The response of firms to eligibility thresholds: Evidence from the Japanese value-added tax

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Abstract

It is common to define benefit eligibility for small business policies by restrictions on the firm size. This paper investigates the incentives for a large firm to "masquerade" as many small firms by separately incorporating business segments, focusing on the case of the Japanese value-added tax. The paper finds that the masquerading behavior was pervasive and took place quickly after the introduction of tax incentives. Tax avoidance accounted for 3.4 percent of the overall revenue drain due to the preferential tax treatment of small businesses, but the efficiency consequence would not have been severe. This study suggests that the strategy may be commonplace in other settings.

Key words: Tax avoidance; Business group; Firm size distribution
JEL Classifications: H32; H25; L22;

1 Introduction

There is a host of public policies that favor small over large firms, and it is common to define benefit eligibility by restrictions on the number of employees or on alternative measures of firm size. [1] There are often sound rationales for exempting small firms from complying with regulations, including the Americans with Disabilities Act that would otherwise impose disproportionate compliance costs on small businesses, and from filing a tax return, including that for a value-added tax (VAT) where the costs of administration does not justify the amount of tax collected from small tax payers. Yet, the tax and regulatory systems are rendered complex by the preferential treatment by firm size, giving rise to a clear concern about policy-induced distortions in firm behavior. Despite the pervasiveness of policy thresholds, to this author's knowledge, the distortions are discussed in press but not well documented in the academic literature. There have been theoretical studies (Keen and Mintz, 2004; Dixon et al., 2004) and an empirical study (Schivardi and Trrini, 2004) focusing on the disincentives for firms to grow beyond the benefit threshold out of concern for the benefit eligibility. Though such behavior is plausible for stand-alone firms,

[1] For example, Title I of the Americans with Disability Act prohibits discrimination against persons with disabilities in employment by businesses having 15 or more employees. In a small business support program in the UK analyzed by Wren and Storey (2002), the eligibility requirement is no more than 500 employees. Under the Emergency Petroleum Allocation Act of 1973, small oil refiners below a set production capacity were not subjected to price controls (Viscusi et al., 2001). Under the 1990 Clean Air Act Amendment, the federal government mandated that states formulate a program applicable to organizations that own or operate more than 10 vehicles in designated areas (Callan and Thomas, 2004).

in practice, a firm can have a flexible structure that allows it to respond in diverse ways without placing restriction on its growth. Just as so-called "tariff hopping" in the context of foreign direct investment, where a firm creates a subsidiary in an importing country with a high tariff to bypass the tax, a large firm may avoid the loss of eligibility through a creation of multiple subsidiaries that are legally independent but have a common ownership and control, subject to legal provisions against such strategies.[2] Thus, the literature leaves undocumented a variety of behavioral responses that are potentially relevant in policy making.

The purpose of this paper is to document the behavioral response caused by a tax threshold in the context of the VAT introduced in Japan in 1989. The tax reform was an overhaul of the Japanese tax system affecting the economy of the nation, but what makes this policy change an attractive "natural experiment" is the sudden appearance of tax incentives and the availability of data that allows us to observe changes made in firm structure, a major obstacle in this line of study. This setting allows us to ask questions such as: How pervasive was the strategy to split corporations? How quickly did firms respond to the new tax incentives? What were the commonly separated business segments, if any? In addition, though a study on a VAT threshold is an interest in itself,[3] it is particularly informative to focus on a tax setting, rather than

[2] Similarly, after the Second World War, the US banks sought to overcome the restriction on interstate banking by separately chartering banks in different states (Matasar and Heiney, 2002).

[3] More than 120 countries adopt VAT and thresholds are incorporated in the ma-

a regulatory setting, since the gains from tax avoidance can be estimated reasonably. By understanding the tax gains to firms, we learn about the extent of revenue drains caused by tax avoidance, but in addition, we can gauge the extent of efficiency losses which may result from firms choosing sub-optimal organizational structures (e.g. Goolsbee and Maydew, 2002). Given that a rational firm would not incur costs greater than the benefits, the amount of tax benefits is the upper bound for the efficiency losses. Though the specificity of the setting may render generalization difficult,[4] this paper provides a tangible example of behavioral response that policy makers can expected from incorporating a threshold in a legislation.

To this end, this paper considers two complementary identification strategies that utilize a large sample of Japanese corporate groups. The data used in this paper is *Affiliated Company Data* (*ACD*), an annual survey of publicly-traded companies that collects information on their domestic subsidiaries.[5] To identify the overall influence of a policy threshold, we first compare the size distribution of businesses in the neighborhood of the threshold before and

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jority of them. As for the OECD nations with a VAT, 84 percent adopt a threshold. See Ebrill et al. (2001) for an international summary.

[4] As is well known in the VAT literature, there is a disadvantage in not registering to file a VAT under the invoice system, which is adopted in most counties. Japan uses the account system instead. Under the invoice system, registered firms, in general, have incentives to avoid purchasing from exempt firms, because non-registered firms are not allowed to issue invoices that registered firms use to obtain tax credits. However, there is no such concern for firms that deal with final consumers, thus a VAT exemption would still be attractive in retail and service sectors.

[5] *Kankei Kaisha Data*, also published in print as *Nihon no Kigyo Gurupu* by Toyo Keizai Co. Westney (1996) provides discussion on corporate groups, sometimes refered to as a vertical *keiretsu* or capital *keiretsu*.

after the tax change. As there is a concern that confounding influences might mask any effects of the tax, we apply the semiparametric technique developed by Dinardo, Fortin and Lemieux (1996) to control for the other changes in the economy. Though this approach has an intuitive appeal, it does not allow us to distinguish between different hypotheses on behavioral response. To test a hypothesis that the tax threshold induced corporations to split up, we next examine new group members founded under different tax regimes, since the direct consequence of corporate splitting is the addition of new members. Finally, this paper estimates tax benefits in the sample, distinguishing between windfall gains and tax-avoidance gains, and extrapolates to the population.

Evidence found in this study is consistent with the hypothesis that a policy threshold induces firms to restructure their organizations by splitting some of their member corporations. First, using a sample consisting of, on average, 14.8 thousand corporations each year, a comparison of the size distribution in 1988 and 1990 shows an increase in the density below the size threshold attributable to the tax reform of 1989. Statistical tests indicate that the difference is significant, implying that the tax threshold exerts a strong influence. Second, we find that the tax influenced the founding of 10.7 to 12.7 percent of new corporations incorporated over July 1988 through March 1991, a period when tax incentives were relatively strong. Further examinations shows that much of the behavioral response occurred within a year and a half after the implementation of the law, suggesting firms are quick in making adjustments

to a new tax regime. Interestingly, a small annual tax benefit, in order of $10,000 to $25,000 per company (in 1990 dollars[6]), is a sufficient tax motive, though it is the smaller groups in our sample that responded to this level of tax incentives. In conjunction with the result suggesting that it was common to separate transportation divisions, which would be relatively independent from other production processes, the efficiency loss caused by tax-motivated restructuring would have been modest; the revenue loss due to tax-motivated splitting, which is the upper bound for the efficiency loss in the economy, is 22 billion yen ($152 million) in 1990, or 3.4 percent of the overall revenue drain due to the preferential tax treatment of small businesses. Nonetheless, horizontal equity of the Japanese VAT was impaired by the incorporation of the threshold.

This paper adds to the literature on tax avoidance by firms and relates to the studies on the effects of taxes on organizational structures.[7] Though tax incentives may be apparent to informed observers, including in the case of VAT thresholds,[8] the relevance to firm decisions is a matter of empirical question. Naturally, it is difficult to assess the pervasiveness of tax avoidance

[6] This paper uses the average dollar-yen exchange rate of 1990 and calculates one dollar to be one hundred and fifty yen.

[7] Goolsbee and Maydew (2002) is similar to this study in focusing on divisive operations. Other studies on tax avoidance by firms include income shifting by multinational corporations (Grubert and Mutti, 1991; Hines and Rice, 1994; Grubert and Slemrod, 1998) and the choice of organizational form (Gordon and MacKie-Mason, 1990, 1994, 1997).

[8] Ebrill et al. (2001, p121) discuss the case of a VAT threshold. Scholes et al. (2002) discuss the effect of taxes on organizational structure in general.

behavior, and as a result of a lack of documentation, the practical importance of tax incentives are sometimes questioned, as in the textbook example of a multi-stage turnover tax.[9] In theory, this tax creates tax incentives to merge with upstream suppliers since the tax is levied at each point that goods change possession, but Williamson (1985) suggests that taxes are of minor consideration in vertical mergers.[10] It is beyond the scope of this paper to verify Williamson's suggestion, since our focus is not on the boundaries between economically independent units. Rather, this study aims to enhance the understanding of the boundaries between distinct legal entities belonging to a close-knit group. Thus, this study is relevant to the literature on business groups,[11] and in a broad sense, also relates to Stephens and Ward-Batts (2004) study on income shifting between husbands and wives. In light of Khanna and Yafeh (2005) who argue that the origin of business groups are not well understood, this paper contributes to the study of business groups by exploring the role of taxes in the formation of groupings.

This paper is organized as follows. Section 2 summarizes the tax scheme to be exploited as a "natural experiment" and discusses preliminary evidence. Section 3 considers a semiparametric approach, outlines its implementation,

[9] Another example is the effects of taxes on merger and acquisition activities, where the evidence in the literature is mixed (e.g. Scholes and Wolfson, 1990; Auerbach and Reishus, 1988).
[10] See also Pedone (1981).
[11] Khanna and Yafeh (2005) provide a recent synthesis of international studies on business groups. See Yafeh (2000) for a review of studies on Japanese business groups and Granovetter (1995) for a review of sociology studies.

and presents evidence on the effects of a tax threshold on corporate size distribution. Section 4 turns to the corporate splitting hypothesis and considers a parametric approach. Section 5 estimates the revenue drain and presents the result extrapolated to the population. Section 6 concludes.

2 Tax Incentives

2.1 Simplified Scheme

Against the backdrop of growing government debt and an aging population, a consumption-type VAT known as "consumption tax" was introduced in April 1989, replacing commodity taxes that had narrow bases.[12] Overall, the Japanese VAT had a simple structure; the tax rate was uniform at 3 percent and relatively few items were exempted.[13] However, the treatment of small business was unusually generous by OECD standards as a result of political concessions given by the leading Liberal Democratic Party (LDP) to its business constituents.[14]

[12] See Homma and Atoda (1989) for a discussion on small business treatment. Ishi (2001) offers a comprehensive overview of the Japanese VAT. Kaizuka (1992) provides a broad overview of the historical backgrounds of the 1989 reform. Discussions by Noguchi (1992) and Hatta (1992) illustrate the main political issues from opposing perspectives. Kishi (1998) provides a narrative account of the reform.

[13] Automobiles were taxed at 6 percent as a transition measure from the replaced indirect tax on automobiles, which was 23 percent.

[14] The LDP efforts to introduce a VAT were met with strong oppositions; there had been two failed attempts in 1979 and in 1987, and 71 percent of public was against the tax bill in a poll conducted by *Yomiuri Shinbun* on 23 February 1989 (Ishi, 2001, p280). To win support from small businesses in passing a VAT bill, including

The special treatment for small businesses included what is known as the simplified filing scheme. A firm usually computes its tax liability by subtracting tax paid on inputs from tax collected on sales under the ordinary filing of a VAT. The main burden to a taxpayer is in the computation of the tax paid on inputs; the simplified filing reduces this compliance cost by presuming that taxed inputs are 80 percent of taxable sales, a common single rate for most industries.[15] Tax liability is then simply 0.6 percent of taxable sales, thus converting a VAT into a turnover tax. The eligibility is defined in terms of the amount of sales in the base period, which is two years prior to the current tax year, and the threshold amount of sales is 500 million yen ($3.3 million) under the 1989 system. 96.7 percent of all businesses were eligible in 1989, but they were small businesses that only accounted for 19 percent of total turnover in the economy.[16]

The main problem with the simplified scheme is that it generates "hidden subsidy" by, in essence, giving too much tax credit. Consider the effective tax payment by a seller under a τ percent VAT. In addition to the tax liable to the government (T), the seller pays tax on its purchase of taxable inputs (c), which

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from the Japan Chamber of Commerce and Industry (JCCI), a leading opposition group in the 1987 attempt, the LDP engaged in a series of dialogue with its business constituent. During April 1988, the LDP special committee on tax reform conducted hearings involving 338 organizations, including business associations and LDP local branches (Kishi, 1998, p137). The tax bill that finally passed included concessions that JCCI expressed support for.

[15] The Japanese VAT initially had two categories for the presumed rate of value-added. All industries, except the wholesale industry, had the rate of 80 percent; the rate for the wholesale industry was 90 percent.

[16] Ishi (2001, p282).

include materials as well as capital equipment but does not include wage bills. If this effective tax payment is smaller than the tax collected from buyers, a tax benefit ($B = \tau s - (\tau c + T)$) is generated. τs denotes tax collected on taxable sales. B under ordinary filing is of course zero because the tax liability is the difference between the tax collected and tax paid on inputs. Under the simplified scheme, however, businesses with high value-added benefit. Denote a ratio of value-added to sales by v, so that $c = (1 - v)s$.[17] Then under the simplified scheme,

$$B = \max[\tau s(v - \widehat{v}), 0] \tag{1}$$

where $\widehat{v}$ is a presumed rate of value-added of 20 percent. The max function captures the legislation allowing low value-added tax payers to opt out from the scheme. A company therefore gains from the tax if its actual value-added ratio is greater than 20 percent. Thus, under the simplified scheme, a hidden subsidy arises from the discrepancy between the actual and presumed rate of value added.

It is well recognized that the simplified scheme compromised the revenue performance of the VAT through this drainage of tax revenue. Further, the system impaired horizontal equity since it did not account for the diversity in value-added ratios across industries, as documented below. Subsequent amendments addressed these concerns: In October 1991, the presumed rate category was expanded to reflect the actual rates to improve equity and the threshold was

[17] For simplicity, investments are ignored in this discussion.

reduced to 400 million yen; in 1997 the threshold was lowered to 200 million yen. [18]

2.2 Behavioral Response

Since it is the businesses with sales less than 500 million yen that are eligible for the simplified scheme, the threshold creates incentives to shift sales to favorably taxed entities within a corporate group. [19] A variety of tax avoidance strategies are conceivable to achieve this end; foregoing sales beyond 500 million yen, falsely attributing sales to small entities, and transferring high value-added business segment to small group members. This paper focuses on a strategy involving splitting a corporation, and this section considers the benefits and costs of such strategy.

Figure 1 shows levels of B for a company with a value-added ratio of 35 percent, which is approximately the average for the manufacturing sector in 1989. [20] Tax benefit is increasing in sales up to the threshold level, peaking at

[18] In April 2004, the simplified scheme threshold was reduced further to 50 million yen.

[19] There are various types of grouping of companies that exist for different reasons. A "corporate group" in this study referred to a group of corporations affiliated though the ownership of capital and is sometimes refered to as a capital *keiretsu* (see Westney, 1998). A distinction should be from a horizontal *keiretsu*, which refers to a group centered on the main bank system.

[20] It is assumed, for the illustration purposes, that the taxable sales in the current year determine the tax status. Although the tax status in year t is determined by level of sales in $t-2$ in practice, the tax treatment is still discontinuous at the threshold. Reinterpreting the sales on the x-axis to be constant annual sales generated over a fixed period of time, the hidden subsidy in present value terms would give the exact same shape.

2.3 million yen ($15,000) per annum. Two kink points for small sales arise from other preferential schemes for very small businesses; exemption and phasing out of exemption. Notice that unlike the personal exemption under a typical individual income tax, where the tax liability is based on the portion of income exceeding the exempted amount, because the sales determine the benefit eligibility in our context, there is a sharp discontinuity at the threshold level of sales. Further, a tax benefit from a single split can be greater than 2.3 million yen. There is an anecdotal case where a producer of TV advertisements was divided into four separate entities.[21] Likewise, successfully dividing a company with 1 billion yen in sales in half would yield tax benefit twice the size of the peak amount.

Table 1 illustrates tax incentives by industry under the tax regime of 1989 and of 1991. The average value-added ratios for each industry are shown in the first column and the presumed rates under the 1989 and 1991 regime are shown in the second and third column respectively. Since the value added is diverse across industries but the presumed value added does not vary very much in 1989, the tax benefits vary as shown in the fourth column. For example, the tax benefit to a real estate company with sales of 500 million is 3.8 million yen per year, which is 18 times as much as that of a retail company. Nonetheless, People's Finance Corporation (1994) reports a case involving a retail company,

[21] This example is reported by a popular center-left newspaper, *Asahi Shinbun*, April 24 (evening edition), 1989.

indicating a possible within-industry variation. [22] The amendment in October 1991 adjusted presumed rates, so that the degree of diversity and the level of incentives were reduced, as shown in the last column.

There is a complication in assessing the tax benefit since it is taxable under corporate income tax. The effective rate was 49.98% in 1989 [23] but it is difficult to know how much is in fact recaptured by the authority in practice, since 48 percent of corporations reported tax losses in 1990 and income may be hidden through other avoidance strategies. Furthermore, there is a favorable tax consequence in creating small corporations (e.g. higher deductibility of entertainment expenses and a lower tax rate for income below 8 million yen). Thus, the tax benefit may be reduced by an income tax but not to its full extent.

In theory, the decision to split a corporation depends also on the costs involved in organizing a business in a way a firm would not have chosen in the absence of the tax incentives: Goolsbee and Maydew (2002) suggest the principle-agent cost might be aggravated; It may be administratively inconvenient to maintain separate legal entities; By founding a new corporation, a firm incurs administrative as well as registration costs. [24] The effect of the threshold in

[22] It is reported that in setting up a new sports merchandise shop in a new location, the tax motive influenced the company's decision to set up a legally separate corporation, rather than a branch.

[23] The rate is the effective tax rate on corporate income as at 1990 and includes corporate income tax, enterprise tax, and corporate inhabitant tax.

[24] One component of the transaction costs is the registration license tax, which is 7 mills of the paid-in capital with the minimum of 150,000 yen for founding of joint

inducing corporate splitting was a concern to the policy makers, and therefore, the tax code contains provisions against this tax avoidance strategy. However, the effectiveness of these provisions is questionable. There was no provision for splitting involving sole proprietors, and even the law on corporations was not tight. A divested corporation is not recognized to be a separate entity from its parent for the purpose of the VAT, depending on the method of financing the paid-in capital, the ownership of the stocks, and the activity of the divested company.[25] There is sufficient room to adjust the legal transaction that a firm can easily avoid being consolidated.[26] Therefore the legal deterrence seems sufficiently weak and whether the costs outweigh the tax benefits is an empirical question.

2.3 Preliminary Evidence

In addition to the anecdotes mentioned above, there is a case in our dataset indicating the relevance of the simplified scheme on a firm's reorganization decision.[27] The case involves a corporate group headed by S-Line Co. which is a closely-integrated owner-managed trucking group; the owner was the company

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stock corporations.

[25] If divested companies were founded by investment in kind and its shares were closely held by related parties, a divested company is aggregated with the parent for the purpose of the VAT. Even so, if a subsidiary is classified in a different two-digit industry from its parent, it is taxed separately in subsequent years (Yamamoto, 1996).

[26] Establishing a company by investment in kind is a cumbersome method that involves assessment of assets by a third party, and it lacks popularity (Niiyama, 2001, p56).

[27] This case was identified while estimating the tax benefits.

representative in all of its 41 subsidiaries in 1991.[28] The group conducted the following reorganization. In November 1988, just as the VAT bill was passing the Lower House, the group founded a subsidiary, Central Japan Operation Services (CJOS).[29] CJOS shared with Delivery911, Ichimiya (DI), another group member, the company representative, telephone number and address. Most interestingly, the sum of their sales at the end of FY1988 was 529 million yen, meaning DI would have crossed the threshold level of sales by just 29 million yen in the absence of the reorganization, assuming CJOS was a business segment of DI prior to the reorganization.[30] In addition, well before the formulation of the 1991 amendment, Three S Transportation (TST) was founded in October 1990. After the tax incentives were reduced, TST merged with DI in 1994. Tax benefit accruing to three corporations is estimated to be 14 million yen ($93,000) over 1989-1991. Thus, S-Line Group's behavior is consistent with the tax avoidance explanation. In particular, it seems fair to suggest that the motive in establishing CJOS was tax planning aiming to

[28] According to the FY2002 financial report filed with the Stock and Exchange Commission, his son was the executive director of the parent company (http://info.edinet.go.jp/InfoDisclosure/alphabet/index.jsp). The large number of subsidiaries is in part due to this firm's national network of parcel delivery.

[29] The names of subsidiaries are translated by this author since their official English names could not be obtained.

[30] As already noted, there are provisions against tax-motivated division, and in determining the tax status, the divested company may be counted as part of a divesting company, under certain form of divisions. Without more information on the circumstances, it is not possible to ascertain that the divestiture was successfully reduced the tax liability. However, in this particular case, it seems fair to say that the two companies were taxed separately. This is because the industry classification of CJOS is different from that of DI, and the voting stock held within the group is less than 50 percent.

prevent DI from stepping over the threshold.

The anecdotes show the relevance of tax incentives but they do not reveal the prevalence of tax avoidance. To see how widespread this strategy was, we first examine the number of commercial registration of new corporations. Figure 2 shows a plot by calendar year. There is a surge of new registrations from 1988 through 1991.[31] This pattern supports the hypothesis of tax-motivated splitting since the reform would have been anticipated from June/July 1988, well before the implementation of April 1989.[32] Though there is an alternative explanation based on the "bubble economy." The surge of founding can also be explained by the high level of domestic investment spurred by loose monetary policy and the rapid appreciation of the yen.[33] Next, we turn to corporation-level data to distinguish these explanations.

3 Semiparametric approach

A natural way to identify the overall influence of a policy threshold is to examine the size distribution of businesses in the neighborhood of the threshold. This paper implements kernel density estimation and makes a comparison of

[31] The spike in 1996 is caused the conversions of small joint-stock corporations to limited-liability corporations. It is a result of the change in the minimum capital requirement for joint-stock corporations.
[32] In June 1988, the proposal for the preferential treatment of small companies was publicized, and JCCI, the leading opposition to the earlier LDP initiative, publicized its acceptance of the reform. *Nihon Keizai Shinbun*, June 3 (evening edition), 1988.
[33] See Cargill, Hutchison and Ito (1997) for a discussion on the bubble economy of the late 1980s.

distributions in 1988 and 1990. There are two main issues in implementation. First, sales distributions may change over time for reasons unrelated to the tax structure, e.g., due to changes in underlying corporate attributes, such as sectoral composition. Since such influences can mask the effects of tax incentives and bias our inference, it is necessary to decompose the change in distribution into that caused by the tax change, and that due to attribute changes. For the purposes of this decomposition, this study applies the technique developed by Dinardo, Fortin and Lemieux (1996, hereafter denoted as DFL), which is widely applied in the study of wage distributions.

Second, the choice of bandwidth is a general issue in kernel density estimation (Pagan and Ullah, 1999), and there is a specific consideration for our purpose: Kernel density estimation can mask any discontinuity in underlying data by oversmoothing, resulting in underidentification of threshold effects. This is because in evaluating a density $f(y)$ at point y, the estimation process uses information at and around y with progressively less weight being placed on distant observations. For example, the estimate of a density at a point immediately below the threshold sales incorporates information from points above the threshold. Since the rule of thumb used in the literature, such as selecting a bandwidth to minimize Mean Integrated Squared Error, does not suit our purpose, we instead present the results for a range of bandwidths.

3.1 Data

The data used in this study is from *Affiliated Company Data* (*ACD*), which contains information on publicly-traded parents and their child corporations. The sample of corporations in this data is not representative of the whole population of Japanese corporations in two respects. First, the sample consists of relatively large corporations, since *ACD* is based on a survey of publicly-traded parents. Table 2 presents the distribution of corporate size in terms of paid-in capital. The distribution is heavily skewed to the left for the population: In 1988, nearly 80 percent of corporations were in the smallest size category, but the sample is relatively dense on the right and contains fewer than 10 percent in the same category. Second, the corporations in the sample are members of corporate groups, but most corporations in the population are independent. According to the 2001 *Establishment and Enterprise Census* (*EEC*) conducted by the Statistics Bureau, Japan, just 4.8 percent of all corporations are affiliated with another company.[34]

These two types of discrepancies complicate the extrapolation of this study to the population. Since the tax threshold affects small to medium size corporations directly, stronger responses are expected from those groups. Thus, in this respect, the results based on this sample, which contains a small fraction of small companies, may understate the true impact on the population. However,

[34] The summary of the *EEC* is published at the website of the Statistics Bureau, Government of Japan (http://www.stat.go.jp/data/jigyou/2001/index2.htm).

affiliates may respond more flexibly to the law than independent corporations do; the transaction costs of sales shifting among sibling corporations would be low, but it may be prohibitively high for an independent corporation. Therefore, it is possible for the result based on this sample to overstate any impact on the population. The net effects of these types of bias are not clear, but the behavior of corporate groups is of interest in itself: The affiliates of corporate groups account for a significant portion of the national economy. According to the 2001 *EEC*, corporate groups accounted for 43.9 percent of private-sector employment.

This study uses samples of corporations from before and after the VAT introduction in 1989. The sample before the tax change is the 1990 *ACD*, which contains information from FY1988. Likewise, the post-introduction sample is the 1992 *ACD*, which contains FY1990 data. The tax change was expected during FY1988,[35] therefore corporations would have had time to respond to the expected change in tax law. The FY1988 sample may capture pre-introduction responses, but the earlier sample is not available. The sample is restricted to observations that contain required variables and existed for at least one year prior to the beginning of the fiscal year. There are overlapping observations in the raw data set due to the survey process. Those overlapped observations are removed from the sample, unless they are the head of another group, or a

[35] The reform law was first passed by the Lower House in November 1988, but the reform proposal, which eventually passed with minor amendments, became known to the public on June 15, 1988 (Ishi, 2002, p276).

subsidiary of a head reported as a subsidiary in another group. The summary statistics are presented in Table 3.[36]

3.2 Method

3.2.1 Notations and Assumptions

This section describes the application of the DFL decomposition technique in our study, following Chiquiar and Hanson (2002). y is a natural logarithm of sales (in million yen), $\mathbf{x} = \{x_1, x_2, ..., x_n\}$ is a vector of n company attributes and t is a time period. Each observation is thought of as a vector $(y, \mathbf{x})$ that belongs to a joint distribution $F(y, \mathbf{x}|t)$ at a given point in time. The probability density function for this joint distribution is denoted as $f(y, \mathbf{x}|t)$. Note that the shape of a joint density at time t can depend on institutional factors, including a tax threshold. The conditional density function of y on $\mathbf{x}$ can be written as,

$$g(y|\mathbf{x}, t) = f\left(y, \mathbf{x}|\mathbf{t}\right) / l(\mathbf{x}|t) \tag{2}$$

where $l(\mathbf{x}|\mathbf{t})$ is the marginal density of $\mathbf{x}$ at time t. By rearranging the expression and taking the integral over the domain of $\mathbf{x}$, which is denoted as $\Omega_{\mathbf{x}}$, we obtain

$$f(y|t) = \int\limits_{\mathbf{x}\in\mathbf{\Omega_x}} f\left(y, \mathbf{x}|\mathbf{t}\right) d\mathbf{x} = \int\limits_{\mathbf{x}\in\mathbf{\Omega_x}} g(y|\mathbf{x}, t) l(\mathbf{x}|t) d\mathbf{x} \tag{3}$$

[36] Further details of the data is explained in Onji (2005).

The middle expression of (3) is the marginal density of y at time t since the marginal density of y can be obtained by integrating over $\mathbf{x}$, given that y and $\mathbf{x}$ have a joint density (Golberg, 1984).

Equation (3) shows that changes in the density of y can occur through changes in the shape of the conditional density $g(.)$ and through the distribution of $\mathbf{x}$. If the threshold causes clustering of corporations at $y = \ln(500)$, then

$$g(y = \ln 500|\mathbf{x},t = 1990) > g(y = \ln 500|\mathbf{x},t = 1988) \tag{4}$$

for some representative level of $\mathbf{x}$. In addition, if the threshold affects density around $y = \ln(500)$, the effects are captured by the difference between $g(\widehat{y}|\mathbf{x},t = 1990)$ and $g(\widehat{y}|\mathbf{x},t = 1988)$, where $\widehat{y}$ represents a value of y in the neighborhood of 500 million. On the other hand, if the density of y changes due to changes in sectoral composition, for example, such an effect causes the distribution of $\mathbf{x}$ to change. This effect is represented by the difference between $l(\mathbf{x}|t = 1990)$ and $l(\mathbf{x}|t = 1988)$.

The following expression is the counterfactual density that would have prevailed in 1990, had the distribution of company characteristics remained as it was in 1988.

$$\int_{\mathbf{x}\in\mathbf{\Omega_x}} g(y|\mathbf{x}, t = 1990)l(\mathbf{x}|t = 1988)d\mathbf{x} \tag{5}$$

To make the substitution for the density of $\mathbf{x}$ in this expression, it is assumed that the distribution of attributes and the conditional distribution are "in-

dependent" of one another. Specifically, it is presumed that the tax change, which is thought to affect the conditional distribution, does not affect the distribution of attributes. In addition, the assumption means that the distribution of attributes will not affect sales conditional on $\mathbf{x}$.[37] If there was an increase in the number of companies in a particular industry, for example, this assumption requires that the goods demanded in the industry increase accordingly, so that companies are not constrained to sell less.

The economy grew robustly by 10.7 percent over 1988 to 1990 and the price level, in terms of the GDP deflator, increased by 4.8 percent. These changes are likely to affect the overall shape of the distribution, including the mean and the spread, but since the analysis on threshold effects is unlikely to be affected, the macroeconomic changes are ignored in this section.

3.2.2 Hypothetical density

To make the counterfactual density estimable, it is re-expressed as follows.

[37] In the study by DFL on wage distributions, it is assumed that wage structures do not depend on the underlying distribution of attributes, such as education levels. For instance, this assumption rules out the possibility that an increase in the supply of educated labor force reducing the return to education.

$$\int_{\mathbf{x}\in\mathbf{\Omega_x}} g(y|\mathbf{x}, t=1990)l(\mathbf{x}|t=1988)d\mathbf{x}$$
$$= \int_{\mathbf{x}\in\mathbf{\Omega_x}} \frac{l(\mathbf{x}|t=1988)}{l(\mathbf{x}|t=1990)} g(y|\mathbf{x}, t=1990)l(\mathbf{x}|t=1990)d\mathbf{x}$$
$$= \int_{\mathbf{x}\in\mathbf{\Omega_x}} \theta g(y|\mathbf{x}, t=1990)l(\mathbf{x}|t=1990)d\mathbf{x}, \tag{6}$$

where $\theta \equiv \frac{l(\mathbf{x}|t=1988)}{l(\mathbf{x}|t=1990)}$. Note that the counterfactual density is equivalent to the 1990 density, except for the weighting function θ. As shown in previous studies, this weight can be simplified by using Bayes' rule: $l(\mathbf{x}) = \frac{l(\mathbf{x}|t)P(t)}{P(t|\mathbf{x})}$.

$$\theta = \frac{P(t=1988|x)}{P(t=1990|x)} \frac{P(t=1990)}{P(t=1988)} \tag{7}$$

Using the combined sample of FY1988 and FY1990 data, $P(t=1988|x)$ is estimated parametrically by running a probit on the observation belonging to the 1988 sample. Independent variables in the regression are age, age squared, the natural logarithm of paid-in capital (in million yen), the natural logarithm of number of workers, an indicator for public companies, 2-digit industry dummies and region dummies. It is necessary for the distribution of these independent variables to be unaffected by the VAT threshold; otherwise, the threshold effects would be biased down as changes in these variables capture the impact of the VAT threshold. As a robustness check, paid-in capital and workers were removed from the regression, but results were not sensitive. In addition, the company age variable may be a concern since the number of young companies would increase due to tax-motivated splitting, but since newly created compa-

nies are but a small fraction of the overall sample, they are generally unlikely to affect the age distribution.

The rest of the terms in the weighting function (7) are computed as follows: $P(t = 1990|x) = 1 - P(t = 1988|x)$, $P(t = 1990)$ and $P(t = 1988)$ are the proportions of the 1990 and 1988 observations, respectively.

3.2.3 Kernel density estimation

The counterfactual density is estimated by the Rosenblatt-Pazen kernel density estimator,

$$\int_{\mathbf{x}\in\mathbf{\Omega_x}} \widehat{\theta} g(y|\mathbf{x}, t = 1990) l(\mathbf{x}|t = 1990) d\mathbf{x} = \sum_{i=1}^{n} \frac{\widehat{\theta}_i}{h} K(\frac{y - Y_i}{h}) \tag{8}$$

where $i = 1...n$ are observations from the FY1990 sample. $\widehat{\theta}$ is the estimated weight based on (7), $K(.)$ is the Epanechnikov kernel density function and h is the bandwidth. The Epanechnikov kernel function has the convenient property of being truncated at points, providing us with information on the range of support involved in estimating a density at each point. As discussed, the choice of bandwidth is an issue. Here, the results are presented for different levels of bandwidth (0.3, 0.2, 0.1, 0.08, 0.06, 0.04, 0.02). The bandwidth based on the rule-of-the-thumb formula ($1.06\sigma n^{-\frac{1}{5}}$) is 0.33 and 0.35 for the 1988 and 1990 sample respectively. Note that the optimal bandwidth differs by samples, as it depends on the sample size (n) and standard deviation (σ). Thus, for a

valid comparison, it may be preferable to vary the bandwidth by varying the percent reduction from the optimal bandwidth rather than using different levels of common bandwidth. This alternative method was implemented but the results were generally not sensitive to the change. The benchmark result to be discussed below uses the common bandwidth of 0.08. With the Epanechnikov function, this bandwidth implies that the information on companies from 418 to 598 million yen is used to estimate the density at $\ln 500$.

3.3 Results

3.3.1 Benchmark Result

Figure 3 presents the results for the medium bandwidth of 0.08. It shows the kernel density estimates of the natural log of sales for the samples in FY1988 and FY1990 along with the counterfactual. The vertical line indicates the threshold level of sales, which is the natural log of 500. A visual inspection of the actual densities suggests that around the threshold level of sales, the density is thicker for the post-change density, whereas for greater amount of sales, the pattern reverses. Figure 4 presents, in a solid line, the differences in the actual densities by sales level. At the threshold point, there is a 12.4 percent increase in the actual density, and the greatest change near the threshold occurs at the sales level of 475 million yen, where the density increases by 15.5 percent. In contrast, the density declines over the range [570, 990],

which peaks at 845. Taken at face value, this shows that there was a movement of mass from sizes above the threshold to below the threshold. Further, Figure 4 shows that the 1990 density is generally increasing over the range, but there is a slight decrease beyond the threshold point, revealing a clustering of companies just below the threshold. These patterns are consistent with the hypothesis of the institutional effects on the size distribution.

The broad pattern is robust to controlling for the changes in company attributes. The line corresponding to "△Attributes" is the actual FY1990 minus the counterfactual; the line corresponding to "△Institution" is the counterfactual minus the actual FY1988. In the neighborhood of the threshold, the estimated changes due to the institution are very close to the actual changes, showing that the change in the attributes did not cause the shift. For example, 95 percent of the change at the threshold point is attributable to institutional effects.

One notable difference is that the reduction in the mass beyond the threshold point becomes pronounced. The decline occurs in the range [560, 1,080], which is wider than in the finding without the control. This suggests that the effects of the threshold in this range were stronger than the comparison of actual densities would suggest. It makes economic sense to find strong effects in this range. If a corporation with 1 billion yen in sales is divided into two, the entire amount of sales can be shifted into the preferred status. In contrast, if the tax status of divesting corporations does not change, the maximum amount of

sales that can be shifted is at most 500 million yen per splitting. Since tax benefits per splitting are greater for corporations in the range (500, 1,000], the decline in the densities that cover most of this range is highly revealing of the threshold effects. Overall, the results show a pattern consistent with the influence of the tax threshold on the sales distribution around the threshold.

3.3.2 Sensitivity to bandwidth

Figure 5 presents a comparison of density decompositions by the maximum, median, and minimum bandwidth. The flattest line corresponds to the maximum bandwidth (0.3). Threshold effects are not detectable with this level of bandwidth, which is not surprising since the range of support involved in evaluating the density at 500 million yen is over 255 to 977 million yen, thereby averaging out any effects caused by the threshold. The minimum bandwidth (0.02) yields a noisy pattern, with a substantial increase in density at a point slightly below the threshold point. Since the effects of the threshold, if there are any, would become visible with narrower bandwidths, this pattern is consistent with what we would expect had there been threshold effects.

To provide a reference for statistical significance, Table 4 presents statistical tests commonly used to compare distributions (Burkhauser et al., 1999): the two-sample test of differences in proportion and the Kolmogorov-Smirnov test. Using a one-sided two-sample test, we test if the null hypothesis of no difference in the proportion over the range [400, 500] is rejected in favor of the alternative

hypothesis of the proportion being higher in the counterfactual distribution. Likewise, we test if the proportion in the range [500, 1000] declined across time. The proportion of corporations in these ranges is obtained by integrating the kernel density estimates for both the counterfactual distribution and the actual 1988 distribution. The Kolmogorov-Smirnov test is used to examine the null hypothesis that cumulative distributions, conditional on sales being in the range [400, 1000], are not different over time. The conditional distributions are derived from the cumulative distribution function estimated for the whole range of support. The Kolmogorov-Smirnov test statistics reported in the table are computed as in Stephens (1970).

The general pattern presented in Table 4 confirms the prediction that the threshold effects are identifiable for a sufficiently low degree of smoothing. For example, at the bandwidth of 0.08, the proportion in [400, 500] is higher under the counterfactual distribution by 30.4 basis points, or by 8.7 percent, and the difference is statistically significant at the 10 percent level. With narrower bandwidths, the null is rejected with a stronger confidence. Similarly, the Kolmogorov-Smirnov test indicates a significant difference in distributions once the bandwidth passes 0.04.

3.3.3 Reliability check

As a reliability check, we applied the same tests in comparing distributions over years where there is no institutional discontinuity. To the extent that the

observed differences are caused by noise rather than by the tax change, the tests should reject the null for narrow bandwidths even when there is no change in tax incentives. To ensure that there are no threshold effects, the data used is from a decade later (FY1998 and FY2000). There is neither a threshold at 500 million yen nor a change in the tax threshold in the intervening year. There still is a threshold at 200 million yen but the tests focuses on the distribution above 400 million yen. Table 5 presents the results. For any level of bandwidths, the tests do not reject the null. Thus, this renders support to our interpretation that the difference in the 1988 and 1990 distribution is caused by the tax change.

We checked whether the pattern of shift is stronger in the industries with stronger tax incentives by repeating the analysis on samples split by the level of value-added. We used an estimate by the Ministry of Finance of value-added at 1-digit SIC to split the sample into two. A visual inspection did not suggest any stronger response in high value-added industries. This is the opposite of our conjecture, but this may be reflecting higher costs of splitting businesses in high value-added industry.

Overall, we find a significant impact of threshold effects on corporate size distribution, but it is not possible to tell from this approach what types of behavior were responsible for causing the shift. The next section turns to this question and examines the hypothesis that corporations were split to gain tax advantage.

4 Parametric approach

Unlike the information on mergers between large corporations, to my knowledge, corporate splitting is not something that is well recorded in Japan or elsewhere, making it a difficult type of behavior on which to conduct a large-scale analysis. Our approach utilizes data on corporate groups to overcome this difficulty. A direct consequence of corporate splitting is an addition of a new member company to a group. In particular, if the tax law that benefits businesses with sales sizes below 500 million yen has an influence on firm decisions, the creation rate of new members with such an attribute increases.

To test this hypothesis, we examine the relative propensity of founding small corporations and large corporations from 1985 through 1998. We focus on the relative propensity, rather than the raw number of small business founding, since creations of new corporations are affected by business conditions. To the extent that there is no difference in the changes in creation rates across corporate sizes, the business cycle effects are removed by examining the difference between the founding pattern of small and large corporations. As a validity check of this assumption, we consider a difference-in-difference approach and compare subsamples based on the degree of incentives as discussed below. The choice of time period has an advantage in allowing us to study the variation in the tax system in a single regression setting, rather than multiple before-after comparisons for each policy change.

One complication arises from the fact that the variable defining the benefit eligibility is not determined concurrently with the decision to avoid tax. In implementing this approach, we use the sales data generated subsequent to corporate creations. Unlike the amount of paid-in capital over which corporate decision makers would have full control, the level of sales is influenced by the business climate after creation and the changes in corporate decision induced by revisions in tax law, in addition to the original intent of decision makers. For example, the 1989 tax change creates an incentive to re-optimize the size of subsidiaries founded before 1989 by dividing an organization further, or by shifting some operations back to the parent.[38] If such reactions were widespread, the sample from this period would resemble post-introduction observations. Thus the structure of the data would bias the estimate of the effect in the 1989 regime downward. We account for the business cycle influence by include explicit controls.

The data set consists of 7,619 subsidiaries founded by 1,842 parent companies from January 1985 through December 1998. As discussed, the level of sales is observed after the founding of a new corporation, and the data is constructed from the seven surveys of *ACD* that are available for every other year from 1989 to 2001. The information on new subsidiaries is based on *ACD* surveys conducted three to five years after the year of founding. In each

[38] In addition, the sales information from subsidiaries founded over 1989-90 samples is based on FY1992, that is to say, after the first amendment that reduced the tax incentive. Re-optimization in the form of mergers and expansion would make these samples resemble the post-amendment samples.

survey, corporations are asked to report fiscal information from the nearest-ending fiscal year, so that financial variables are from corporate fiscal year starting two to four years after the founding. For instance, to construct data on new subsidiaries founded from January 1985 through December 1986, the survey conducted in October 1989 is used, and this survey contains information mainly from FY1988. In selecting the survey to extract information from, we are constrained by data availability. In addition, observations closer to the survey date tend to contain more missing information. [39] In sum, the data has time dimensions but is essentially a cross-section data.

Table 6 presents the summary statistics by four tax regimes. Overall, 48.3 percent of subsidiaries have sales of less than 500 million after being in existence for, on average, 3.2 years, indicating new subsidiaries start off being small in general. The pattern of change in proportion is consistent with the tax avoidance hypothesis. The proportion of small businesses increases by 6.7 percentage points after the introduction of VAT, which is statistically significant. With the two amendments that reduce incentives, the proportion falls by 4.3 and 4.7 percentage points. While suggestive, this pattern may be caused by other influences in the economy. For example, the proportion of manufacturing subsidiaries, which are likely to have a larger optimal scale than those

[39] Even when the data is available, there is a concern that the level of sales is affected by a shorter financial year. For these reasons, the sample is restricted to the subsidiaries with at lease one year in operation at the beginning of the fiscal year. As a result, the youngest subsidiary in the sample is 24 months old, as of the end of the fiscal year.

in the service sector, increases first and declines subsequently. To control for the changes in observables, we fit a binary response model of the following form.

$$F(y_i \mid Z_i) = \Phi(\alpha_0 + \sum_{t=1}^{T} \alpha_t Rt_i + X_i'\beta) \tag{9}$$

The dependent variable y_i indicates whether subsidiary i is a small company with sales less than 500 million yen. $\Phi(\bullet)$ is a normal cumulative density function so we will be estimating the probit model. [40]

Rt_i is an indicator for subsidiary i being founded during t^{th} tax regime. Its coefficient indicates whether the propensity to found small corporations is different from the base period. The sample period is divided into seven tax regimes on the basis of the implementations of the changes (April 1989, October 1991, April 1997) and the expectations of the changes (July 1988, April 1991, April 1994). The base period is the time before July 1988. The timing for the expectation is chosen to satisfy two criteria; details of the relevant amendments had become public knowledge, and the timing of changes had been anticipated. We used newspaper articles in the major financial newspaper, *Nihon Keizai Shinbun*, to identify these dates. [41]

[40] The logit model yields a similar prediction and the results are not reported here.
[41] *Nihon Keizai Shinbun*, June 3 (evening edition), 1988; April 13, 1991; March 15, 1994. As discussed in the earlier footnote, the leading opposition group expressed support for the proposed plan in June 1988. In March-April 1991, as a result of the Socialist Party's compromise in agreeing to amend the tax, the prospect of a change in October 1991 became imminent. The proposal for the amendment had been publicized in August 1990. In April 1994, the government announced a planned

X_i is a vector of individual subsidiary characteristics. AGE is the number of months from the founding until the end of the fiscal year in which financial variables are generated. Two-digit industry dummies and region dummies, which indicate the location of the head office, are included to control for compositional changes. A measure of parent size ($PSIZE$) is the inverse of the natural logarithm of paid-in capital of the parent company. Dummies for parent industries are also included. Seasonality was observed in the overall pattern of founding, so dummies variables for the founding month ($INCMO$) are included. Sales size of companies would be affected by the economic climate in which they operated, thus an industry-specific growth rate of value-added from the time of founding until the end of the fiscal year ($GROWTH$) is included. Price levels at the time of observation affect sales in nominal terms, and the statutory threshold does not adjust for nominal changes.[42] GDP deflators by industry ($PRICE$) are included to control for this influence.

4.1 Results

The first two columns in Table 7 present the estimated model with and without the regime dummies. The standard error is corrected for heteroskedasticity and for clustering at the group level. The regime dummies are jointly significant

amendment to the preferential treatment.

[42] In addition, a quadratic term for AGE is included to control for possible nonlinearity in age. Quadratic controls for $GROWTH$ and $PRICE$ were included to check robustness, but they did not make a significant change.

at 1 percent, indicating that there is a substantial variation in the propensity to found small corporations that is not explained by the changes in control variables. In addition, a test indicates that the regime dummies do not impose a superficial structure to the data.[43] The coefficients of control variables have the expected signs except for the price level but its coefficient is insignificant. The model fit seems sensible; the model predicts correctly 73 percent of the time and MacFadden's likelihood ratio index is 0.018.

Panel A of Figure 6 presents the marginal effects of regime dummies and their confidence intervals.[44] The propensity to found a small company increases after the announcement of the tax change in June 1988, reaches a peak during the second regime when the VAT was introduced, and declines subsequently. The coefficient of the second regime, which is just after the tax reform, is positive and significant. A new company founded in this period is 7.3 percent more likely to be a small company than those in the base period. The estimates imply that 10.7 percent of new corporations founded over July 1988 through

[43] The model restricts the effects within a regime to be constant while allowing for cross-regime differences. An alternative is a flexible model that allows for within-regime differences. e.g. a model with an indicator for each founding month. We present the results from the parsimonious model since the latter model is informative about within regime variation but estimates are much volatile. We conducted a test of restriction by comparing the base model with the one with 167 dummy variables for each founding month. Other than the regime dummies, both models have the same specification and do not include the control for founding month to avoid collinearity. A likelihood ratio test did not reject the hypothesis that two models are the same at 10 percent level of significance.

[44] It is conventional to evaluate the marginal effects at the means of regressors, and we followed the convention to compute the values presented in the figure. An alternative way is to take an average of marginal effects evaluated at each data point. This alternative method produces conservative estimates; the absolute value of each estimate is 14 percent lower than that estimated from the conventional method.

March 1991 were due to tax avoidance.[45] While the rest of regime dummies are not significantly different from zero, the decrease from the second regime to the last regime is significant, suggesting that the amendments to the simplified scheme successfully reduced tax incentives. Thus coefficients of the regime dummies show a pattern consistent with that implied by tax incentives.

4.2 Transition process

One explanation for the decline that occurs after the second regime is that corporations conducted less corporate splitting in response to the announcement of the VAT amendment of 1991, but there is an alternative explanation. Suppose a corporation consists of n divisions that differ in terms of costs of separate incorporation. Given tax incentives, business segments that are least costly to be divided will be the first to be separated. After an initial surge of corporate splitting, we would expect a natural subsiding in corporate splitting activity as it is costly to separate remaining segments. To distinguish between these explanations, the transition process is examined by dividing the first and second regimes into eight sub-regimes. If the announcement effect caused the decline, we do not expect to observe a decline during the second regime.

Panel B of Figure 6 shows that the decline had already started during August-

[45] The computation is based on the assumption that the ratio of the number of small to large new corporations remains at pre-expectation level.

November 1990, favoring the explanation based on a natural reduction. [46] One may point out that the preliminary idea about the amendment was publicized on August 8, 1990 and argue that an expectation of the imminent policy change caused the decline. However, it does not seem plausible to think that the effect of the tax, which reached 11.6 percent at its peak, would have continued without the policy change. Another possible explanation for the decline is a new regulation on the capital requirement for new corporations. Under the minimum capital requirement, which was enacted in April 1990, newly founded joint-stock corporations had to have paid-in capital of at least 10 million yen. Such a change would raise a hurdle in founding a new corporation. [47] This explanation, however, seems unconvincing since there was a grace period for existing companies, which were not required to increase capital until the end of March 1996. As the requirement was not immediately applicable to companies founded before April 1991, when the law went into effect, the cost of founding a company would have been unaffected until then. Therefore, the change in the commercial law does not explain the decline that occurs during 1990, and it is the natural decline that best explains this pattern. In conjunc-

[46] One interesting pattern in the figure is the dip just before the implementation. The level is not significantly different from zero, but it may be reflecting the incentive to delay the founding of a subsidiary. Newly founded entities are exempted from the VAT for their first two years of operation. So an entity, which was initially scheduled to open in March, could extend the exempted period by a month, by delaying registration to April. The pattern is consistent with an explanation that there were birthday shiftings of smaller companies.

[47] This commercial law reform was in part a policy response to sole proprietors incorporating their business for tax purposes, according to the Justice Department (*Nihon Keizai Shinbun*, March 3, 1990, p7).

tion with the study by Scholes and Wolfson (1990) that find firms respond quickly to tax incentives, our examination suggests tax-motivated structural change occurs within one to two years after the creation of tax incentives.

4.3 Examination of subsamples

Thus far, the identification strategy relied on the variation in incentives across tax regimes. The key assumption being that in the absence of tax changes, the relative propensity to found small corporations remains constant after controlling for subsidiary characteristics and for business climates. To provide a validity check for our approach, we tried incorporating cross-section variation in the analysis by considering two observable characteristics that are likely to influence the decision to avoid tax, parent size and the level of value-added, for the following reasons. First, for a given corporate splitting, the relative size of tax benefits to group profit is greater when a parent company is small. [48] Second, tax benefit (1) is a weakly increasing function of the level of value-added ratio (v). If tax affected firm behavior, then, we would expect an increase in the likelihood of small parents to establish a small corporation conducting high value-added businesses.

In testing these conjectures, the main difficulty was the lack of appropriate

[48] One might be concerned that the paid-in capital of the parent will fall due to spin-offs. I tried replacing $PSIZE$ with an alternative control for a group size, which is defined to be the sum of paid-in capital from group companies, but the results were not affected.

information on value added at individual entity level. The main data does not contain any information on value added so we instead used matching information from the annual estimates of the value-added ratio by 2-digit SIC industry and by paid-in capital in the *Financial Statement Statistics of Corporations*. This data source allows us to incorporate industry-size variations in the analysis but measurement errors are expected to arise if a sample corporation is not representative of its respective industry-size cell and because of a definitional issue.[49] Nevertheless, since on average the standard value-added ratio should be correlated with the level of incentives, we use this data to operationalize the further examination.

First, the sample is divided by median parent size and by median incentive measure and the base model is fit to them. Table 8 shows the coefficient estimates. Comparing the subsamples by parent size, none of the coefficients of tax regime dummies are significantly different from zero in the subsample with large parents but some are significant in the small parent subsample, strongly suggesting small groups responded actively to the tax incentives as conjectured. Turning to the subsamples classified by tax incentives, we find somewhat mixed results. While the coefficient of the tax regime after the VAT

[49] Given the consumption-type VAT in Japan, buyers receive full credit for tax paid on capital equipment provided that they are filing an ordinary return. Filers of the simplified return forgo this benefit, resulting in a higher effective tax payment in a year where large investments are made. Thus for v to measure the level of incentives accurately, the value of inputs should include the total amount of investment outlay in a given year, rather than the amount of capital depreciation, unlike in the standard computation of value added.

introduction is not significant for the low incentive subsample but significant for high incentive subsample, the point estimate on the former is positive and is of a moderate size. Moreover, there are significant reductions after the announcement of the second amendment, indicating some non-tax factor might be at work due to the difficulty in measuring the level of incentives.

Second, we conducted interaction analysis to see if the differences in coefficients across subsamples are statistically significant. We focused on the tax regime after the VAT introduction since the analysis so far suggests that much of the response occurred then. To implement, the second regime dummy is interacted with the parent size, the incentive measure, and then with both variables. Since the parent size is defined as the inverse of the log of parent paid-in capital, smaller parents are associated with higher values of this variable. This means if the response of small parents is significant, the interaction term with the regime dummy will be positive and significant. The incentive measure is defined as $(v_i - \widehat{v}_{i,1989})$ where $\widehat{v}_{i,1989}$ is the presumed rate of the value-added ratio for i's industry as defined in the 1989 tax law.[50] The 1989 law is used to control for any systematic relationship between the incentive measure and the size to isolate the effect of the 1989 institution. If the response is greater in the high incentive industry, the coefficient of the interaction term will be positive and significant. Finally, if there is a high response among small parents to

[50] Strictly speaking the incentive measure should be truncated below zero if $v < \widehat{v}$ to account for the tax provision that allows companies to renounce the simplified scheme. The results are not sensitive to this consideration.

set up high value-added subsidiaries, the triple interaction term of the second regime, parent size and incentive measure will be positive and significant. The results from each examination are shown in Column 3-5 in Table 7. They indicate a significant influence for small parents but not for incentive measure on average. The result does indicate a significant increase in the propensity for small parents to found high-value added subsidiaries as shown by the coefficient of the triple interaction term. Thus further examinations lend support to the interpretation that the results we find are caused by the tax incentives.

5 Estimation of Tax Benefits

In understanding the consequence of tax-motivated reorganizations, it is of interest to know the scale of benefits that arises from corporate splitting, not only because the tax benefit is a loss of revenue to government, but because it provides an upper bound for the efficiency loss to firms. A rational firm would not maintain a separate legal entity if costs, which may include the exacerbation of the principal-agent problem, exceed monetary gains. Previous studies have estimated the total amount of tax benefit in the economy, without making any distinction between the windfall gains to qualifying corporations (those that are already in existence or are founded for non-tax reasons) and the tax-avoidance gains. This section estimates tax benefits in the sample, distinguishing between windfall gains and tax-avoidance gains, and extrapolates

to the population.

5.1 Method

The sample is based on the *ACD* survey conducted during the fall of 1991 asking FY1990 information. The year is chosen to assess the revenue drain prior to the amendment of October 1991. The sample consists of 15,230 observations with valid information on current sales and past sales matched from the 1989 survey. Past sales are necessary in classifying whether a corporation qualifies for preferential treatment, since the tax status is determined on the basis of the amount of sales two years prior to the current year.[51] The total amount of tax benefit is computed as the sum of tax benefits accruing to sample corporations deemed to qualify on the basis of past sales, taking into account three types of special treatment; the simplified scheme, exemption and the phasing out of exemption.

Since tax avoidance is not observable, the parametric model is necessary to assess its revenue consequence. A simple approach is to apportion the total tax benefits on the basis of the finding that attributes 10.7 percent of corporate founding over July 1988 through March 1991 to tax avoidance. Since

[51] Doi (1990) bases his classification on current sales but this results in an underestimation of tax benefits due to company growth: Companies selling in excess of 500 million yen are eligible to file a simplified return if their sales were below the threshold in the base year. My comparison of these different classification methods indicates that the total benefit is 34 percent lower when current sales is used.

the result from this approach is aggregated over all industries and sizes, in an alternative approach, we utilize the entity-level information to obtain finer estimates. Using the coefficients of the interaction model (Column 5, Table 7), we predicted the size of corporation (i.e. greater than 500 million yen or not) on the basis of observables excluding the regime coefficients and the interaction terms. We classified as "tax motivated" newly founded corporations that are predicted to be large but are in fact small. 12.7 percent of founding are tax-motivated under this approach, so the two approaches are largely comparable. This approach further allows us to account for the effect of splitting on divesting corporations. As the anecdotal example shows, the tax benefits accrue to a divesting corporation if it remains small as a result of splitting. The divesting corporations are identified through matching address with tax-motivated corporations.

Three considerations are important in interpreting this exercise. First, the sample is based on groups headed by large corporations. Our analysis showed that there is active tax avoidance among smaller groups, but the vast majority of corporations in the population is unaffiliated with other companies. Thus the direction of bias is ambiguous in this respect. Second, it is difficult to account for the amount of tax benefits recaptured by the authority through the corporate income tax as discussed above, and here, we report the tax benefit figure without making an adjustment for the income tax. Third, as already discussed, the information on value-added is based on the population

average that does not incorporate investment expense, and this is likely to result in overestimation. Overall, the results from these exercises should be viewed as an upper bound for the tax revenue loss.[52]

5.2 Results and Interpretation

Table 9 summarizes the tax benefits to the population of corporations in Japan, excluding the financial sector, extrapolated from the sample estimate using weights based on the number of corporations at each industry-size cell. The total tax benefit in the economy is 669 billion yen ($4.5 billion) in 1990. This constitutes 14.5 percent of the total VAT receipt, meaning 14.5 yen in 100 yen of tax receipts was channeled from consumers to producers. The amount is more than three times the government expenditure on small and medium sized enterprise in the general account of 1990 (194 billion yen). As 87 percent of the total benefits accrued to corporations in the smallest size category, the tax benefits were a substantial subsidy in disguise to small and medium sized enterprises, including subsidiaries of large parents. The benefits accrued mostly to the small manufacturing corporations as a group, in part due to the prominence of the sector in the economy, but it is the transportation industry that benefited the most in terms of per company benefits. The estimate is higher than those from the previous study by the Ministry of Finance (¥480 billion) and by Doi (¥560 billion), reflecting the relatively accurate classifica-

[52] Further details on the estimation method are outlined in Onji (2005).

tion method but also due to the fact that it does not account for investment expenditure. [53]

Under the simple approach, 2.7 percent of the total tax benefit arise from the tax motive, having a 95 percent confidence interval of 0.3 to 5.9 percent. The alternative approach similarly attributes 3.4 percent to the tax motive, 13.3 percent of which is due to having a divesting body qualify for special treatment. In terms of absolute value, tax avoidance caused a revenue drain of 22 billion yen ($146 million). Thus, the tax motivated gains are small relative to the windfall gains, making up about 0.5 percent of the total tax receipt. Most interestingly, a comparison by industry reveals that 23 percent of tax benefits to transportation subsidiaries was attributable to tax motives. It appears that tax avoidance was widespread amongst trucking companies, but a comparison by parent industry shows that it is not necessarily the case. It is the manufacturing parents which have the highest fraction of tax benefits attributable to tax motives (5.8 percent), followed by transportation, retail, and construction. This indicates that a rather broad range of parent companies split business segments undertaking transportation-related activities and that there are relatively low costs of splitting transportation segments.

[53] The estimate by Ministry of Finance is as reproduced in Homma and Atoda (1989). Doi (1990) does not report the total tax benefits and the figure here is based on the average tax benefits and the approximate sample size in his paper.

6 Conclusion

In summary, this paper documented the effects of a tax threshold on firm behavior in the context of the Japanese VAT. A semiparametric comparison of size distributions revealed a visible impact of the threshold following the tax reform of 1989, indicating a prevalence of tax avoidance of unspecified form. Further examination narrowed down the avoidance strategy as follows. First, corporate splitting was a relevant and widespread method. In our sample of group corporations, the threshold induced the founding of 10.7 to 12.7 percent of new corporations over July 1988 to March 1991. Second, firms responded quickly and the response peaked in 8 to 16 months after the implementation of the law. Third, a common method seems to have involved separately incorporating a transportation segment, suggesting little organizational disadvantages to such a transaction. The overall impact of tax-motivated splitting on the revenue performance of VAT was, however, rather modest, causing a drain of 0.5 percent of total VAT receipt in 1990, due to the fact that gains to each firm were small. The first approximation of the efficiency loss, which is half the revenue loss, implied by this study is 11 billion yen ($73 million).

Overall, to the extent that the profit motive dominates decisions of firms operating in different countries, this study suggests masquerading behavior may be commonplace in tax as well as regulatory systems in various countries around the world, especially since the results indicate that a modest benefit

induces behavioral changes at a large scale. Nonetheless, this study focused on an environment where anti-avoidance clauses are sufficiently loose due to the political reason. It would be interesting to explore the role of anti-avoidance provisions and their enforcement in further studies. Lastly, a threshold is a common component in a host of public policies that favor small over large firms. In this author's opinion, the masquerading by firms is likely to be left undocumented in variety of other settings.

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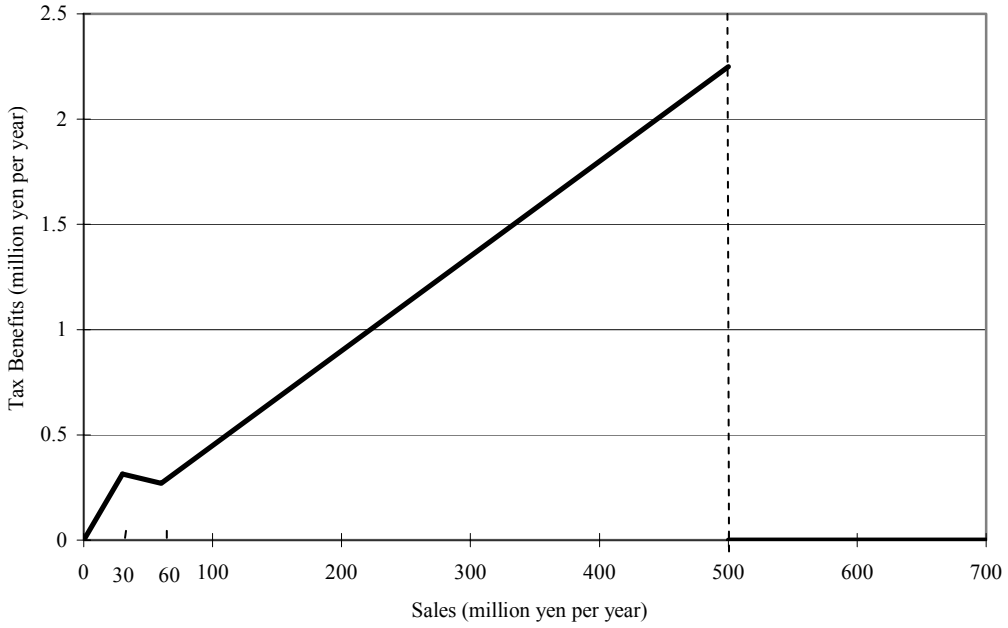
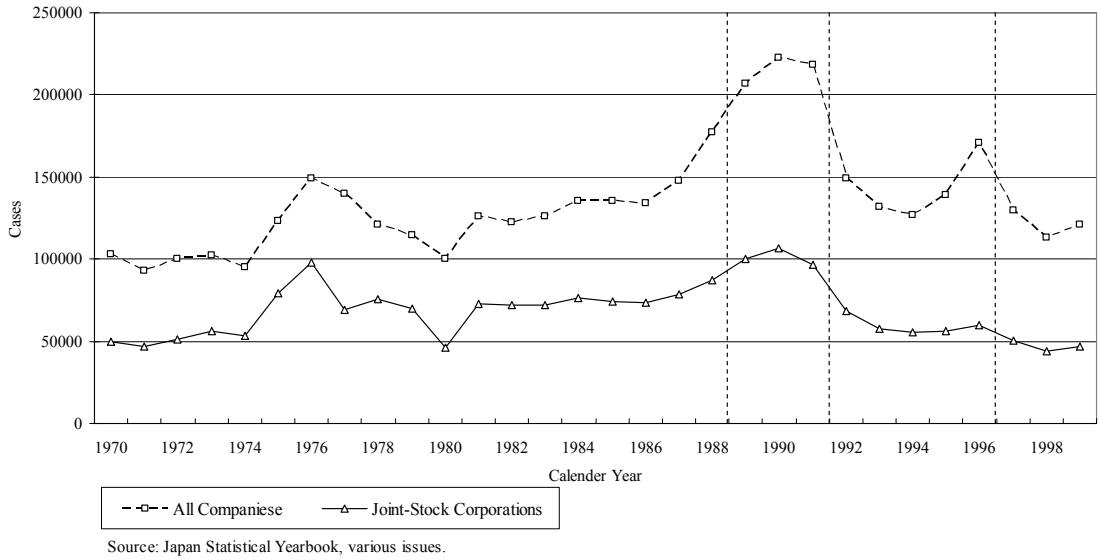
Figure 1: The illustration of tax incentives under the 1989 VAT



Notes: 'Sales' refers to an amount of annual taxable turnover from one entity. The computation of tax benefits assumes that the actual value-added ratio is 35 percent, the presumed ratio is 20 percent, the 3 percent VAT is fully passed onto the buyer, the tax status of the company is determined by the current sales and no capital investments. The tax status includes the ordinary filing (500,], the simplified filing (60, 500], the exemption [0, 30], and the phase-out of the exemption (30, 60].

Figure 2: Commercial registrations (founding) by type of organization



Source: Japan Statistical Yearbook, various issues.

Figure 3: The plots of kernel density estimates in the range near the threshold

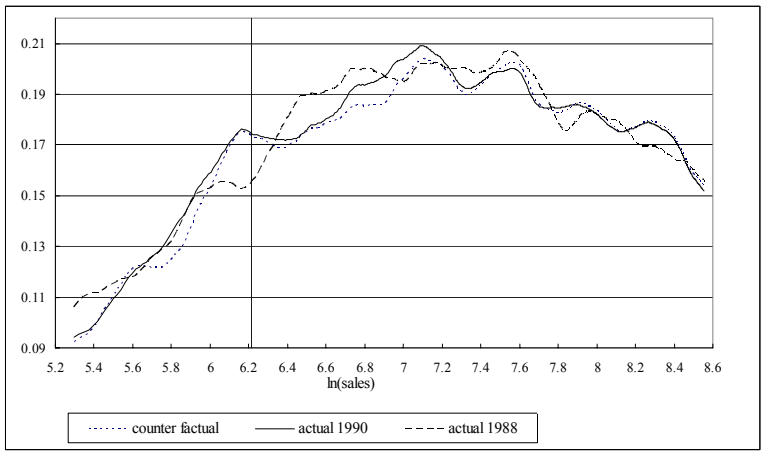


Figure 4: The decomposition of density changes: 1988-1990

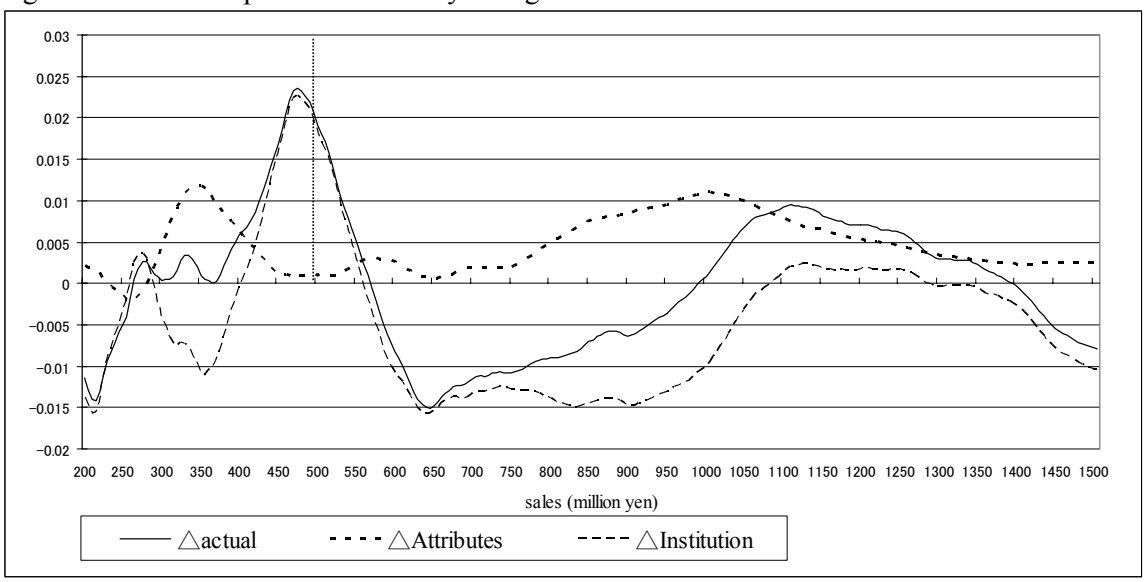


Figure 5: The estimates of institutional effects by selected bandwidth

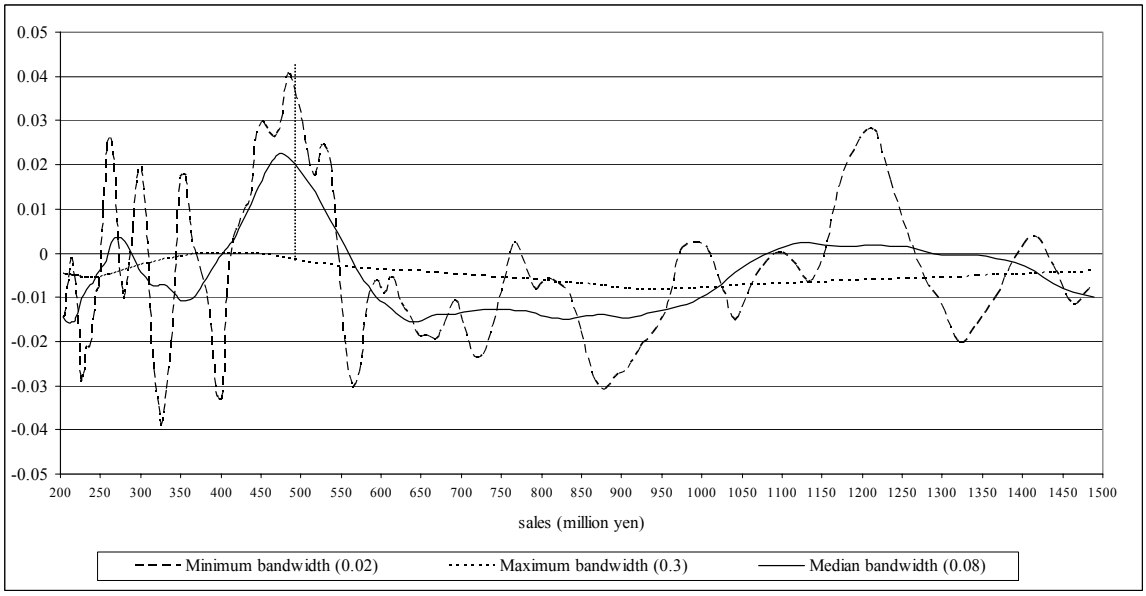


Figure 5: Marginal effects of tax regimes

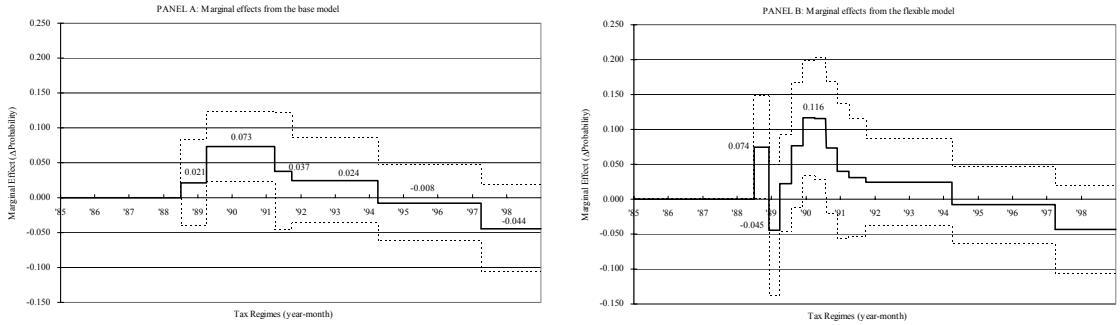


Table 1: Industry variation in tax incentives

Industry	Value-added ratio (%)			Tax benefits[b] (mil. Yen)	
	Estimate[a]	Presumed rate		B_{1989}	B_{1990}
	v	1989	1991		
Wholesale	14.8	10	10	0.72	0.72
Retail	21.4	20	20	0.21	0.21
Construction	23.1	20	30	0.465	0
Mining	29	20	30	1.35	0
Agricultural, Forestry, and Fisheries	31	20	30	1.65	0.15
Manufacturing	33.4	20	30	2.01	0.51
Services	39.3	20	40	2.895	0
Transportation and Telecommunications	45.2	20	40	3.78	0.78
Real Estate	45.6	20	40	3.84	0.84

Notes: a. Industry average reported in the Ministry of Finance (1990) as reproduced in Ishi (2001, p293). b. Tax benefits (B) is computed as in the text, assuming s=500 million yen, τ=0.03.

Table 2: The number of corporations by the size of paid-in capital

Year	Data	Size Categories (paid-in capital, yen)				
		All sizes	(0, 10m]	[10m, 100m)	[100mil., 1 bil.)	[1 bil.,)
1988	Population	1,980,540	1,583,805	376,205	17,442	3,088
			(79.97)	(19.00)	(0.88)	(0.16)
1988	Sample	13,760	1,316	6,833	3,439	2,172
			(9.56)	(49.66)	(24.99)	(15.78)
1990	Population	2,020,455	1,590,035	406,618	19,997	3,805
			(78.70)	(20.13)	(0.99)	(0.19)
1990	Sample	15,901	1,420	8,081	3,863	2,537
			(8.93)	(50.82)	(24.29)	(15.95)

Notes: Number of corporations. Percentage of all sizes are in parentheses. The population figures are based on the estimates by the Ministry of Finance, *Financial Statement Data.* The sample figures are based on this author's calculation using the samples

Table 3: Summary statistics of the 1988 and 1990 sample

Variable	**1988**	**1990**	**all**
ln (amount of sales)	7.835	7.844	7.840
	(7.636)	(7.665)	(7.650)
Age [months]	280.3	278.0	279.1
	(230.0)	(229.0)	(230.0)
ln (amount of paid-in capital)	4.514	4.517	4.516
	(3.912)	(3.912)	(3.912)
ln (number of workers)	4.341	4.243	4.289
	(4.263)	(4.143)	(4.190)
Number of group members	31.1	33.8	32.5
	(17.0)	(18.0)	(18.0)
Voting shares held in group [%]	62.4	63.3	62.9
	(70.0)	(71.9)	(70.0)
Indicator			
Publicly traded	0.139	0.133	0.136
Shares the same address as parent[a]	0.259	0.274	0.267
Sales at or less than 500 million	0.224	0.223	0.223
Wholesales	0.118	0.120	0.119
Retail	0.076	0.076	0.076
Construction and Mining	0.062	0.065	0.063
Agriculture, Forestry, and Fishery	0.005	0.004	0.005
Manufacturing	0.360	0.356	0.358
Service	0.116	0.166	0.143
Transportation and Communication	0.089	0.091	0.090
Financial and Real Estate	0.089	0.096	0.093
Others	0.084	0.025	0.053
Observations	13,760	15,901	29,661

Notes: The figures are sample averages for continuous variables and proportions for dummy variables. Standard deviations are in parentheses. a. Parent companies are excluded in computation.

Figure 4: Two tests on a change in distribution: 1988-1990

I. Two sample test

Bandwidth	Proportion over the relevant range		Difference (%)
	Counter factual 1990	Actual 1988	
	[1]	[2]	[1] - [2]
A. Hypothesis: The density increased over [400, 500] range			
0.3	0.0353	0.0354	-0.36
0.2	0.0360	0.0354	1.74
0.1	0.0377	0.0351	7.44
0.08	0.0380	0.0350	8.70 *
0.06	0.0384	0.0349	9.94 *
0.04	0.0387	0.0350	10.65 **
0.02	0.0392	0.0350	11.97 **
B. Hypothesis: The density fell over [500, 1,000] range			
0.3	0.1242	0.1278	-2.87
0.2	0.1248	0.1293	-3.52
0.1	0.1243	0.1304	-4.63 *
0.08	0.1241	0.1306	-4.98 **
0.06	0.1239	0.1308	-5.27 **
0.04	0.1238	0.1309	-5.42 **
0.02	0.1236	0.1307	-5.41 **

II. Kolmogorov-Smirnov test on the difference in the cumulative distributions over [400, 1,000] range

Bandwidth	Modified Kolmogorov-Smirnov Statistics
0.3	0.192
0.2	0.499
0.1	1.012
0.08	1.111
0.06	1.193
0.04	1.276 *
0.02	1.413 **

Notes: **, * denote significance at 5 and 10 percent levels respectively.

Table 5: Two tests on a change in distribution: 1998-2000

I. Two sample test

Bandwidth	Proportion over the relevant range		Difference (%)
	Counter factual 2000	Actual 1998	
	[1]	[2]	[1] - [2]
A. Hypothesis: The density increased over [400, 500] range			
0.3	0.0402	0.0413	-2.83
0.2	0.0410	0.0420	-2.57
0.1	0.0416	0.0430	-3.13
0.08	0.0418	0.0431	-2.91
0.06	0.0420	0.0431	-2.45
0.04	0.0423	0.0433	-2.50
0.02	0.0424	0.0437	-2.91
B. Hypothesis: The density fell over [500, 1,000] range			
0.3	0.1348	0.1343	0.35
0.2	0.1359	0.1355	0.30
0.1	0.1363	0.1362	0.02
0.08	0.1363	0.1364	-0.08
0.06	0.1363	0.1366	-0.21
0.04	0.1363	0.1365	-0.20
0.02	0.1365	0.1363	0.12

II. Kolmogorov-Smirnov test on the difference in the cumulative distributions over [400, 1,000] range

Bandwidth	Modified Kolmogorov-Smirnov Statistics
0.3	0.286
0.2	0.325
0.1	0.314
0.08	0.348
0.06	0.370
0.04	0.412
0.02	0.535

Notes: **, * denote significance at 5 and 10 percent levels respectively.

Table 6: Summary statistics of the sample of new group corporations

	All regimes	Sub-regimes			
		Pre. intro.	Reform	Amendment 1	Amendment 2
Variable	85.1-98.12	85.1-89.3	89.4-91.9	91.10-97.3	97.4-98.12
Y	0.483	0.463	0.531	0.488	0.441
Indicator: SALES≤500					
AGE	37.9	38.3	39.6	37	36.3
Age as at FYend [month]	(7.0)	(7.2)	(6.7)	(6.9)	(6.7)
PSIZE	0.108	0.108	0.108	0.109	0.109
$[\ln(\text{log parent's capital})]^{-1}$	(0.019)	(0.019)	(0.018)	(0.019)	(0.020)
GROWTH	0.111	0.195	0.121	0.058	0.011
△industry GDP [%]	(0.152)	(0.174)	(0.121)	(0.113)	(0.101)
PRICE	109.9	106	111	112.4	111.9
Ind.GDP deflator	(20.400)	(13.100)	(20.400)	(23.300)	(25.700)
Incentieve measure	0.068	0.073	0.066	0.067	0.06
v - vhat	(0.066)	(0.067)	(0.064)	(0.065)	(0.063)
SALES	3,085	2,682	2,383	3,426	4,476
Business turnover [¥mil.]	(25456)	(13332)	(12181)	(34101)	(36274)
HOLDING	79.9	76.1	76.7	83	87.2
Voting stock held [%]	(29.6)	(32.3)	(31.8)	(26.8)	(21.9)
Industry dummies					
Wholesales	0.114	0.099	0.115	0.122	0.131
Retail	0.088	0.084	0.082	0.085	0.117
Constr. & Mining	0.053	0.055	0.043	0.052	0.071
Agri., Forestry, Fishery	0.006	0.008	0.007	0.004	0.004
Manufacturing	0.211	0.215	0.223	0.211	0.178
Service	0.287	0.263	0.298	0.288	0.336
Transp. & Comm.	0.069	0.069	0.057	0.073	0.077
FIRE	0.115	0.115	0.129	0.122	0.062
Other Industries	0.058	0.091	0.046	0.043	0.023
N	7,619	2,512	1,557	2,696	854

Notes: The figures are sample averages for continuous variables, and proportions for dummy variables. Standard deviations are in parentheses. The statistics on PSIZE are based on 7,530 observations. Public utilities and unclassified observations are included in "Other Industries". The sample is divided into four time periods with these three milestones serving as boundaries; the VAT introduction (1989.4), the first amendment (1991.10), and the second amendment (1997.4).

Table 7: Examination of the propensity to found small corporations: Probit estimates

	[1]	[2]	[3]	[4]	[5]
Tax regimes dummies					
1. Expect the '89 reform		0.054	0.053	0.068	0.068
[1988 Jul. ~ 1989 Mar.]		(0.079)	(0.079)	(0.080)	(0.080)
2. Reform Implemented		0.183 ***	-0.614 *	0.228 ***	-0.070
[1989 Apr. ~ 1991 Mar.]		(0.065)	(0.324)	(0.074)	(0.354)
3. Expect the `91 amendment		0.094	0.093	0.151	0.150
[1991 Apr. ~ 1991 Sep.]		(0.107)	(0.107)	(0.108)	(0.108)
4. `91 amendment implemented		0.0611	0.060	0.086	0.086
[1991 Oct. ~ 1994 Mar.]		(0.079)	(0.079)	(0.078)	(0.078)
5. Expect the '97 amendment		-0.0197	-0.020	-0.011	-0.010
[1994 Apr. ~ 1997 Mar.]		(0.070)	(0.070)	(0.072)	(0.072)
6. `97 amendment implemented		-0.1106	-0.111	-0.093	-0.092
[1997 Apr. ~ 1998 Dec.]		(0.080)	(0.080)	(0.080)	(0.080)
Control variables					
Age	-0.0504 *	-0.0516 *	-0.051 *	-0.053 *	-0.053
	(0.028)	(0.029)	(0.029)	(0.029)	(0.029)
Age squared	0.0005	0.0005	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Inverse of parent size	19.0223 ***	19.103 ***	18.143 ***	18.049 ***	17.122 ***
	(1.401)	(1.389)	(1.446)	(1.381)	(1.442)
Industry growth rate	-0.1428	-0.230	-0.241	-0.116	-0.125
	(0.157)	(0.168)	(0.169)	(0.172)	(0.172)
Industry GDP deflator	0.0013	-0.0004	0.000	0.002	0.002
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Regime 2 × parent size			7.430 **		2.784
			(2.924)		(3.186)
Incentive measure				5.749 ***	5.736 ***
				(0.642)	(0.638)
Regime 2 × incentive measure				-0.149	-11.382 ***
				(0.665)	(4.280)
R.2 × incentive × p. size					107.255 ***
					(39.779)
Own Industry	YES	YES	YES	YES	YES
Parent Industry	YES	YES	YES	YES	YES
Incorporation Month	YES	YES	YES	YES	YES
Region	YES	YES	YES	YES	YES
N	7527	7527	7527	7527	7527
LL	4553.09	4539.123	4534.767	4485.649	4477.506

Notes: Standard errors are shown in parentheses, and they are heteroskedasticity consistent and are corrected for clustering at the group level. ***,**, * denotes the significance at the 1, 5, 10 percent level respectively. For presentation purposes, coefficients on dummy variables (two-digit industry, parent's industry, month of incorporation, location of the head quarters) and a constant term are not presented. 3 observations in the mining industry are not used in the analysis because the industry dummy predicts Y perfectly.

Table 8: Further examination by subsampling

	Sub-sampling by parent size		Sub-sampling by tax incentives	
	LARGE	SMALL	High Incentive	Low incentive
Tax regimes dummies				
1. Expect the '89 reform	0.013	0.104	0.166	-0.040
[1988 Jul. ~ 1989 Mar.]	(0.103)	(0.122)	(0.107)	(0.119)
2. Reform Implemented	0.043	0.305 ***	0.234 **	0.135
[1989 Apr. ~ 1991 Mar.]	(0.100)	(0.086)	(0.095)	(0.086)
3. Expect the `91 amendment	-0.136	0.284 **	0.268	0.008
[1991 Apr. ~ 1991 Sep.]	(0.179)	(0.134)	(0.193)	(0.126)
4. `91 amendment implemented	0.121	0.047	0.182	-0.109
[1991 Oct. ~ 1994 Mar.]	(0.123)	(0.102)	(0.115)	(0.108)
5. Expect the '97 amendment	-0.020	0.025	0.056	-0.180 *
[1994 Apr. ~ 1997 Mar.]	(0.109)	(0.094)	(0.102)	(0.101)
6. `97 amendment implemented	-0.031	-0.151	0.099	-0.499 ***
[1997 Apr. ~ 1998 Dec.]	(0.117)	(0.109)	(0.108)	(0.124)
Control variables				
Age	-0.067	-0.047	-0.080 *	-0.019
	(0.045)	(0.038)	(0.041)	(0.042)
Age squared	0.001	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Inverse of parent size	34.913 ***	13.909 ***	18.803 ***	18.661 ***
	(4.690)	(2.174)	(1.933)	(1.699)
Industry growth rate	-0.037	-0.373	-0.197	-0.716 ***
	(0.235)	(0.257)	(0.282)	(0.243)
Industry GDP deflator	0.000	0.000	-0.002	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)
Own Industry	YES	YES	YES	YES
Parent Industry	YES	YES	YES	YES
Incorporation Month	YES	YES	YES	YES
Region	YES	YES	YES	YES
N	3726	3772	3747	3762
LL	2153.1	2275.5	2256.9	2139.2
Mean of dependent variable	0.391	0.573	0.607	0.357

Notes: Standard errors are shown in parentheses, and they are heteroskedasticity consistent and are corrected for clustering at the group level. ***,**, * denotes the significance at the 1, 5, 10 percent level respectively.

Table 9: Tax benefits estimates extrapolated to the population (in millions of yen)

Industry	Corporate size (paid-in capital, yen) [0, 10m)	[10m, 100m)	[100m, 1b)	[1b,)	All	Parent's industry
Manufacturing	192,136 (0.002)	13,585 (0.034)	810 (0.014)	3 (0.000)	206,535 (0.004)	0.058
Agri., Forestry, Fishery	3,697 (0.000)	409 (0.029)	5 (0.000)	0 (0.000)	4,110 (0.003)	0.000
Mining	0 (0.000)	636 (0.000)	0 (0.000)	1 (0.000)	638 (0.000)	0.000
Construction	107,100 (0.015)	1,656 (0.058)	254 (0.000)	0 (0.000)	109,009 (0.016)	0.016
Electricity and Gas	8 (0.000)	8 (0.000)	56 (0.000)	2 (0.000)	74 (0.000)	0.000
Communication	82 (0.000)	50 (0.022)	76 (0.024)	0 (0.432)	209 (0.015)	0.002
Transportation	61,276 (0.284)	15,018 (0.012)	181 (0.002)	9 (0.000)	76,483 (0.230)	0.021
Wholesale	16,778 (0.037)	1,527 (0.006)	6 (0.000)	0 (0.000)	18,310 (0.035)	0.005
Retail	26,797 (0.004)	4,711 (0.004)	184 (0.001)	0 (0.000)	31,692 (0.004)	0.018
Real estate	83,579 (0.000)	23,600 (0.012)	2,799 (0.000)	21 (0.206)	109,999 (0.003)	0.001
Services	88,780 (0.006)	21,991 (0.030)	1,291 (0.011)	378 (0.001)	112,439 (0.010)	0.000
Total	580,232 (0.036)	83,190 (0.021)	5,661 (0.005)	415 (0.012)	669,499 (0.034)	0.036

Note: The amount of tax benefits in millions of yen. The fractions of tax benefits arising from tax-motivated splitting are shown in parentheses. The last column shows the fraction of tax benefits by parent's industry. The proportion for "Total" in the last two columns does not match because the subsidiaries of financial parents are omitted in computing the figures for the last column.