the statutory limit for reporting consolidated financial

[23] Although Desai (2005) reports that book and tax income diverge considerably in the U.S. data, the breakdown in the relationship does not happen until the mid-1990s. If the technology for accounting manipulation developed concurrently in Japan, then the two notions of corporate income should be reasonably close since the sample year is before the mid-1990s.

[24] This roughly translates to the range (-$7,000, $7,000) using the average dollar-yen exchange rate is $1 = 150 yen in 1990.

statement to enhance its appearance.[25] In addition, some of the industry variations may not be due to the extent of control. Table 2 reports the level of holding by industry classification of parent. In most industries, the mean holding level is around 70 percent; for financial and insurance parents, the mean is apparently low and the standard deviation is high, reflecting Article 11 of the Antitrust Regulation. Prior to the reforms of 1997, the law restricted banks from holding more than a 5 percent stake in other companies in principle. The upper limit for insurance corporations was 10 percent. However, there are exceptions to this principle; upon approval banks and insurance corporations may hold wholly-owned subsidiaries, generally in activities integrated with the operation of parents, such as ATM machine maintenance, personnel service, maintenance of branch buildings, and bank logistics. Many subsidiaries that conduct periphery activities, such as leasing, investments advising, and credit card operation, have holding levels as high as the law allows.

The standard solution for measurement issues in a linear regression is the instrumental variable estimation. But the model is non-linear and we can not apply the solution even if valid instruments are available (Hauseman, 2001). In the absence of a clearly established solution, we consider additional variables that are conjectured to capture shifting costs: $SAMEADD_i$ is the indicator for the subsidiary that shares an address with another group member; $SAMEREP_i$ is the indicator for the company representative of the subsidiary i also being the head of some other group company.

In principle, the true amount of loss is not observable, so that the average size of corporations ($|y_2|/\overline{y}$) is also not observable. $RELATIVESIZE_i$ is a proxy for this variable and is defined as the percentage of total group sales accounted for by subsidiary i. We would expect it is less likely for subsidiaries that are large relative to other group members to report zero profit. The model suggests that tax rates affect tax incentives but there is little variation in tax rates over the sample period.

Control variables (Z_i) include age of the company in months, natural logarithm of paid-in capital, a dummy for public company, industry dummies, 8 geographic region dummies and time dummies. Parent industry dummies are also included for the regression except on the subsample of financial and insurance industry.

5 Analysis

5.1 Baseline specification

The marginal effects estimated with the baseline probit model is presented in Columns 1 through 3 in Table 3 for the sample that pools all sectors.[26] With-

[25] A recent high-profile case includes the criminal indictment of Kanebo Co. (*Nihon Keizai Shinbun*, August 19, 2005).

[26] The result from logit model is qualitatively the same and is available from the corresponding author.

out controlling for corporate size in the regression, the coefficient on $LARGE$ is negative as shown in Column 1. This is as expected: corporations would not likely to become large unless they are successful. A control variable for the size – a natural log of paid-in capital ($PCAP$) – turns the coefficient to positive and significant (Column 2), a pattern consistent with the income shifting hypothesis. The signs of coefficients on $HOLDING$ and $RELATIVESIZE$ are consistent with the income shifting hypothesis and are significant. The pattern is robust to inclusion of a host of control variables including time dummies, dummy for publicly-listed corporation, own industry dummies, parent industry dummies, and region dummies (Column 3). The positive coefficient on Year 1992 dummy reflects the onset of recession after the collapse of the bubble economy. The significantly negative coefficient on the public corporation dummy reflects the stringent criteria for being listed on the stock exchange, but it may in part capture the disincentive to artificially reduce profits out of the concern about market valuation.

Since the Antitrust Regulation places stronger restriction on group formation by the financial/insurance parents, the sample has been split (Column 4-5). The coefficient on $LARGE$ in the financial/insurance is three time as large as in the other sectors, being consistent with the conjecture that the tighter restriction on mergers renders income shifting attractive in the sector. The industry differences in profitability alone would not explain this finding, since the likelihood of zero-profit reporting is relative to another group of firms in the same sector.

Note that the coefficient on $HOLDING$ is negative and significant for the other sectors (Column 4). Though this result is inconsistent with the income shifting hypothesis, given the lower standard deviation on $HOLDING$ for the other sectors – 29 as compared to 45 percentage points in the financial/insurance – it is possible that the low holding may not accurately reflect the degree of control in other sectors. For the financial/insurance sector, where the "five percent rule" puts exogenous restriction on the level of intra-group shareholding, the coefficient on $HOLDING$ is positive and significant. Overall, the results of the baseline estimation are largely consistent with the income shifting hypothesis.

5.2 Extensions

Table 4 includes additional proxy for shifting costs: dummies for the subsidiary that shares headquarter address and company representative with another group member. The result on the pooled sample shows that both indicators are positive and significant (Column 1), but the strength of the relationship is somewhat sensitive to the sample specification, especially with regard to the coefficient on the shared headquarter (Column 3 and 5). Part of the reason may be that in the financial/insurance, after controlling for $HOLDING$, these variables have no explanatory power. Interaction terms with the proxy for shifting costs and $LARGE$ are generally positive but not significant, indicating

that large subsidiaries with low shifting costs are not significantly more likely to report zero profit.

The tax penalty, and thus the tax incentive to shift income, arises only when some group members are making losses while others are making profit. Our study so far used a sample that includes all observations regardless of the overall profitability of the group. Since the incentives to shift income would be more pressing for groups in which the profitability varies among members, we have tried excluding observations from "profitable" groups to check sensitivity. Here, a group is defined to be "profitable" if x percent of group members reports positive profit in the respective year, so that the profitability is based on the unweighted count of group members. The cut-off percentages we have tried are 100, 90, 80 and 70 percent. The sample is based on all sectors as it is generally representative of the subsample.

By excluding such observations, we would expect to observe a stronger correlation between the explanatory variables and the incidence of zero-profit reporting for the tax reason, provided that the excluded observations are sufficiently similar to included observations. If, for instance, the fraction of large corporations in excluded observations is greater, the coefficient on $LARGE$ from the remaining sample mechanically increases since excluded large corporations would mostly be reporting non-zero profit. Thus, caution is required in interpretation.

Table 5 presents the results. Column 1 reproduces the baseline result excluding 3,103 observations that are in groups where some other group member have missing observation on profit. Column 2 excludes 4,828 observations in groups with all members reporting profits. The coefficient on $LARGE$ increases by 0.08 as expected under the hypothesis. Since the fraction of large corporations is identical to three decimal points, it is likely that not all of the increase is attributable to the mechanical effects, but rather, attributable to tax incentives. The subsequent restrictions on the sample also increase the coefficient (Column 3-5), but it is difficult to attribute to the tax incentives as the fraction of large corporations decreases. Cautions are required in interpreting these results, but at the least, Table 5 shows that the results are qualitatively robust to excluding samples that would have smaller tax incentives.

5.3 Robustness check

As noted earlier, the available data is on book income rather than tax income. To check the sensitivity to the definition of profit, we tried alternative specifications of the dependent variable under different assumptions about the reporting discrepancy. The first specification assumes that the tax profit of zero corresponds to a range of book profit around zero, thereby "zero profit" is defined to be a range of (-2, 2) million yen. The second specification assumes that tax incomes are systematically smaller than book incomes, and

the range for book profit coded as zero profit is (-1, 3).[27] Column 1 and 2 of Table 6 shows that estimates are qualitatively unchanged, suggesting that the discrepancy between the two concepts is unlikely to be a serious concern.

In the main analysis, $HOLDING$ enters linearly in the regression. To account for the possibility that income shifting involves subsidiaries with a certain minimum degree of control, two discrete specifications of this variable are tried. The first specification replaces $HOLDING$ with the dummy variable for 75 percent or more of voting shares being controlled by the group. The second specification uses the dummy for being wholly-owned subsidiary. Table 6 presents the result. For the financial-insurance sector, the estimated marginal effects on the holding variable are very similar between the specifications. It reflects the regulation that causes the variable to be close to discrete in the first place. For the subsample of other industries, the level of holding has no explanatory power. In sum, the results regarding the level of $HOLDING$ are generally not sensitive to the specification.

Finally, the functional form of the size control poses a trade-off in the model specification choice. Since the identification of the tax effects on large corporation is based on a dummy variable for size exceeding the tax threshold, control variables based on underlying (untransformed) size inevitably capture some of the effects of the taxes, especially when it is in a flexible form.[28] We think the log-linear specification is appropriate for the purpose of this study since the specification avoids attributing the tax effects to the average size-effects. Given the concern about specification errors, and to be conservative, we consider the estimates based on the log-linear specification as an upper bound and those based on flexible forms as a lower bound.

As a basis for comparison, Column 1 of Table 7 presents the result of a baseline model with a sample that omits observations with missing information on the number of workers and/or sales. Column 2 includes in the regression the log of number of workers and log of sales as additional controls. The coefficient on $LARGE$ is lowered but is statistically significant. Column 3 includes a quadratic control of paid-in capital. As expected, the point estimate is positive but is insignificant, since the quadratic controls would attribute increases in the propensity to report zero profit to the average size effects. The results are similar when including quadratic controls for other size variables. Overall, based on the estimates from Column 2 and 4, our analysis indicate that the tax incentives increase the propensity for large corporations to report zero profit by 0.5 - 2.7 percentage points on average.

[27] The ranges of alternative definition are restricted by the data publisher's reporting procedure to round off figures below one million yen.

[28] As a demonstration of this point, Appendix 2 fits a flexible model fit to the data. We then compare it with an extrapolation based on the sample of small corporations and show that for large corporations the observed fraction of zero-profit reporting is greater than the predicted.

6 Supplementary analysis

6.1 The spread of profitability distribution

As additional implications of income shifting, we first consider the shape of profitability distribution. Other things held constant, if incomes are shifted to loss-making subsidiaries within the sample of corporations, the observed distribution of profitability should be "narrower" than the true distribution as a result of the relocation of incomes. A natural comparison group would be a sample of stand-alone entities, but such data is not available for the current study. As a practical alternative, we compare tightly-controlled subsidiaries with other affiliates of the group. To the extent that the shifting of income mainly takes place within subsidiaries with high level of ownership, we would expect a lower profitability variance in such group.

The left panel in Figure 3 presents a visual comparison of the distribution of profitability, defined here as after-tax profit per sales, for wholly-owned subsidiaries and that for partially-owned group members.[29] The profitability distribution of the wholly-owned subsidiaries (solid line) is denser around zero profit. The concentration near the low level of profitability is apparent by examining the difference between two distribution, which is presented in the right panel (solid line). The negative difference for the high levels of profitability indicates a higher profitability for the partially-owned subsidiaries. On the positive income, the distribution for wholly-owned subsidiary appears relatively "squashed" and the pattern is consistent with the shifting out of income. The distribution for the wholly-owned subsidiary is also relatively dense on the negative profit, suggesting that the survival rates between the groups might differ, possibly for a tax reason. We separately examine this consideration below.

The heterogeneity in the business activities conducted by subsidiaries may be responsible for the observed difference in profitability distribution. The age distribution, for example, for the wholly-owned subsidiaries is much left-skewed. To reduce the potential group heterogeneity, we apply the semi-parametric density decomposition technique developed by DiNardo, Fortin, and Lemieux (hereafter DFL, 1996), which has been used to compare, for instance, the wage distributions of migrated workers with workers who stayed behind (Chiquiar and Hanson, 2005). The technique is often compared to the Oaxaca decomposition. With the Oaxaca decomposition, a male-female wage gap, for example, is decomposed into an explained and unexplained component. Likewise, with the DFL technique, the density function at each point of support is decomposed into a component explained by the differences in observables and a residual component.[30] We follow the application by Chiquiar and Hanson (2005) and control for the differences in observed attributes including age, paid-in capi-

[29] The kernel density estimation uses the bandwidth determined the optimal bandwidth formula.

[30] Onji (2007) applies the DFL decomposition in a similar context of sales distributions and outlines the details of implementation.

tal, sales, number of workers, 2-digit industry, region, parent's industry, and sample year. To the extent that the business risks are not captured by these variables, however, the residual component can reflect the differences in business risk as well as the behavioral response. The dash line on the right panel shows the difference in the distribution after adjusting for the differences in the observables. The smaller magnitude of the dashed line as compared to the solid line indicates that a part of the observed difference in distributions is explained by the differences in the observables. The difference, however, still remains after the adjustment, suggesting that influence of the tax incentive.

We think that as a measure of profitability, profit per sales is the most sensible variable available in our dataset. To see the sensitivity of this choice, we have tried different measures; profit per worker and profit per paid-in capital (Figure 4). The raw difference, as shown by the solid line in each panel, indicates that the distribution for wholly-owned subsidiaries is much dense around zero. The adjusted difference is much less pronounced for profit per worker on the left panel. As a measure to assess the statistical significance, we considered the variance of distribution. Table 8 presents the results of the F test for the homogeneity of variance, along with the mean and standard deviation of the actual and adjusted distributions estimated with the kernel density estimation. Consider first the variance of unadjusted distributions (Column 1). For sales or worker as the denominator, the variance of profitability is significantly higher for the group of partially-owned subsidiaries. The variance of profit per paid-in capital is not statistically different between groups. The difference is significant after the adjustment for each profitability measure under either adjustment method (Column 2, 3). Overall, the visual inspection and the F test indicate that the spread of the profitability distribution is narrower for the tightly controlled group, suggesting the relocation of income due to income shifting.

6.2 The attrition of loss-making subsidiaries

We next consider the attrition rate of loss-making subsidiaries. If corporate groups utilize the tax credits on losses made by subsidiaries, we should observe a higher survival rate among the group of loss-making subsidiaries to which income are shifted.[31] To operationalize the test, we once again compare the group members with varying degree of control, measured with the level of intra-group shareholding. To the extent that the high shareholding levels are associated with the ease of income shifting, we should observe a negative correlation between the likelihood of exit and the shareholding level.

We observe the survival of company over four years with the data constructed from the three surveys, matching companies across years. In match-

[31] The tax law on mergers reinforces the prediction. As mentioned already, the losses carried forward by an acquiring corporation are still carried forward after a merger, but those of an acquired corporation are not. This rule creates tax incentives to merge a profitable corporation into a loss-making corporation.

ing companies across surveys, while the data contains a subsidiary identifier, stated to be unique to each company within group, we used in addition the founding year and month as an extra identifier. The precautionary measure was to ensure accuracy but it lead to omissions of authentic matches with minor inconsistency in the reporting of founding dates. "Attrition" is measured by the absence of a company in the subsequent surveys, so that the changes may be due to closure, to being merged in or outside the group, and to the shares being sold off outside the group. The sample is restricted to those which reported zero profit or less in the 1988 survey and to those with valid information on variables used in analysis.

In the standard duration analysis, the time to failure is observed (Greene, 2000). Here, we have a censored data as we only observe whether a company has exited by the survey date. We therefore fit interval censored proportional hazard model (ICPHM) to account for the nature of the data. A hazard model posits the length of survival as a function of time and covariates. A proportional hazard model is a semiparametric class of the model with a function, common across individuals, determines the effect of survival time, $h(t, X, \alpha) = h_0(t)e^{x\beta}$ (Cox, 1972). t is the survival length and is censored in our application. X is a vector of covariates and α is the parameter. $h_0(t)$ characterizes how the hazard function, $h(.)$, changes as a function of survival length.

The ICPHM is estimated with the maximum likelihood following the application in Hosmer and Lemeshow (1999). Since the effects of ownership appeared to be non-linear, we present the specification with the dummies for different level of holding, the base being the category less than 50 percent ownership (Table 9). The control variables are, as in the baseline analysis, age, age squared, paid-in capital, own industry, parent's industry, and headquarter location. The outcome is the exit, so that a negative coefficient on a covariate implies a negative correlation with the exit likelihood. The coefficient on the dummy for wholly-owned subsidiaries implies the odd ratio of 0.535 ($= e^{-0.625}$) indicating that 100-percent-owned subsidiaries are exiting at a rate that is 46.5 percent lower than less-than-50-percent-owned subsidiaries. The 95 percent confidence interval is [0.415, 0.691]. With the estimate of the baseline non-survivorship of 12.3 percent at the end of 4 years, the attrition rate is 5.7 percentage point lower for the wholly-owned subsidiaries. The odd ratio is lower for the dummy for subsidiaries in the holding range of [75, 100) and is higher for that in the range [50, 75). The coefficients on these dummies are highly significant, indicating that the survival rate is generally higher for tightly-controlled subsidiaries. To check whether the result is driven by the correlation between unobserved group heterogeneities with the survival rate, we have considered a specification that includes group dummies (Column 2). This entails trimming the sample to (1) groups with at least two members and (2) the group-level survival rate is between 0 and 1. The trimming halved the sample size. The coefficients on the top two ownership dummies are robust while the dummy for the ownership range of [50, 75) turns insignificant. Thus the unobserved group heterogeneity is not the cause of the differential survival

rates across ownership. In sum, the analysis indicates that the tightly-owned subsidiaries are much more likely to survive after reporting a negative profit.

We interpret the analyses of the spread of distribution and the survival rate as being consistent with the tax consideration. One competing hypothesis to our tax-based explanation is that many of the partially-owned corporations are joint ventures on new lines of businesses, and being at a trial stage of business, they may be closed quickly once the operation turned out to be unsuccessful. While we cannot reject the alternative explanation of the differences in business operation, we have controlled in our regression analysis for the own industry as well as for the parent's industry.

7 Concluding remarks

This paper considered perverse incentives caused by the tax law asymmetries in a corporate income tax that lacks an explicit allowance for loss offsets with group members. We argued that to the extent that corporate groups are formed for business purposes, the income shifting within corporate groups is an unintended consequence of government's failure to account for the group behavior in the tax law. Taken as a whole, the findings are highly suggestive of income shifting being pervasive among large Japanese capital *keiretsu* around the early 1990s.

Our findings underscore the importance of accounting for group behavior in corporate taxation. Under the CITs of most nations, there is no consolidated filing of taxes, in spite of the consolidated *financial* reporting becoming the global standard; it seems reasonable to suspect that income shifting is pervasive among corporate groups in such nations. In this view, the introduction of consolidated filing of 2002 is a step forward for Japan's tax system. Yet, the nation's tax system contains various inconsistencies in how groups of corporations are treated. For example, the special depreciation deduction for small companies provides against subsidiaries of large corporations benefiting from the scheme (National Tax Agency 2007) There is, however, no restriction placed on the same subsidiaries from paying taxes at the reduced rate intended for small stand-alone corporations. Our paper calls for further amendments to the tax system to reflect the business practices.

Finally, we interpreted the evidence as being driven by the tax motives based on our model of income shifting. But one may argue that the other motives for within-group transfers, particularly the risk sharing (Nakatani 1984; Hoshi and Kashyap 2001; Khanna and Yafeh 2005) and perhaps the tunnelling (Bertrand et al. 2002; Morck et al. 2005), being the main driving force behind the pattern, with perhaps the tax incentive playing a minor role.[32] It is beyond the scope of the current paper to distinguish between different motives

[32] Another explanation involves the accounting gimmickry involving so-called "hidden assets." Hidden assets arise from the discrepancy between the value of assets in the balance sheet, which is recorded in book value, and their value in the market. There is a well-known strategy to offset operation losses available to corporations that hold hidden assets: a corporation sells an asset, realizes its hidden value while offsetting operation loss, and repurchases

for within-group transfers. As such, we view this paper as an early step in understanding the importance of tax motives in interpreting the within-group transfers. In further studies, it would be interesting to see if the tendency to report zero profits are reduced once groups start filing consolidated tax returns.

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References

1. Altshuler, R. and Auerbach, A.J. (1990). The significance of tax law asymmetries: An empirical investigation. Quarterly Journal of Economics, 105(1), 61-86.
2. Bertrand, M., Mehta, P., Mullainathan, S. (2002). Ferreting out tunneling: An application to Indian business groups. Quarterly Journal of Economics, 117(1), 121-148.
3. Chiquiar, D., Hanson, G.H. (2005). International migration, self-selection, and the distribution of wages: evidence from Mexico and the United States. Journal of Political Economy, 113(2), 239-281.
4. Cox, D.R. (1972). Regression models and life tables. Journal of Royal Statistic Society: Series B, 34(2), 187-275.
5. Desai, M.A. (2005). The degradation of reported corporate profits. Journal of Economic Perspectives, 19(4), 171-192.
6. DiNardo, J., Fortin, N.M., Lemieux, T. (1996). Labor market institutions and the distribution of wages, 1973-1992: A semiparametric approach. Econometrica, 64(5), 1001-1044.
7. Flath, D. (2005). The Japanese Economy, 2nd edition. Oxford: Oxford University Press.
8. Giudici, G. and Paleari, S. (1998). Income shifting in Italian business groups and some governance implications. Journal of Management and Governance, 1(2), 207-230.
9. Gramlich, J.D., Limpaphayom, P., Ghon, R.S. (2004). Taxes, keiretsu affiliation, and income shifting. Journal of Accounting and Economics, 37(2), 203-228.
10. Granovetter, M. (1995). Coase revisited: Business groups in the modern economy. Industrial and Corporate Change, 4(1), 93-130.
11. Grubert, H. (2003). Intangible income, intercompany transactions, income shifting, and the choice of location. National Tax Journal, 56(1), 221-242.
12. __, Mutti, J. (1991). Taxes, tariffs and transfer pricing in multinational corporate decision making. Review of Economics and Statistics, 73(2), 285-293.
13. __, Slemrod, J. (1998). The effect of taxes on investment and income shifting to Puerto Rico. Review of Economics and Statistics, 80(3), 365-373.
14. Greene, W.H. (2000). Econometric Analysis, 4th edition. New Jersey: Prentice-Hall.
15. Hausman, J. (2001). Mismeasured variables in econometric analysis: Problems from the right and problems from the left. Journal of Economic Perspectives, 15(4), 57-67.
16. Hines, Jr., J.R., Rice, E.M. (1994). Fiscal paradise: Foreign tax havens and American business. Quarterly Journal of Economics, 109(1), 149-182.
17. Holemström, B., Roberts, J. (1998). The boundaries of firm revisited. Journal of Economic Perspectives, 12(4), 73-94.
18. Hoshi, T., Kashyap, A. (2001). Corporate financing and governance in Japan: The road to the future. Cambridge, MA: MIT Press.

it immediately. Such a financial operation allows firms to window-dress financial statements, and to realize the capital gain without invoking tax liability. For this explanation to explain the differences in the profit reporting behavior by corporate size, the propensity to engage in such activities need to be greater for large corporations.

19. Hosmer, D.W., Lemeshow, S. (1999). Applied survival analysis: Regression modelling of time to event data, New York: John Wiley & Sons, Inc.
20. Ishi, H. (2001). The Japanese tax system, 3rd edition. Oxford: Oxford University Press.
21. John, K., Ofek, E. (1995). Asset sales and increase in focus. Journal of Financial Economics, 37(1), 105-126.
22. Jung, K., Kim, B., Kim, B. (2007). Tax motivated income shifting and Korean business groups (Chaebol). KAIST Business School Working Paper Series No. 2007-004, KAIST Business School, Korea.
23. Kaneko, H. (2003). Sozeihō (Tax Law), 9th edition. Tokyo: Kōbundō.
24. Kester, W. (1989). Industrial groups as systems of contractual governance. Oxford Review of Economic Policy, 8(3), 24-44.
25. Khanna, T., Yafeh, Y. (2005). Business groups and risk sharing around the world. Journal of Business, 78(1), 301-340.
26. _ , (2007). Business groups in emerging markets: Paragons or parasites? Journal of Economic Literature, 45(2), 331-372.
27. Majd, S. & Myers, S.C. (1987). Tax asymmetries and corporate income tax reform. In M. Feldstein (Ed.), Effects of taxation on capital accumulation (pp. 343-373). Chicago: University of Chicago Press.
28. Morck, R., Wolfenzon, D., Yeung, B. (2005). Corporate governance, economic entrenchment, and growth. Journal of Economic Literature, 43(3), 655-720.
29. Nakatani, I. (1984). The economic role of financial corporate grouping. In M. Aoki (Ed.), The economic analysis of the Japanese firm (pp. 227-258). New York: North-Holland.
30. National Tax Agency. (2007). Chūshō kigyōsha tou no shōgaku genkashōkyaku shisan no shutoku kakaku no sonkin sannyū no tokurei (Special rule on the acquired price of small depricable asset for small- and medium-sized enterprises). Resource document. National Tax Agency, Japan. http://www.nta.go.jp/taxanswer/hojin/5408.htm. Accessed 29 October 2007.
31. Onji, K. (2007). The response of firms to eligibility thresholds: Evidence from the Japanese value-added tax. Paper presented at the NBER Japan Project Meeting, Tokyo, 26-27 June.
32. PricewaterhouseCoopers. (2002). Corporate taxes: Worldwide summaries, 2002-2003. New Jersey: John Wiley & Sons.
33. Samphantharak, K. (2003). Internal capital markets in business groups. Ph.D thesis. Chicago: University of Chicago.
34. Scholes, M.S., Wolfson, M.A., Erickson, M., Maydew, E.L. & Shevlin, T. (2002). Taxes and business strategy: A planning approach. New Jersey: Prentice Hall.
35. Shimotani, M. (1993). Nihon no Keiretsu to Kigyō Gurūpu: Sono Rekishi to Riron (Keiretsu and Corporate Groups in Japan: History and Theory). Tokyo: Yuhikaku.
36. Westney, D.E. (1998). The Japanese business system: Key features and prospects for change. In P. Drysdale & L. Gower (Eds.), The Japanese economy, part 1, vol.4 (pp. 151-175). London: Routledge.

Appendix 1: Derivation of the solution function

To simplify the problem (7), divide the domain of s into three segments $[0,\ |y_2|]$, $[|y_2|,\ |y_2|+ m]$ and $(|y_2|+ m, \infty)$. Denote the solution to the problem by s^*. First, note that the solution cannot be in the last range, i.e., $s^* \notin (|y_2|+ m, \infty)$. For $s \in (|y_2|+ m, \infty)$, $\pi_2^b(s) > m$, so that the marginal tax rate faced by the subsidiary is τ_H. Since the parent also faces τ_H when they are profitable, there is no tax savings from an additional s in this range. Thus, to save on transaction costs, the firm will not shift more than $|y_2|+ m$. Second, consider the range $s \in [0,\ |y_2|]$. The subsidiary reports income of zero or below, since the amount of shifting in this range is no greater than the amount of loss. In general, the after-tax income of the parent can be positive or negative; in the absence of transaction costs, the condition (1) guarantees that the parent reports positive income, but depending on the costs of shifting, the parent can

report negative income. However, we can ignore the case of negative income. To see why, suppose that there is a value for $\widehat{s} \in [0,\ |y_2|]$ such that $\pi_1^b(\widehat{s}) < 0$. Since we also have $\pi_2^b(\widehat{s}) < 0$, the overall income must be negative, i.e., $\pi_1^b(\widehat{s}) + \pi_2^b(\widehat{s}) < 0$. Given the condition (1), the firm makes positive profit without shifting income, $0 < (1- \tau_H)\pi_1^b(0) + \pi_2(0)$, so that $\widehat{s}$ is dominated by $s = 0$. In other words, at the optimum, the parent must have positive profit, $y_1 - s - g(s) > 0$. Thus, the parent faces τ_H, and the firm's optimization problem becomes (10).

$$\underset{s}{Max}\ \tau_H s - (1-\tau_H)g(s) s.t.\ y_2 + s \leqslant 0 \tag{10}$$

Note that there is no explicit inequality constraint on a parent's profit, but since it can be verified that the constraint holds with a slack, the constraint on a parent's profit is not included here. The first order conditions for the problem are

$$\tau_H - (1-\tau_H)\frac{s}{\overline{y}\psi} - \lambda = 0 \tag{11}$$

$$\lambda(y_2 + s) = 0,\ \lambda \geq 0 \tag{12}$$

The solution for this restricted problem is summarized as

$$s^* = \min(|y_2|,\ \frac{\tau_H}{1-\tau_H}\overline{y}\psi) \tag{13}$$

Third, consider the problem with the restriction that $s \in [|y_2|,\ |y_2| + m]$. The subsidiary faces the marginal rate of τ_L in this range. The parent faces τ_H by a similar argument to above. To see that the parent must have positive income, suppose that at $\widehat{s} = m + |y_2|$, $\pi_1^b(\widehat{s}) < 0$. Since $\pi_2^b(\ m + |y_2|) = m$, the overall profit is $\Pi(\ m + |y_2|) = \pi_1^b(\widehat{s}) + m(1-\tau_L) < m$. $\widehat{s}$ cannot be the optimal value, since the profit without shifting income is $\Pi(0) = (1- \tau_H)y_1 + y_2 > m$ by assumption, i.e., $\widehat{s}$ is dominated by $s = 0$. It follows that for any other value of s in the range, $\pi_1^b(s) > 0$. Thus, the problem can be written as

$$\begin{aligned} &\underset{s}{Max}\ (\tau_H - \tau_L)s - (1-\tau_H)g(s) \\ &s.t.\ y_2 + s \leqslant m,\ \ -y_2 - s \leqslant 0 \end{aligned} \tag{14}$$

The first order conditions for the problem are

$$(\tau_H - \tau_L) - (1-\tau_H)\frac{s}{\overline{y}\psi} - \lambda_1 + \lambda_2 = 0 \tag{15}$$

$$\lambda_1(y_2 + s - m) = 0 \tag{16}$$

$$\lambda_2(-y_2 - s) = 0 \tag{17}$$

$$\lambda_1, \lambda_2 \geq 0 \tag{18}$$

The solution to the problem is summarized as

$$s^* = \min\left[\max(|y_2|,\ \frac{\tau_H - \tau_L}{1-\tau_H}\overline{y}\psi),\ m + |y_2|\right] \tag{19}$$

By combining (13) and (19), we obtain

$$s^* = \min\left\{\max\left[\min\left(|y_2|, \frac{\tau_H}{1-\tau_H}\overline{y}\psi\right), \frac{\tau_H-\tau_L}{1-\tau_H}\overline{y}\psi\right],\ m+|y_2|\right\} \quad (8)$$

Appendix 2: Note on the functional form

This note demonstrates the underestimation of tax effects in a regression with a flexible size control. One way to identify the effects of tax incentives would be to compare the actual fraction of corporations reporting zero profit with the predicted fraction based on the sample without the cap. To the extent that the tax incentives are influential, we would expect to observe the actual fraction to be greater than the predicted fraction. As an example, we examine the propensity to report zero profit using a probit model with a cubic function of the log of paid-in capital as the control.

In Figure A1, the long-dotted line shows the predicted fraction of zero-profit corporations based on the model estimated on a sample below 100 million yen in paid-in capital. The figures are averaged over intervals with the width of 0.2. The amount above 4.6, which corresponds to ln(100), is therefore an out-sample prediction, representing the pattern that would have prevailed had the relationship between the propensity to report profit and the corporate size remained as it was below 100 million. Broadly speaking, the fraction declines over the size. However, the out-sample prediction is generally low compared to the actual figure, indicating a systematically high incidence of zero profit among large corporations unexplained by the level of size.

Now consider the short dotted line, which is an in-sample prediction based on the estimates from the whole sample. As the model is fit to the data, any effects of taxes are absorbed into the coefficients on the size controls, so that the predicted values trace the actual values closely. Thus, by incorporating a flexible size control in the analysis presented in the text, the tax effects would inevitably be underestimated.

Table 1
Summary Statistics

Variable	Subsidiaries of F&I Parents	Subsidiaries of non-F&I Parents	ALL Subsidiaries
PROFIT [mil. Yen]	61.1	81.6	79.7
	(472.2)	(978.8)	(944.3)
HOLDING [%]	42.5	74.4	71.5
	(45)	(29.1)	(32.2)
RELATIVESIZE	0.013	0.028	0.026
	(0.038)	(0.052)	(0.051)
AGE [month]	138.2	234.5	225.9
	(123)	(170.4)	(168.9)
ln(paid-in capital)	233.6	292.9	287.5
	(1162.9)	(6164.8)	(5890.5)
ZEROPROFIT	0.132	0.07	0.076
LARGE	0.187	0.22	0.217
SAME ADDRESS	0.207	0.115	0.123
SAMEREP	0.135	0.19	0.185
N	3,008	30,322	33,340

Notes: Standard deviations are in parentheses. "F&I" refers to financial and insurance. ZEROPROFIT is the indicator for reported profit in the range of (-1, 1). SAMEREP is the indicator for subsidiaries that share same company representative with another member company.

Table 2

The percentage of voting shares by industry classification of parent

Industry Classification of Parent Company	Average	Std.Dev.	N
Telecomm.,Newspaper,Publishing,Broadcasting	82.5	25.7	165
Agriculture and Fishery	81.9	22.4	186
Communication Equipment	81.4	26.4	515
Precision Instruments	80.8	26.2	463
Paper, Pulp and Allied Products	80.4	25.6	347
Retail	80	27.6	1,688
Petroleum and Coal Products	79.3	26.7	303
Real Estate	78.9	28.5	566
Food Products	78.6	27.6	1,526
Nonferrous Metal Products	78.2	27.5	686
Textile Mill Products	78	25.6	210
Textile	77.8	28	1,171
Pharmaceuticals	76.4	29.5	441
Wholesale	76.2	28.4	3,178
Machinery and Equipment	76.1	29	851
Electrical and Electronic Equipment	76.1	29	851
Rubber Products	75.2	26.3	155
Service	73.6	29.8	1,174
Land Transportation	73	31	2,192
Miscellaneous Manufacturing Industries	72.9	28.6	930
Chemical Manufacturing	71.9	28.3	2,519
Stone, Clay, Glass, and Concrete Products	71.2	30.5	825
Transportation Equipment	71.1	29.7	1,744
Electric and Gas	70.3	29.1	560
Construction	70.2	30	2,812
Metal Products	69.7	29	851
Water Transportation	68.1	30.1	2,192
Iron and Steel Industries	67.9	29.9	885
Other	66.7	21	10
Warehousing and Other Transportation	66.5	30.7	726
Air Transportation	54.6	28.5	239
Financial and Insurance	43	45.1	3,131
All Industries	71.6	32.2	34,887

Table3
Baseline probit model

	(1) pooled	(2) pooled	(3) pooled	(4) Non F&I	(5) F&I
LARGE = 1	-0.045**	0.047**	0.042**	0.031**	0.147**
	(0.003)	(0.007)	(0.006)	(0.006)	(0.036)
HOLDING	0.030**	0.016**	0.017**	-0.008*	0.096**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.013)
RELSIZE	-0.974**	-0.496**	-0.377**	-0.392**	-0.225
	(0.130)	(0.092)	(0.082)	(0.082)	(0.379)
AGE		-0.270**	-0.240**	-0.205**	-0.783**
		(0.020)	(0.019)	(0.020)	(0.105)
AGE SQ		0.244**	0.203**	0.152**	0.879**
		(0.028)	(0.027)	(0.028)	(0.189)
PUBLIC		-0.033*	-0.029+		0.324
		(0.017)	(0.016)		(0.225)
LN(PCAP)		-0.029**	-0.027**	-0.023**	-0.057**
		(0.001)	(0.001)	(0.001)	(0.005)
YEAR1990			-0.008**	-0.011**	0.017
			(0.003)	(0.003)	(0.012)
YEAR1992			0.010**	0.007*	0.036**
			(0.003)	(0.003)	(0.013)
Observations	33340	33340	33340	30332	3008
Pseudo R-squared	0.05	0.11	0.14	0.12	0.31

Notes: The dependent variable is 1 if the reported profit is zero and is 0 otherwise. Robust standard errors in parentheses. Column 3-5 include dummies for own industry, headquarter location, and a constant. PUBLIC is ommitted in non F&I subsample because all public corporations reported non-zero profits. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 4
Baseline model with additional explanatory variables

	(1) pooled	(2) pooled	(3) Non F&I	(4) Non F&I	(5) F&I	(6) F&I
LARGE = 1	0.042**	0.032**	0.030**	0.022+	0.147**	0.125**
	(0.006)	(0.011)	(0.006)	(0.013)	(0.036)	(0.042)
HOLDING	0.014**	0.013**	-0.010*	-0.010*	0.092**	0.090**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.013)	(0.013)
OFFICE SHARE	0.008*	0.008*	0.003	0.003	0.017	0.013
	(0.003)	(0.004)	(0.004)	(0.004)	(0.011)	(0.011)
SAME HEAD	0.012**	0.011**	0.011**	0.010**	0.006	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.014)	(0.014)
RELSIZE	-0.387**	-0.388**	-0.399**	-0.400**	-0.209	-0.202
	(0.082)	(0.082)	(0.083)	(0.083)	(0.374)	(0.361)
AGE	-0.235**	-0.235**	-0.202**	-0.202**	-0.767**	-0.769**
	(0.019)	(0.019)	(0.020)	(0.020)	(0.108)	(0.106)
AGE SQ	0.201**	0.202**	0.151**	0.152**	0.859**	0.866**
	(0.027)	(0.027)	(0.028)	(0.028)	(0.195)	(0.191)
PUBLIC	-0.029+	-0.028			0.326	0.344
	(0.016)	(0.017)			(0.224)	(0.224)
LN(PCAP)	-0.027**	-0.027**	-0.023**	-0.023**	-0.056**	-0.056**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)
YEAR1990	-0.009**	-0.009**	-0.011**	-0.011**	0.016	0.017
	(0.003)	(0.003)	(0.003)	(0.003)	(0.012)	(0.012)
YEAR1992	0.009**	0.009**	0.006*	0.006*	0.035**	0.036**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.013)	(0.013)
LXH		0.008		0.006		0.009
		(0.011)		(0.013)		(0.047)
LXadd		-0.001		0.000		0.073
		(0.012)		(0.012)		(0.091)
LXrep		0.011		0.011		0.033
		(0.011)		(0.011)		(0.080)
Observations	33340	33340	30332	30332	3008	3008
Pseudo R-squared	0.14	0.14	0.12	0.12	0.31	0.31

Notes: The dependent variable is 1 if the reported profit is zero and is 0 otherwise. Robust standard errors in parentheses. All regression include dummies for own industry, headquarter location, and a constant. Except F&I sectors, parents' industry dummies are included. PUBLIC is ommitted in non F&I subsample because all public corporations reported non-zero profits. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 5
Exclusion of profitable groups

	(1) balanced	(2) [, 1)	(3) [, 9)	(4) [, 8)	(5) [, 7)
LARGE = 1	0.046**	0.054**	0.055**	0.072**	0.076**
	(0.007)	(0.009)	(0.010)	(0.013)	(0.017)
HOLDING	0.012**	0.015**	0.018**	0.022**	0.033**
	(0.004)	(0.005)	(0.005)	(0.007)	(0.010)
OFFICE SHARE	0.010*	0.018**	0.017**	0.021**	0.025*
	(0.004)	(0.005)	(0.005)	(0.007)	(0.010)
SAME HEAD	0.013**	0.015**	0.015**	0.021**	0.028**
	(0.003)	(0.004)	(0.004)	(0.006)	(0.008)
RELSIZE	-0.370**	-0.323**	-0.356**	-0.442**	-0.510**
	(0.047)	(0.059)	(0.063)	(0.083)	(0.110)
AGE	-0.220**	-0.253**	-0.266**	-0.322**	-0.314**
	(0.021)	(0.026)	(0.029)	(0.039)	(0.054)
AGE SQ	0.176**	0.193**	0.199**	0.241**	0.212*
	(0.034)	(0.042)	(0.047)	(0.064)	(0.089)
LN(PCAP)	-0.029**	-0.036**	-0.039**	-0.047**	-0.054**
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)
YEAR1990	-0.000	-0.003	-0.003	-0.007	-0.020*
	(0.003)	(0.004)	(0.004)	(0.006)	(0.009)
YEAR1992	0.020**	0.016**	0.014**	0.005	-0.011
	(0.003)	(0.004)	(0.004)	(0.006)	(0.008)
Observations	30237	25409	23210	15918	10673
Pseudo R-squared	0.14	0.14	0.14	0.14	0.16
Fraction LARGE =1	0.188	0.188	0.187	0.178	0.171

Notes: The dependent variable is 1 if the reported profit is zero and is 0 otherwise. Robust standard errors in parentheses. All regression include dummies for own industry, parents' industry, headquarter location, and a constant. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 6
Specification tests

	(1) PROFIT1	(2) PROFIT2	(3) NON F&I	(4) NON F&I	(5) F&I	(6) F&I
LARGE = 1	0.054**	0.059**	0.025**	0.025**	0.048*	0.048*
	(0.008)	(0.009)	(0.006)	(0.006)	(0.023)	(0.024)
HOLDING	0.017**	0.017**				
	(0.005)	(0.006)				
OFFICE SHARE	0.018**	0.029**	-0.005	-0.005	-0.001	-0.001
	(0.005)	(0.006)	(0.003)	(0.003)	(0.008)	(0.008)
SAME HEAD	0.014**	0.010*	0.003	0.003	-0.014	-0.014
	(0.004)	(0.005)	(0.003)	(0.003)	(0.010)	(0.010)
RELSIZE	-0.762**	-0.761**	-0.018	-0.017	0.431**	0.424**
	(0.109)	(0.108)	(0.048)	(0.048)	(0.108)	(0.110)
AGE	-0.378**	-0.410**	-0.090**	-0.089**	-0.337**	-0.337**
	(0.027)	(0.031)	(0.019)	(0.019)	(0.106)	(0.106)
AGE SQ	0.324**	0.326**	0.046	0.046	0.365+	0.365+
	(0.038)	(0.046)	(0.030)	(0.030)	(0.208)	(0.208)
PUBLIC	-0.038	-0.039			0.319	0.374
	(0.029)	(0.033)			(0.216)	(0.244)
LN(PCAP)	-0.051**	-0.064**	-0.008**	-0.008**	-0.022**	-0.022**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.004)	(0.004)
YEAR1990	-0.012**	-0.013**	-0.011**	-0.011**	0.016	0.016
	(0.004)	(0.004)	(0.003)	(0.003)	(0.010)	(0.010)
YEAR1992	0.010*	0.011*	0.005*	0.005*	0.019+	0.019+
	(0.004)	(0.005)	(0.003)	(0.003)	(0.011)	(0.011)
LN(SALES)			-0.021**	-0.021**	-0.032**	-0.032**
			(0.001)	(0.001)	(0.004)	(0.004)
LN(WORKER)			0.001	0.001	0.008*	0.008*
			(0.001)	(0.001)	(0.003)	(0.003)
q100				-0.000		0.083**
				(0.002)		(0.014)
q75			-0.001		0.081**	
			(0.002)		(0.014)	
Observations	33340	33340	29348	29348	2880	2880
Pseudo R-squared	0.15	0.15	0.16	0.16	0.28	0.28

Notes: The dependent variable is 1 if "zero profit" is reported and is 0 otherwise. The range of zeroprofit for PROFIT1 and PROFIT2 is (-2,2) and (-1,3) respectively. Robust standard errors in parentheses. All regressions include dummies for own industry, headquarter location, and a constant. Parent's industry dummies are included except for F&I subsamples. PUBLIC is ommitted in non F&I subsample because all public corporations reported non-zero profits. + significant at 10%; * significant at 5%; ** significant at 1%

Table 7
Flexible size controls

	(1)	(2)	(3)	(4)
LARGE = 1	0.036**	0.027**	0.008	0.005
	(0.006)	(0.006)	(0.006)	(0.005)
HOLDING	0.011**	0.015**	0.012**	0.015**
	(0.004)	(0.004)	(0.004)	(0.004)
OFFICE SHARE	0.003	-0.002	0.003	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)
SAME HEAD	0.007*	0.001	0.007*	0.000
	(0.003)	(0.003)	(0.003)	(0.003)
RELSIZE	-0.351**	0.010	-0.363**	-0.032
	(0.078)	(0.046)	(0.078)	(0.048)
AGE	-0.206**	-0.105**	-0.211**	-0.111**
	(0.019)	(0.019)	(0.019)	(0.019)
AGE SQ	0.160**	0.071*	0.168**	0.075*
	(0.027)	(0.029)	(0.027)	(0.030)
PUBLIC	-0.028+	-0.021	-0.041**	-0.035**
	(0.016)	(0.017)	(0.006)	(0.007)
YEAR1990	-0.009**	-0.008**	-0.009**	-0.009**
	(0.003)	(0.003)	(0.003)	(0.003)
YEAR1992	0.007*	0.006*	0.007*	0.007*
	(0.003)	(0.003)	(0.003)	(0.003)
LN(PCAP)	-0.024**	-0.010**	-0.040**	-0.023**
	(0.001)	(0.001)	(0.002)	(0.002)
LN(WORKER)		0.003*		0.000
		(0.001)		(0.003)
LN(SALES)		-0.023**		-0.032**
		(0.001)		(0.004)
LN(PCAP) SQ			0.003**	0.002**
			(0.000)	(0.000)
LN(SALES)SQ				0.001*
				(0.000)
LN(WORKER)SQ				0.000
				(0.000)
Observations	32228	32228	32228	32228
Pseudo R-squared	0.12	0.16	0.13	0.17

Notes: The dependent variable is 1 if "zero profit" is reported and is 0 otherwise. Robust standard errors in parentheses. All regressions include dummies for own industry, parent's industry, headquarter location, and a constant. The sample in this table omits 1,112 observations with missing information on workers and/or sales. + significant at 10%; * significant at 5%; ** significant at 1%.

Table 8

F test for difference in variance

	F tests for difference in variance			Means and standard deviations			
	Actual/Actual	Adjusted/Actual	Actual/Adjusted	Wholly owned		Partially owned	
Variables	(1)	(2)	(3)	Actual	Adjusted	Actual	Adjusted
profit/sales	1.222**	1.408**	1.448**	0.007	0.009	0.012	0.006
				(0.061)	(0.057)	(0.068)	(0.073)
profit/worker	1.498**	1.235**	1.285**	0.389	0.558	0.681	0.419
				(2.134)	(2.351)	(2.613)	(2.420)
profit/paid-in capita	0.983	1.115**	1.106**	0.598	0.592	0.717	0.697
				(1.399)	(1.314)	(1.387)	(1.472)

Notes: Standard deviations in parentheses. The mean and variance is obtained from the empirical distribution estimated with kernel density. The test statistics is computed as $S^2_{\text{partially owned}}/S^2_{\text{wholly owned}}$. The cut offs for F is 1.021, 1.027, and 1.038 for 10, 5, and 1 percent level of significance.

Table 9
Interval censored proportional hazard model

	(1) Full sample		(2) Restricted sample	
	Coefficients	Hazard ratio	Coefficients	Hazard ratio
HOLDING[50,75)	-0.398*	0.672	-0.214	0.807
	(0.166)		(0.173)	
HOLDING[75,100)	-0.834**	0.434	-0.727**	0.483
	(0.213)		(0.217)	
HOLDING[100]	-0.625**	0.535	-0.702**	0.496
	(0.130)		(0.135)	
AGE	-0.180+		-0.025	
	(0.098)		(0.108)	
AGE SQUARED	0.041*		0.012	
	(0.018)		(0.021)	
LN(PCAP)	0.086*		0.010	
	(0.037)		(0.036)	
		Baseline survivorship function		Baseline survivorship function
1988-90	-2.892**	0.946	-1.488**	0.798
	(1.065)		(0.389)	
1990-92	-2.581*	0.877	-0.831*	0.516
	(1.064)		(0.388)	
Observations	3228		1604	
LL	-1058.68		-768.61	

Notes: The dependent variable is 1 for observations which have exited by the time of hte subsequent survey date and is 0 otherwise. Standard errors in parentheses. The sample in Column 1 is the subsidiaries reporting losses in 1988. The sample in Column 2 is restricted to observations belonging to groups with (1) more than one valid observations and (2) mixed survival outcomes. The estimation is based on the expanded data set following the method outlined in Hosmer and Lemeshow (1999: 262). All columns include dummies for headquarter location (aggregated over 6 regions), own industry and parent's industry (2-digit for Column 1 and 1-digit for Column 2). Group dummies are included in Column 2. The unit for AGE is in decades. + significant at 10%; * significant at 5%; ** significant at 1%.

Figure 1
Illustration of the optimal shifting schedules

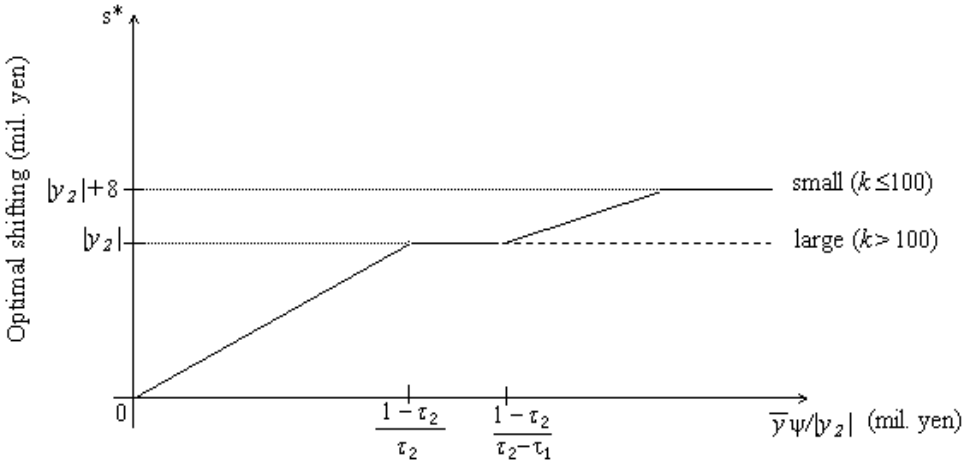
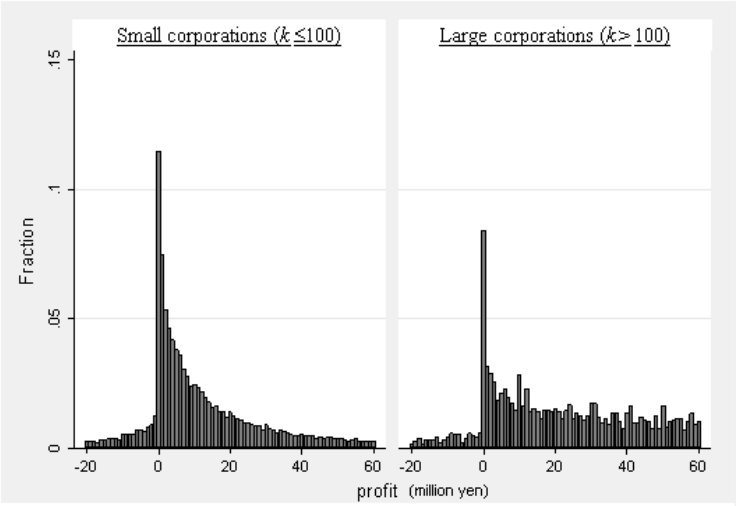


Figure 2
The distribution of profits by the size of paid-capital



Notes: The sample used for this figure is based on the subsidiary data from FY1988, 1990, 1992. It contains active corporations with valid entries for profit over the range of [-20, 60]. "Profit" is after-tax book profit and is in million yen. The width of each bin is 1 million except for the bin spanning 0, which has the range of (-1, 1). This is because the information in the data rounds to zero, any figures with absolute value below one million. Small corporations are the observations with paid-in capital (k) at 100 million yen and less. Large corporations are those with k above 100 million yen.

Figure 3
The profitability distributions: Wholly-owned versus partially-owned subsidiaries

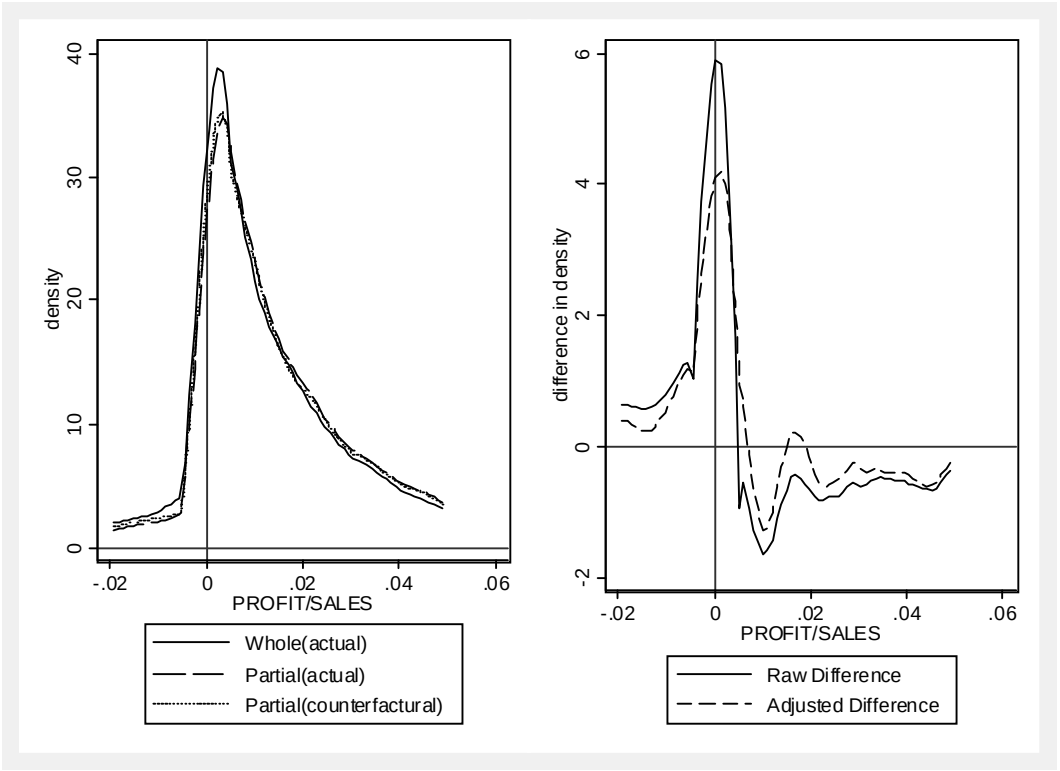
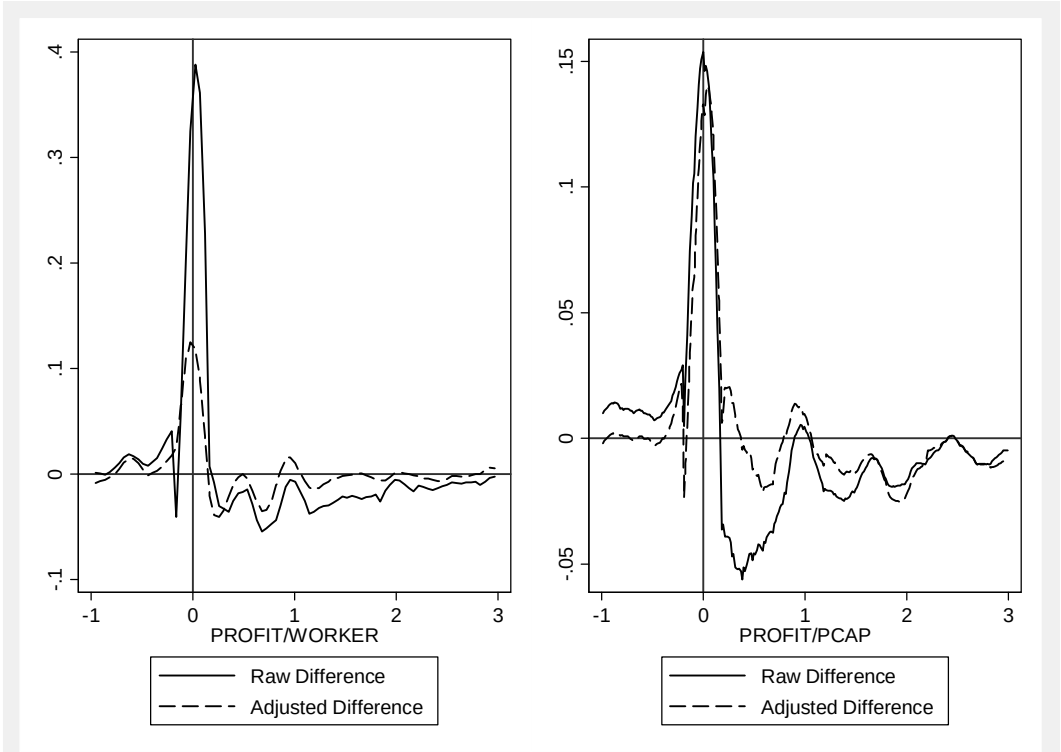
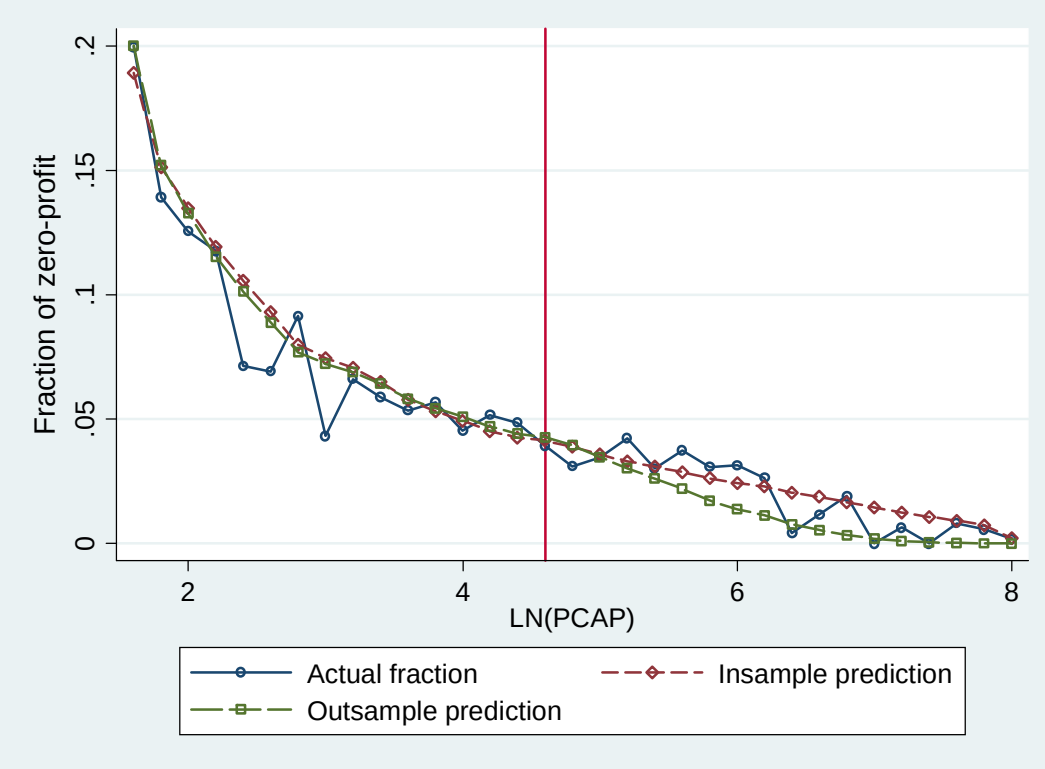


Figure 4
The comparison of profitability distribution using alternative definitions



Appendix Figure 1

An illustration of downward bias from a flexible size control



Notes:

1. The sample based on estimations is 69,538 observations with paid-in capital of 5 million yen or more. "Actual fraction" is the fraction of corporations reporting zero profit within respective bin of 0.2 in width. "In-sample prediction" is the average of predicted probability from fitting a cubic function in a probit model on the whole sample. "Out-sample prediction" is that from the sample at and below 100 million yen, so that the points on the
2. The vertical line represents LN(100).
3. The largest size category aggregates the observations up and greater than 8 in log of paid-in capital.