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Abstract

Governments in most countries regulate, tax, and subsidize firms depending on whether firm size is larger or smaller than some preset thresholds. Firms that remain below the thresholds can receive benefits from the government, but may incur costs or distortions that could arise from being below the optimal size without such policies. Such benefits and costs are likely to depend on firm and industry characteristics. Using the policy reform in Japan that raised the thresholds as a natural experiment, we examine (1) whether and to what extent the distribution of firm size is distorted due to the presence of the thresholds, (2) the characteristics of firms that grow beyond the thresholds, and (3) how firms that grow beyond the thresholds perform as compared to those that remain below the thresholds. We have obtained evidence for some, although not all, industries as follows. First, bunching and its shift can be found at the thresholds in the size distribution in terms of stated capital. Second, capital structure is distorted under the threshold of stated capital. Third, firms with lower productivity are more likely to be small and medium enterprises (SMEs) after the policy reform. Finally, while the ex-post research and development (R&D) intensity of firms that grew to large firms decreases as compared to those that remain as SMEs, the ex-post profitability and productivity of firms that grew to large firms increase. Overall, our results suggest that size-dependent policies in Japan cause distortions on firms' financial policy, R&D, and operating performance. However, the degree of such distortions greatly differs across industries.

Keywords: Size-dependent policy, Firm growth, Capital structure, Productivity
JEL classification: D22; L11; L53

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Size-dependent Policy and Firm Growth

1. Introduction

Governments in most countries regulate, tax, and subsidize firms depending on whether the firm size is larger or smaller than some thresholds. Firms that remain below the thresholds can receive benefits from the government, but may incur costs or distortions that may arise from being below the size that would be optimal without such size-dependent policies. Firms are likely to choose their size depending on these benefits and costs. While firms' decision on size may be rational from each firm's viewpoint, such a policy may result in misallocation of resources, as firms that would grow beyond the thresholds without the policy remain smaller and vice versa.

We examine the determinants and consequences of firms' choices between remaining as small and medium-sized enterprises (SMEs, i.e., below the thresholds) or growing to become large firms (i.e., above the thresholds) using a dataset of Japanese firms. These questions have significant aggregate implications since firms' decisions on size affect to what extent size-dependent policies result in misallocation of resources. Japan provides an ideal field for examining the effects of size-dependent policies on firm growth for two reasons. First, Japan's policies for SMEs are broad in coverage spanning provisions of credit and credit guarantees through state-owned financial institutions, tax credits, and subsidies for innovation, investment, and export, as well as loose environmental and other regulations. Second, and perhaps more importantly, the definition of SMEs, which various SME policies target, changed in 1999.[1] We use this institutional change as a quasi-natural experiment to examine how firms responded to

[1] The revised Small and Medium-sized Enterprise Basic Act was passed by the Diet on November 25, 1999 and implemented on December 3, 1999.

the change and what are the consequences of their responses to the change.

The specific questions this study tackles are threefold. The first question is whether and to what extent there was bunching at the thresholds defined by the SME policies in the distribution of firm size, and how this bunching, if any, changed after the institutional change. The second question is what the ex-ante characteristics of the firms were that grew beyond the thresholds as compared to those of the firms that remained below the thresholds. The final question is how the firms that grew beyond the thresholds performed ex post as compared to those that remained below the thresholds. These issues reveal the impacts of the size-dependent policy that depends on the prefixed thresholds on firm growth.

We have obtained evidence for some, although not all, industries as follows. First, bunching and its shift can be found at the thresholds in the size distribution in terms of stated capital. Second, capital structure was distorted under the old stated capital threshold. Third, firms with lower productivity were more likely to be SMEs after the policy reform. Finally, ex-post productivity of firms that grew to become large firms improved as compared to those that remained as SMEs.

This study is closely related with the literature on size-dependent policies from the viewpoint of misallocation and aggregate productivity (Guner et al., 2006, 2008; Schivardi and Torrini, 2008; Garcia-Santana and Pijoan-Mas, 2014; Gourio and Roys, 2014; Garicano et al., 2016). Gunar et al. (2008) develop a growth model with an endogenous size distribution of production units to analyze the effects of size-dependent policies on aggregate output and size distribution. Gunar et al. (2006) apply a similar model to Japan's Large Scale Retail Location Law. Garcia-Santana and Pijoan-Mas (2014) also use a multi-sector span-of-control model to quantify the impacts of Indian

firm-level restrictions and the Small Scale Reservation Laws (SSRL) on their aggregate productivity costs, finding that the productivity costs are sizable. Gourio and Roys (2014) use a general equilibrium model to examine the impact of size-dependent labor regulations in France that bind on firms with 50 or more employees on labor allocation. Garicano et al. (2016) also examine the welfare implications of the French labor regulations by extending the Lucas (1978)'s span-of-control model to find that welfare costs of the regulations are 3.4% of GDP. Most of these model-based analyses find that removing size-dependent policies lead to a sizable increase in aggregate productivity, output, and welfare.[2]

Unlike these model-based studies on macroeconomic implications, Schivardi and Torrini (2008) and Tsuruta (2017) focus on the effects of size-contingent regulations on firms' and workers' behavior. Schivardi and Torrini (2008) examine the effects of employment protection legislation (EPL) in Italy that depends on whether the number of employees is more than 15 or not, finding that the probability of firms' growth is reduced near the threshold and that workers in firms just above the threshold have on average less stable employment relations than those just below it. Tsuruta (2017) examines the effects of the small- and medium-sized enterprise (SME) policies in Japan on firm size, finding that firms just below the thresholds used to define SMEs are less likely to increase their registered capital beyond the thresholds. Our study is close to Schivardi and Torrini (2008) and Tsuruta (2017) in that we also focus on firms' responses to the size-dependent policies. A contribution to our study is that we employ a natural experiment approach to uncover how firms responded to the institutional change of the thresholds below which firms can enjoy a variety of benefits as SMEs and how firms that

[2] Gourio and Roys's (2014) study is exceptional, finding that removing the regulation leads to a modest increase in output per worker, especially when firm entry is elastic.

responded to the institutional change performed thereafter as compared to those that did not respond to it.[3]

The remainder of the paper is organized as follows. Section 2 provides brief background information on the SME policies in Japan. Section 3 details the data used in our analysis. Section 4 presents the empirical framework and results. Section 5 concludes, providing potential avenues for future research.

2. Background information

In Japan, the Small and Medium-sized Enterprise Basic Act (the "Act" hereafter) defines SMEs, and many SME policies use this definition as a target of their policies. Such policies cover the provision of credit and credit guarantees through state-owned financial institutions, tax credits, and subsidies for innovation, investment and export, as well as loose environmental and other regulations. Table 1 describes how the Act defines SMEs in terms of the number of regular workers and the amount of stated capital for each industry. For example, firms falling into manufacturing industries have been classified as SMEs since 1999 if *either* the number of regular workers is equal to or less than 300 *or* the amount of stated capital is equal to or less than 300 million yen (about 3 million dollars). In contrast, firms with more 300 regular workers *and* capital of 300 million yen have not been classified as a large firm and off the target of SME policies since then. The thresholds for manufacturing firms were 300 regular workers and 100 million yen of stated capital before 1999.

[3] Tsuruta (2017) examines how the propensity to increase capital changed after the rise of the thresholds that define SMEs. However, he does not examine how the firms that increased capital in response to this institutional change performed thereafter as compared to those that did not respond to it.

[Insert Table 1 here.]

Among various SME policies, the corporate tax system has used a unique definition of SMEs that is different from the definition of the Act. The tax rate depends on whether stated capital is greater than 100 million yen (about 1 million dollars) irrespective of the number of regular workers.[4] Although this tax threshold also may affect the growth of SMEs, this study focuses on the definition of the Act because the tax threshold has not changed over the period that our database covers.

3. Data

The dataset used in this study is from the Basic Survey of Japanese Business Structure and Activities (BSJBSA), published by the Ministry of Economy, Trade and Industry (METI). It covers the universe of enterprises in Japan with more than 50 regular workers and with stated capital of over 30 million yen. This annual-frequency data covers around 30,000 firms in each year. We use available data for consecutive years, that is, 1994–2013. This period covers both before and after the change in the definition of SMEs by the Act. The dataset covers both SMEs (firms equal to or below either of the thresholds) and large firms (firms above both of the thresholds) in all industries except for retails and services. Firms in retail industry that held regular workers below the threshold have not been covered throughout the observation period, and firms in service industry that held regular workers below the threshold were not covered before 1999.

Table 2 shows descriptive statistics of the variables we used in the analyses below for SMEs and large firms separately for each industry for each of the pre-1998 and post-

[4] Among firms with stated capital equal to or less than 100 million yen, the tax rate also depends on taxable corporate income.

1999 periods. Because many firms do not report R&D expenditures, we replaced the unrecorded data on R&D with zero.

[Insert Table 2 here.]

4. Empirical framework and results

4.1 Size distribution

We first examine the distribution of firm size in terms of regular workers and stated capital to see whether there is bunching at the thresholds for each industry and for each pre-1998 and post-1999 periods. Given that the Act defines SMEs as the firms in which either regular workers or stated capital are less than the respective threshold, we examine the distribution of stated capital among the firms that hold regular workers above the threshold. For firms whose regular workers are above the threshold, whether stated capital is above or below (or equal to) the threshold determines whether they are classified as SMEs. Similarly, we see the distribution of regular workers among the firms that hold stated capital above the threshold.

Figure 1 depicts the distribution of stated capital among the firms whose regular workers are above the threshold. In Figures 1 and 2, the light blue arrow points at the pre-1998 threshold and the dark blue arrow points at the post-1999 threshold. Bunching at the thresholds is not very clear because stated capital is distributed at the round values (e.g., 100 million yen, 500 million yen, and 1,000 million yen). However, the share of the firms at the old threshold decreased and that at the new threshold increased after the 1999 reform for the wholesale industry, and the share of the firms at the new threshold increased for the retail industry, while such clear changes cannot be observed

for manufacturing, services, and “other” industries.

[Insert Figure 1 here.]

Figure 2 depicts the distribution of regular workers among the firms whose stated capital is above the threshold. We do not find a clear bunching for any industry. The definition regarding regular workers changed only for service industry, but no clear change in the distribution of regular workers can be observed for service industry.

[Insert Figure 2 here.]

In sum, we obtain some evidence on bunching and its shift following the change in definition of SMEs regarding stated capital, while we observe no clear bunching in the distribution of regular workers. These results suggest that constraining regular workers below or equal to the thresholds is costly relative to capital.

4.2 Leverage and Investment

The presence of bunching of stated capital in wholesale and retail industries suggests that the capital structure of the firms in these industries may be distorted due to the thresholds. Firms that restrain stated capital below or at the thresholds may hold more debt than those that hold stated capital above the thresholds. If this is the case, we will observe more number of firms that hold high debt at or slightly below the threshold of stated equity than slightly above the threshold.

To test this conjecture, we compare the debt-to-asset ratios of firms with $T_s -$

$10 < E_i \leq T_s$ and firms with $T_s < E_i \leq \mathrm{T}_s + 10$, where and E_i is the stated capital of firm i, T_s is the threshold value of industry s where firm i falls into, and 10 denotes 10 million yen. Table 3 reports the results for the 1994–1998 and 1999–2013 periods. We find that the debt ratios of the firms just below the threshold are significantly higher than those of the firms just above the threshold for firms in the manufacturing, retail, and service industry during the 1999–2013 period, although the debt ratios are significantly lower for firms in the other industry during the 1994–1998 period and for firms in the wholesale industry during the 1999-2013 period. The former result suggests that firms' capital structure is distorted due to the thresholds.

[Insert Table 3 here.]

To investigate whether the difference in the leverage between the firms just below and above the thresholds may simply reflect the difference in the size of capital rather than the distortion arising from the thresholds, we compare the leverage ratio for firms with $\mathrm{T}_s - 20 < E_i \leq T_s - 10$ and firms with $\mathrm{T}_s - 10 < E_i \leq T_s$. Table 4 shows that during the 1999-2013 period, the debt ratio of the latter is significantly higher than the former for the wholesale, service and other industries and that it is not significantly different between the two capital classes. These results suggest that the difference in the leverage between the firms just below and above the thresholds reflect the distortion arising from the thresholds.

[Insert Table 4 here.]

We further investigate whether firms whose stated capital is just below the threshold and hence more levered have different financial and investment policies from those whose stated capital is just above the threshold. While capital structure is irrelevant in perfect capital markets (Modigliani and Miller, 1958), leverage potentially affects firms' investment if information and/or agency problems matter. Myers (1977) demonstrates that high-growth firms with risky debt may forgo positive-NPV projects leading to an underinvestment or 'debt-overhang' problem while Jensen (1986) and Stulz (1990) argue that in low-growth firms with large free cash flows, leverage can be used as a disciplining device to lessen an overinvestment problem. A number of empirical studies have explored the potential impact of corporate financing on investment decisions. Lang et al. (1996), using data from Compustat over the period 1970–1989, find a strong negative relation between leverage and subsequent growth in number of employees and capital expenditures for firms with poor investment opportunities (i.e., Tobin's Q < 1). Aivazian et al. (2005), using data on Canadian publicly-traded firms, find that leverage is negatively related to investment and that this negative effect is significantly stronger for firms with low growth opportunities than those with high growth opportunities. Dang (2011), using a panel of UK firms between 1996–2003, also finds that leverage has a negative effect on firm investment levels.

Given these preceding studies, we compare the R&D intensity (R&D expenditures as a ratio of total sales), investment ratio (investment as a ratio of the previous year's physical capital stock), liquidity (liquid assets as a ratio of total assets), and interest rates (interests paid as a ratio of total debt) between firms with $\mathrm{T}_s - 10 < E_i \leq T_s$ and firms with $T_s < E_i \leq \mathrm{T}_s + 10$. We hypothesize that firms below the threshold and levered more than firms above the threshold exhibit lower R&D intensity, lower investment ratio,

higher liquidity, and higher interest rates. Below we focus on the manufacturing, retail, and service industries during the 1999–2013 period because firms below the threshold levered more than firms above it in these industries during this period.

Table 5 show that the results for the relationship between firm leverage and investment and financial policies are mixed depending on the industries and investment and financial variables. First, Panel A shows that our hypothesis for the R&D intensity is supported for the manufacturing and retail industries (in terms of the median for the latter) while it is rejected for the service industry. Next, Panel B shows that our hypothesis for the investment ratio is supported for the retail industry (in terms of the median). Third, Panel C shows that our hypothesis for the liquidity is supported for the manufacturing industry but rejected for the retail and service industries. Finally, Panel D shows that our conjecture for the interest rate is supported for the retail and service industries but rejected for the manufacturing industries. These mixed results may reflect both the distortions arising from high leverage and policy incentives such as R&D subsidies given to SMEs.

[Insert Table 5 here.]

4.3 Ex-ante characteristics of firms that change their status between SMEs and large firms

A. Ex-ante characteristics of SMEs that grow to become large firms

SMEs are likely to choose to remain as SMEs or grow to become large firms by balancing the costs or distortions that they incur by restraining stated capital or regular workers and the benefits that they receive as SMEs. The results in Section 4.1 suggest that at least for some industries, firms seem to incur some distortions by remaining at

or below the thresholds. The costs and benefits of remaining as SMEs are most likely to vary across firms. In this subsection, we examine ex-ante characteristics of SMEs that grow to become large firms as compared to those that remain as SMEs.

To this aim, we define *CAPINC* as follows. First, we restrict our sample to firms whose stated capital was above the old threshold in year t-1 and whose regular workers exceeded the threshold in year t-1. Then, if a firm increased capital to a level above the new threshold, *CAPINC* takes a value of one. If the firm's capital remained below or equal to the old threshold, then *CAPINC* takes a value of zero. If the firm decreased capital to a level at or below the old threshold, then we exclude it from our sample (Figure 3A). Firms in this sample became SMEs automatically because of the policy reform in 1999, suggesting that they are least likely to be distorted by the old threshold. In this sense, we can use these firms to examine what types of firms are likely to be large firms.

[Insert Figure 3 here.]

We therefore use this sample to test the following hypotheses:

H1. If SME policies are beneficial on average for the class of firms that newly became SMEs because of the policy reform, then this class of firms is less likely to increase capital above the new threshold than before.

H2. If SME policies are more beneficial for a particular class of firms than the other class of firms among the firms that newly became SMEs because of the policy reform, then the former is less likely to grow to be large firms than the latter.

Note that firms with rich growth opportunities are likely to grow regardless of whether there is a policy threshold. Therefore, simply comparing firms that grow to become large firms and those that remain as SMEs may capture the difference in growth opportunities rather than the difference in benefits from being SMEs. To avoid this problem, we need to examine how the characteristics of firms that increase capital beyond the new threshold changed after the policy reform. We therefore test the above hypotheses by estimating the following Probit model using data from 1995 to 2002:

$$Prob(CAPINC_{it}) = F(Const + \alpha Post_{it}) \quad (1)$$

$$Prob(CAPINC_{it}) = F(Const + \alpha Post_{it} + \beta X_{it} + \gamma Post_{it} \times X_{it-1}), \quad (2)$$

where F(·) denotes a cumulative distribution function (cdf) of standard normal distribution, $DEBTRATIO_{it-1}$ is a total debt relative to total assets, $Post_{it}$ is a dummy for the post-1999 period, X_{it-1} is a vector of firm *i*'s characteristics (other than $DEBTRATIO_{it-1}$) at year t-1, and FE_t is a fixed effect for year *t*. Firm *i*'s characteristics vector, X_{it-1}, is composed of sales growth (*SALES_G*), natural logarithm of the number of regular workers (*LNEMP*), natural logarithm of total factor productivity (*LNTFP*), R&D expenditures as a ratio of sales (*RDSALES*), return on assets (*ROA*), firm age (*AGE*), and stated capital (*CAPITAL*). We estimate Eqs. (1) and (2) for each industry of manufacturing, wholesale, retail and "others." The number of observations for the service industry was too small to estimate them. Hypothesis 1 posits that α in Eq. (1) should be negative, while Hypothesis 2 posits that the opposite sign of coefficient γ in Eq. (2) captures the characteristics of firms that benefited from staying as SMEs in the post-reform period.

Table 6A shows the results for Eq. (1). Coefficient α is positive and significant for manufacturing, not supporting Hypothesis 1. Manufacturing firms that became SMEs due to the policy reform were more likely to increase capital to become large firms than before.

Table 6B shows the results for Eq. (2). For manufacturing firms, the interaction term of *Post* and *RDSALES* is positive and significant, whereas for wholesale firms, it is negative and significant. The latter result may be interpreted as suggesting that more R&D-intensive wholesalers tended to remain as SMEs, probably because of the subsidies for R&D and other benefits that they receive as SMEs, although this is not the case for manufacturing firms. For manufacturing firms, the interaction term of *Post* and *CAPITAL* is also positive and marginally significant, suggesting that manufacturing firms with stated capital closer to the threshold were more likely to grow to large firms after the policy reform. For retailers, the interaction of *Post* and *LNTFP* is positive and marginally significant, suggesting that retail firms with lower productivity were more likely to remain as SMEs even after the policy reform. On the other hand, for the other industries, the interaction of *Post* and *ROA* is negative and marginally significant, suggesting that firms with lower profitability in the other industries were more likely to grow to be large firms after the policy reform.

[Insert Table 6 here.]

B. Ex-ante characteristics of large firms that shrink to become SMEs

Large firms are likely to choose to shrink to become SMEs or to remain as large firms by considering the tradeoff between the benefits that they can obtain from the government as SMEs and the costs that they incur by reducing their size. In this

subsection, we examine the ex-ante characteristics of large firms that shrank to become SMEs compared to those that remained as large firms.

To this end, we define *CAPDEC* as follows. First, we restrict our sample to firms whose stated capital was above the new threshold in year t-1 and who held regular workers below or at the threshold in year t-1. Then, if a firm decreased capital to a level below the new threshold, *CAPDEC* takes a value of one. If the firm's capital remained above the old threshold, then *CAPDEC* takes a value of zero. If the firm decreased capital to a level at or below the old threshold, then we exclude it from our sample (Figure 3B). Using *CAPDEC*, we test the following hypotheses:

H3. If SME policies are beneficial on average for the class of firms that hold stated capital above the new threshold, then this class of firms is more likely to decrease capital down to the new threshold than before.

H4. If SME policies are more beneficial for a particular class of firms than other class of firms among the firms that hold stated capital above the new threshold, then the former is more likely to shrink to become SMEs than the latter.

To test these hypotheses, we estimate Eqs. (1) and (2) with CAPINC replaced with CAPDEC using the same observation period. Hypothesis 3 posits that α in Eq. (1) to be positive. Coefficient γ in Eq. (2) captures the characteristics of firms that benefited from becoming SMEs in the post-reform period.

Table 7A shows the results for Eq. (1) with *CAPINC* replaced by *CAPDEC*. Coefficient α is negative and significant for the service industry, which is inconsistent

with Hypothesis 3. This result suggests that the likelihood of service firms' reducing capital decreased although the policy reform made it more beneficial.

Table 7B shows the results for Eq. (2) with *CAPINC* replaced by *CAPDEC*. For manufacturing firms, the debt ratio is positive and significant while its interaction with *POST* is negative and significant, suggesting that large firms with lower debt ratio were more likely to reduce capital in the post-reform period as compared to the pre-reform period. For the other industry, the interaction term of *POST* with *RDSALES* and that with *ROA* are both positive and marginally significant, suggesting that firms with higher R&D intensity and higher ROA tended to decrease capital to become SMEs after the policy reform.

[Insert Table 7 here.]

In sum, we have not obtained evidence that the policy reform discouraged SMEs to grow to become large firms or induced large firms to become SMEs on average. However, the policy reform changed firms' incentives to increase or decrease capital beyond the new threshold. Although firms' characteristics that changed their status between SMEs and large firms vary across industries, the effects of productivity on changing status is notable. In the retail sector, firms with lower productivity were more likely to remain as SMEs after the policy reform. This result may suggest that SME policies attract firms with low productivity.

4.4 Ex-post performance of firms that grow from SMEs to large firms

By growing from an SME to a large firm, the firm is likely to lose benefits that the

government provides to SMEs. However, if being an SME faces some distortions such as restraining stated capital, the firm is likely to gain by becoming a large firm. We compare the ex-post performance of firms that grow from SMEs to become large firms as compared with the performance of SMEs that remain as SMEs after controlling for ex-ante firm characteristics.

Specifically, we first estimate the Probit model of *CAPINC* for each of the 1995–1998 and 1999–2002 periods using X_{it-1} in Eq. (2) as the explanatory variables and then form control groups from the same industry-year observations using nearest-neighbor propensity-score-matching. Then, using matched sample, we estimate the following difference-in-differences regressions.

$$\Delta y_{it+s} = \alpha + \beta \text{Treatment}_i + \gamma \text{Post}_t + \delta \text{Treatment}_i \times \text{Post}_t + \varepsilon_{it+s} \quad (3)$$

$$\text{for } s = 0, \ldots, 3.$$

The dependent variable Δy_{it+s} is the change in performance measures described below from t-1 to up to t+3, where t denotes the year when the firm in the treatment group increased capital. Treatment_i is a dummy for the treatment group, i.e., firms with *CAPINC=1*. Post_t is a dummy for the post-1999 period. Note that in the pre-1998 period, both firms in the treatment group and those in the control group were large firms, whereas in the post-1999 period, the treatment group consists of firms that grew to become large firms while the control group consists of firms that remained as small firms. To capture the effects of SME policies on firm performance, we need to compare the average treatment effects (ATEs) between the pre-reform and post-reform periods. The interaction term of Treatment_i and Post_t serves this purpose. For example, a negative δ shows that firms that grew to be a large firm after the policy reform performed worse in terms of the relevant measure, suggesting that SME policies have a positive effect on

the performance measure. If we instead focus on the post-reform period, we may simply capture the effects of increasing capital.

We analyze four categories of performance measures. The first variable measures firms' size in terms of the log of the number of regular workers (*LNEMP*). The second set of variables measures firms' growth in terms of the sales growth rate (SALES_G), the asset growth rate (*ASSET_G*), the ratio of investment to the previous period's capita stock (*I_K*), and the ratio of R&D expenditures to sales (*RD_SALES*). The third set of variables characterizes firms' capital structure in terms of the log of total debt (*LNDEBT*) and the ratio of total debt to total assets (*DEBTRATIO*). The fourth set of variables measures operating performance in terms of the log of TFP *(LNTFP*), and the return on assets (ROA), where return is measured by current profit.

Tables 8A to 8C show the results for the manufacturing, wholesale and retail industry, respectively.[5] We explain the results for each category of variables focusing on δ.

Size

The size measure, *LNEMP*, is positive and significant for the wholesale industry (marginally significant in t+1, and significant in t+2 and t+3), showing that the wholesale firms that grew to large firms tended to become larger afterwards than those that remained to be SMEs. SME policies may constrain wholesale firms to increase their employment.

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[5] For "other" industries, we could conduct the DID analysis for the post-1999 period due to insufficient number of observations.

Among the firm growth measures, *SALES_G*, *ASSET_G*, or *I_K* is not significant for any industry. On the other hand, *RD_SALES* is negative and significant for the manufacturing industry (significant in t+2 and marginally significant in t+3). SME policies seem to promote R&D by manufacturing firms.

Capital structure

The level of debt, *LNDEBT*, is not significant for any industry, while the ratio of debt, *DEBTRATIO*, is positive and significant for the manufacturing industry (marginally significant in t+2 and significant in t+3). Note that our sample consists of firms that newly became SMEs due to the policy reform. These firms are least likely to have had excess debt before the policy reform. The result for the manufacturing industry suggests that compared with such new SMEs (firms in the control group), firms that grew to be large firms (in the treatment group) tend to become more levered afterwards.

Operating Performance

LNTFP is positive and marginally significant for the wholesale industry (marginally significant in t+1). ROA is also positive and significant for the wholesale industry (marginally significant in year t+1 and significant in year t+2). These results suggest that SME polices tended to worsen the productivity and profitability of SME firms in the wholesale industry.

[Insert Table 8 here.]

5. Conclusion

Using the policy reform in Japan that raised the thresholds as a natural experiment, we have examined (1) whether and to what extent the distribution of firm size is distorted due to the presence of the thresholds, (2) what the characteristics of firms are that grow beyond the thresholds, and (3) how the firms that grow beyond the thresholds perform as compared to those that remain below the thresholds. We have obtained evidence for some, although not all, industries as follows. First, bunching and its shift can be found at the thresholds in the size distribution in terms of stated capital (for the wholesale and retail industries), while no bunching or its shift can be found in the size distribution in terms of regular workers. Second, capital structure was distorted at the stated capital threshold. Specifically, the debt-to-asset ratio seems to be higher than that would be achieved without the threshold (for the "other" industries during the 1994–2008 period and for the manufacturing, retail, and service industries during the 1999–2013 period). Third, SMEs with lower productivity were more likely to remain as SMEs after the policy reform (for the retail industry). Finally, while ex-post R&D intensity of firms that grew to large firms decreased as compared to those that remained as SMES (for the manufacturing industry), ex-post profitability and productivity of firms that grew to large firms increased (for the wholesale industry).

Overall, our results suggest that size-dependent policies in Japan cause distortions on firms' financial policy, R&D, and operating performance. However, the degree of such distortions greatly differs across industries.

To the best of our knowledge, this is the first work that has used a policy change as a natural experiment to study the effect of size-dependent policies on firm behavior. While we have shed new light on this issue, we have not revealed what specific policies have led to our results. Revealing the relation between specific SME policies and firm

productivity, among others, seem to be an important future task.

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Table 1. Definition of SMEs

A. 1973-1998

	Definition in the SME Basic Act (revised 1973) SME operators	
Industry type	Stated capital	Employees
Manufacturing	￥100 million or less	300 or fewer
Wholesale	￥30 million or less	100 or fewer
Retail	￥10 million or less	50 or fewer
Service industry	￥10 million or less	50 or fewer
Other industry	￥100 million or less	300 or fewer

B. 1999-Present

	Definition in the SME Basic Act (revised 1999) SME operators	
Industry type	Stated capital	Employees
Manufacturing	￥300 million or less	300 or fewer
Wholesale	￥100 million or less	100 or fewer
Retail	￥50 million or less	50 or fewer
Service industry	￥50 million or less	100 or fewer
Other industry	￥300 million or less	300 or fewer

Source: The Small and Medium Enterprise Agency, Ministry of Economy, Trade and Industry.

Table 2. Summary Statistics

All periods

SMEs

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	0.0101905	6.060801	5.226927	0.0076753	0.0428807	0.6584797	42.28891	0.2894962	9.294081	0.0178402	8.808785
Median	0.0069562	5.932245	5.189052	0	0.0315055	0.6951706	39	0.0787528	9.227689	0.0078688	8.782859
Max	6.343881	11.94084	13.01017	8.4875	12.89655	1	2004	1724.5	16.53346	6.901946	16.49802
Min	-5.854069	3.931826	-6.006691	0	-7.235919	0	0	0	2.564949	-6.854427	2.772589
SD	0.1873287	1.106174	1.035022	0.0388097	0.0837996	0.2229648	90.15003	6.858219	1.564405	0.1644419	1.573545
Obs	143771	168904	165402	168904	168799	167356	168903	141918	168829	142367	167338

Large firms

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	-0.0035036	4.810408	4.559627	0.0051897	0.0374949	0.6657086	44.37012	0.1957548	7.874455	0.0082101	7.389516
Median	0.0001355	4.663439	4.555628	0	0.0265907	0.7128834	39	0.0411523	7.858254	0.0016966	7.415175
Max	5.958425	10.25235	13.19023	60.82759	174.7667	1	2004	1345.91	13.85434	6.962123	13.85363
Min	-4.755404	3.912023	-7.878986	0	-36.16667	0	0	0	1.791759	-6.828488	0.6931472
SD	0.1961653	0.6539057	0.8942997	0.1098124	0.3133392	0.2266673	108.4441	3.892208	1.013463	0.148514	1.094858
Obs	303047	356006	345726	356006	355694	349443	356005	297789	355919	300038	349391

Total

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	0.0009027	5.212756	4.775566	0.0059895	0.0392282	0.6633677	43.70044	0.2260103	8.331196	0.0113091	7.849134
Median	0.0025419	4.976734	4.727101	0	0.0282146	0.7072365	39	0.0518135	8.166784	0.0037842	7.731931
Max	6.343881	11.94084	13.19023	60.82759	174.7667	1	2004	1724.5	16.53346	6.962123	16.49802
Min	-5.854069	3.912023	-7.878986	0	-36.16667	0	0	0	1.791759	-6.854427	0.6931472
SD	0.1934716	1.012395	0.9925191	0.0930834	0.2623924	0.2255001	102.9174	5.044053	1.387024	0.1538853	1.432981
Obs	446818	524910	511128	524910	524493	516799	524908	439707	524748	442405	516729

Before 1998

SMEs

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	0.0050209	5.850675	4.97463	0.0067295	0.0307649	0.7298051	36.43386	0.2971703	9.160252	0.0197472	8.791364
Median	0.003747	5.752573	4.961963	0	0.0224868	0.7797163	38	0.0814263	9.081711	0.0075626	8.763271
Max	6.343881	11.25396	10.65353	8.4875	6.154583	0.9999782	113	1724.5	15.79764	4.06034	15.54937
Min	-5.854069	3.931826	-6.006691	0	-7.235919	0	0	0	2.995732	-2.432722	2.772589
SD	0.1825258	1.069613	0.9364061	0.0537283	0.0857416	0.2015985	15.41523	10.03144	1.445762	0.1356778	1.431433
Obs	34991	47910	47292	47910	47859	47859	47910	34548	47859	34570	47841

Large firms

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	-0.0093459	4.734295	4.377967	0.0049838	0.0291336	0.7267078	34.54508	0.2248728	7.81676	0.0077245	7.441004
Median	-0.0034054	4.59512	4.432589	0	0.0213592	0.7758064	36	0.0560288	7.798934	0	7.46451
Max	5.164284	9.01627	11.08926	2.184466	12.8431	0.999882	106	441	13.85434	4.123286	13.85363
Min	-4.580637	3.912023	-6.221797	0	-13.27875	0	0	0	2.484907	-2.965733	1.609438
SD	0.1941784	0.586159	0.7981089	0.0190493	0.1249492	0.202433	13.77246	3.435701	0.9086442	0.1399201	0.9817046
Obs	50956	71788	70670	71788	71709	71709	71788	50228	71709	50279	71658

Total

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	-0.0034969	5.181135	4.617175	0.0056825	0.0297866	0.7279475	35.30107	0.2543356	8.354514	0.0126229	7.981616
Median	0	4.955827	4.614836	0	0.0218377	0.7774616	36	0.0658945	8.185907	0.0029688	7.854769
Max	6.343881	11.25396	11.08926	8.4875	12.8431	0.9999782	113	1724.5	15.79764	4.123286	15.54937
Min	-5.854069	3.912023	-6.221797	0	-13.27875	0	0	0	2.484907	-2.965733	1.609438
SD	0.1896512	0.9814054	0.9047913	0.0370646	0.1109341	0.2021042	14.48195	6.92841	1.328566	0.1383328	1.354981
Obs	85947	119698	117962	119698	119568	119568	119698	84776	119568	84849	119499

After 1999

SMEs

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	0.0118533	6.144005	5.327948	0.0080498	0.0476753	0.6299135	44.60736	0.2870269	9.347027	0.0172286	8.81576
Median	0.0081246	6.003887	5.296568	0	0.0356361	0.6584466	39	0.0776986	9.298214	0.0079918	8.791182
Max	5.68158	11.94084	13.01017	2.099207	12.89655	1	2004	1065.714	16.53346	6.901946	16.49802
Min	-5.703783	3.931826	-4.869576	0	-3.649937	0.0103803	0	0	2.564949	-6.854427	3.218876
SD	0.1888185	1.109379	1.055192	0.0309688	0.0825291	0.224707	105.9816	5.458116	1.60586	0.1726507	1.626917
Obs	108780	120994	118110	120994	120940	119497	120993	107370	120970	107797	119497

Large firms

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	-0.0023226	4.829633	4.606301	0.0052417	0.0396062	0.6499591	46.85175	0.189847	7.889012	0.0083078	7.376232
Median	0.0012055	4.682131	4.593901	0	0.0279605	0.6936176	41	0.0383245	7.875879	0.0021391	7.40062
Max	5.958425	10.25235	13.19023	60.82759	174.7667	1	2004	1345.91	13.67088	6.962123	13.51801
Min	-4.755404	3.912023	-7.878986	0	-36.16667	0	0	0	1.791759	-6.828488	0.6931472
SD	0.1965438	0.668566	0.9115612	0.1225272	0.3449768	0.2299008	121.0457	3.978422	1.037734	0.1501847	1.12182
Obs	252091	284218	275056	284218	283985	277734	284217	247561	284210	249759	277733

Total

Variable	*SALES_G*	*LNEMP*	*LNTFP*	*RD_SALES*	*ROA*	*DEBTRATIO*	*AGE*	*I_K*	*LNASSET*	*ASSET_G*	*LNDEBT*
Mean	0.0019505	5.222097	4.823089	0.0060801	0.0420162	0.6439289	46.18159	0.2192448	8.324315	0.0109973	7.809279
Median	0.0034957	4.983607	4.767217	0	0.0302476	0.683038	40	0.0485703	8.160519	0.0039816	7.6912
Max	5.958425	11.94084	13.19023	60.82759	174.7667	1	2004	1345.91	16.53346	6.962123	16.49802
Min	-5.703783	3.912023	-7.878986	0	-36.16667	0	0	0	1.791759	-6.854427	0.6931472
SD	0.194356	1.021183	1.012546	0.1040104	0.2924245	0.2285355	116.7558	4.478142	1.403738	0.1573491	1.453269
Obs	360871	405212	393166	405212	404925	397231	405210	354931	405180	357556	397230

Table 3. Comparison of debt ratios between above and below the thresholds

A. Pre-1998 period

Manufacturing	￥90 million < capital <=￥100 million	￥100 million < capital <=￥110 million
	DEBTRATIO	*DEBTRATIO*
mean	0.711	0.727
median	0.754	0.763

Wholesale	￥30 million	￥30 million < capital <=￥40 million
	DEBTRATIO	*DEBTRATIO*
mean	0.794	0.792
median	0.829	0.837

Other industry	￥90 million < capital <=￥100 million	￥100 million < capital <=￥110 million
	DEBTRATIO	*DEBTRATIO*
mean	0.728	0.894 ***
median	0.793	0.889 ***

*** p<0.01, ** p<0.05, * p<0.1

B. Post-1999 period

Manufacturing	￥290 million < capital <=￥300 million	￥300 million < capital <= ￥310 million
	DEBTRATIO	*DEBTRATIO*
mean	0.659	0.612 ***
median	0.677	0.639 ***

Wholesale	￥90 million < capital <=￥100 million	￥100 million < capital <= ￥110 million
	DEBTRATIO	*DEBTRATIO*
mean	0.701	0.766 ***
median	0.746	0.805 ***

Retail	￥40 million < capital <= ￥50 million	￥50 million < capital <=￥60 million
	DEBTRATIO	*DEBTRATIO*
mean	0.717	0.693 ***
median	0.771	0.749 ***

Service industry	￥40 million < capital <=￥50 million	￥50 million < capital <=￥60 million
	DEBTRATIO	*DEBTRATIO*
mean	0.634	0.615 ***
median	0.669	0.648 ***

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Comparison of debt ratios below the thresholds

A. Pre-1998 period

Manufacturing	￥80 million < capital <= ￥90 million	￥90 million < capital <= ￥100 million
	DEBTRATIO	*DEBTRATIO*
mean	0.696	0.711
median	0.739	0.754

Wholesale	￥30 million	￥30 million < capital <= ￥40 million
	DEBTRATIO	*DEBTRATIO*
mean		
median		

Other industry	￥80 million < capital <= ￥90 million	￥90 million < capital <= ￥100 million
	DEBTRATIO	*DEBTRATIO*
mean	0.706	0.728
median	0.720	0.793

*** p<0.01, ** p<0.05, * p<0.1

B. Post-1999 period

Manufacturing	￥280 million < capital <= ￥290 million	￥290 million < capital <=￥300 million
	DEBTRATIO	*DEBTRATIO*
mean	0.666	0.659
median	0.677	0.677

Wholesale	￥80 million < capital <=￥90 million	￥90 million < capital <=￥100 million
	DEBTRATIO	*DEBTRATIO*
mean	0.688	0.701 ***
median	0.731	0.746 ***

Retail	￥30 million < capital <=￥40 million	￥40 million < capital <=￥50 million
	DEBTRATIO	*DEBTRATIO*
mean	0.720	0.717
median	0.772	0.771

Service industry	￥30 million < capital <=￥40 million	￥40 million < capital <=￥50 million
	DEBTRATIO	*DEBTRATIO*
mean	0.624	0.634 **
median	0.651	0.669 **

Other industry	￥280 million < capital <= ￥290 million	￥290 million < capital <=￥300 million
	DEBTRATIO	*DEBTRATIO*
mean	0.452	0.724 ***
median	0.424	0.756 ***

*** p<0.01, ** p<0.05, * p<0.1

Table 5. Comparison of R&D intensity, investment ratio, liquidity and interest rates between above and below the thresholds

A. R&D intensity

Post-1999 period

Manufacturing	￥290 million < capital <=￥300 million		￥300 million < capital <= ￥310 million	
	RD/Sales		RD/Sales	
mean		0.0074		0.0124 ***
median		0.0005		0.0038 ***
Wholesale	￥90 million < capital <=￥100 million		￥100 million < capital <= ￥110 million	
	RD/Sales		RD/Sales	
mean		0.0012		0.0015
median		0.0000		0.0000
Retail	￥40 million < capital <= ￥50 million		￥50 million < capital <=￥60 million	
	RD/Sales		RD/Sales	
mean		0.0001		0.0002
median		0.0000		0.0000 ***
Service industry	￥40 million < capital <= ￥50 million		￥50 million < capital <=￥60 million	
	RD/Sales		RD/Sales	
mean		0.0019		0.0010 *
median		0.0000		0.0000 ***

*** p<0.01, ** p<0.05, * p<0.1

B. Investment ratio

Post-1999 period

Manufacturing	￥290 million < capital <=￥300 million		￥300 million < capital <= ￥310 million	
	I/K		I/K	
mean		0.2666		0.1937
median		0.1300		0.1328
Wholesale	￥90 million < capital <=￥100 million		￥100 million < capital <= ￥110 million	
	I/K		I/K	
mean		0.1500		0.3476 **
median		0.0211		0.0217
Retail	￥40 million < capital <= ￥50 million		￥50 million < capital <=￥60 million	
	I/K		I/K	
mean		0.1359		0.1268
median		0.0202		0.0348 ***
Service industry	￥40 million < capital <= ￥50 million		￥50 million < capital <=￥60 million	
	I/K		I/K	
mean		0.3865		0.2685
median		0.0313		0.0272

*** p<0.01, ** p<0.05, * p<0.1

C. Liquidity

Post-1999 period

Manufacturing	￥290 million < capital <=￥300 million	￥300 million < capital <= ￥310 million
	Liquid assets/Assets	Liquid assets/Assets
mean	0.5780	0.5508 ***
median	0.5747	0.5455 ***

Wholesale	￥90 million < capital <=￥100 million	￥100 million < capital <= ￥110 million
	Liquid assets/Assets	Liquid assets/Assets
mean	0.6832	0.6985 **
median	0.6969	0.7089 *

Retail	￥40 million < capital <= ￥50 million	￥50 million < capital <=￥60 million
	Liquid assets/Assets	Liquid assets/Assets
mean	0.5092	0.5337 ***
median	0.5121	0.5453 ***

Service industry	￥40 million < capital <= ￥50 million	￥50 million < capital <=￥60 million
	Liquid assets/Assets	Liquid assets/Assets
mean	0.6053	0.6155 *
median	0.6655	0.6575

*** p<0.01, ** p<0.05, * p<0.1

D. Interest rates

Post-1999 period

Manufacturing	￥290 million < capital <=￥300 million	￥300 million < capital <= ￥310 million
	Interests/Debt	Interests/Debt
mean	0.0066	0.0071 **
median	0.0051	0.0058 *

Wholesale	￥90 million < capital <=￥100 million	￥100 million < capital <= ￥110 million
	Interests/Debt	Interests/Debt
mean	0.0071	0.0073
median	0.0054	0.0056

Retail	￥40 million < capital <= ￥50 million	￥50 million < capital <=￥60 million
	Interests/Debt	Interests/Debt
mean	0.0133	0.0092
median	0.0094	0.0082 ***

Service industry	￥40 million < capital <= ￥50 million	￥50 million < capital <=￥60 million
	Interests/Debt	Interests/Debt
mean	0.0098	0.0087 ***
median	0.0080	0.0066 ***

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Estimation results for CAPINC

A. Eq. (1)

	Manufacturing		Wholesale		Retail		Others	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
POST dummy	0.0280	0.0057 ***	0.0012	0.0018	0.003926	0.002579	-0.0086	0.0207
cons	0.0209	0.0035 ***	0.0108	0.0012 ***	0.015504	0.001729 ***	0.0288	0.0133 **
Number of obs =	4,020		13,873		10,308		238	

*** p<0.01, ** p<0.05, * p<0.1

B. Eq. (2)

	Manufacturing		Wholesale		Retail		Others	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
POST dummy	0.0214	0.0757	-0.0085	0.0289	-0.0561	0.0390	0.8706	0.4688 *
Lag_SALES_G	0.0258	0.0400	0.0153	0.0099	0.0300	0.0144 **	-0.1879	0.2486
POST#c.Lag_SALES_G	-0.0288	0.0486	-0.0023	0.0147	0.0209	0.0239	0.1671	0.2970
Lag_LNTFP	0.0116	0.0071	0.0086	0.0039 **	0.0018	0.0061	0.0853	0.0396 **
POST#c.Lag_LNTFP	-0.0106	0.0114	0.0000	0.0054	0.0150	0.0080 *	-0.0722	0.0471
Lag_RD_SALES	-0.2502	0.2915	0.9268	0.2973 ***	5.7083	4.9088	-0.2665	2.7829
POST#c.Lag_RD_SALES	1.0304	0.4081 **	-1.1319	0.4286 ***	-5.5187	5.0661	6.4785	5.2934
Lag_ROA	0.1648	0.1309	-0.0369	0.0607	0.1056	0.0727	1.8145	0.9138 **
POST#c.Lag_ROA	0.0002	0.1825	0.0525	0.0771	-0.0945	0.0794	-1.8575	1.1167 *
Lag_DEBTRATIO	0.0347	0.0328	0.0204	0.0117 *	0.0256	0.0167	0.5291	0.2478 **
POST#c.Lag_DEBTRATIO	0.0345	0.0434	0.0097	0.0152	0.0032	0.0210	-0.3776	0.3143
Lag_AGE	0.0003	0.0004	-0.0005	0.0001 ***	-0.0004	0.0002 *	0.0014	0.0023
POST#c.Lag_AGE	-0.0002	0.0006	0.0001	0.0002	-0.0002	0.0003	-0.0004	0.0032
Lag_CAPITAL	0.0000	0.0000	0.0003	0.0001 ***	0.0000	0.0000	0.0005	0.0004
POST#c.Lag_CAPITAL	0.0002	0.0001 *	0.0000	0.0001	0.0001	0.0001	-0.0006	0.0005
_cons	-0.0810	0.0505	-0.0456	0.0214 **	0.0010	0.0295	-1.0624	0.3821 ***
Number of obs =	2,661		8,800		5,872		147	

*** p<0.01, ** p<0.05, * p<0.1

Table 7. Estimation results for CAPDEC

A. Eq. (1)

	Manufacuturing		Wholesale		Retail		Service		Others	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
POST dummy	0.0016	0.0056	-0.0001	0.0100	0.0036	0.0410	-0.0372	0.0153 **	-0.0067	0.0213
cons	0.0978	0.0039 ***	0.1718	0.0067 ***	0.1214	0.0279 ***	0.1588	0.0137 ***	0.0675	0.0159 ***
Number of obs =	11,468		5,792		260		3,150		533	

*** p<0.01, ** p<0.05, * p<0.1

B. Eq. (2)

	Manufacuturing		Wholesale		Retail		Service		Others	
	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err	Coef.	Std. Err
POST dummy	0.1069	0.0557 *	0.0294	0.1371	-0.1892	0.9513	0.1108	0.1714	-0.1606	0.1971
Lag_SALES_G	-0.0685	0.0278 **	-0.0185	0.0516	0.1860	0.4696	0.2371	0.1614	0.0238	0.1032
POST#c.Lag_SALES_G	0.0595	0.0355 *	0.0582	0.0693	0.0944	0.6534	-0.2439	0.1822	0.1517	0.1382
Lag_LNTFP	-0.0053	0.0074	-0.0462	0.0201 **	0.0027	0.1394	0.0201	0.0180	0.0147	0.0195
POST#c.Lag_LNTFP	-0.0146	0.0102	-0.0188	0.0269	0.0884	0.2054	-0.0183	0.0217	-0.0166	0.0259
Lag_RD_SALES	-0.5985	0.1952 ***	-1.3655	0.8498	4.6208	12.7218	0.7541	0.9188	-4.0324	3.8976
POST#c.Lag_RD_SALES	-0.0854	0.2812	0.6568	1.1503	-7.3377	14.0710	-0.4722	0.9714	12.5336	6.9327 *
Lag_ROA	0.2214	0.1226 *	-0.0210	0.3382	2.7167	1.5042 *	0.1929	0.3675	-0.3753	0.3940
POST#c.Lag_ROA	-0.0836	0.1542	0.6186	0.4232	-3.1307	2.3507	0.2860	0.4291	0.8206	0.4909 *
Lag_DEBTRATIO	0.1263	0.0294 ***	0.0606	0.0697	0.3993	0.2609	-0.0595	0.1273	-0.0877	0.1352
POST#c.Lag_DEBTRATIO	-0.0793	0.0372 **	0.0033	0.0882	-0.3376	0.3821	-0.1299	0.1417	0.2172	0.1650
Lag_AGE	-0.0008	0.0004 **	0.0013	0.0007 *	0.0007	0.0042	-0.0045	0.0017 **	-0.0056	0.0019 ***
POST#c.Lag_AGE	0.0000	0.0005	-0.0002	0.0009	0.0013	0.0057	0.0011	0.0020	0.0017	0.0023
Lag_CAPITAL	0.0000	0.0000 ***	-0.0001	0.0000 ***	-0.0017	0.0009 *	0.0000	0.0000	0.0000	0.0000
POST#c.Lag_CAPITAL	0.0000	0.0000	0.0000	0.0000	0.0016	0.0010 *	-0.0001	0.0000 ***	0.0000	0.0000
_cons	0.1284	0.0414 ***	0.3970	0.1011	-0.0811	0.6696	0.3041	0.1483 **	0.3037	0.1582 *
Number of obs =	7,599		3,447		129		1,020		281	

*** p<0.01, ** p<0.05, * p<0.1

Table 8. Difference-in-differences regressions

A. Manufacturing

	Treatment				Post				Treatment*Post			
	Coef.	Std. Err.	t	P>|t|	Coef.	Std. Err.	t	P>|t|	Coef.	Std. Err.	t	P>|t|
LNEMP_from (t-1) to (t)	0.006	0.051	0.120	0.905	0.005	0.044	0.130	0.900	-0.030	0.062	-0.480	0.632
LNEMP_from (t-1) to (t+1)	0.059	0.055	1.060	0.290	-0.006	0.048	-0.140	0.892	-0.050	0.067	-0.740	0.461
LNEMP_from (t-1) to (t+2)	0.078	0.066	1.180	0.241	-0.003	0.057	-0.060	0.952	-0.043	0.081	-0.530	0.596
LNEMP_from (t-1) to (t+3)	0.078	0.076	1.030	0.306	0.016	0.066	0.250	0.804	-0.059	0.093	-0.640	0.525
SALES_G_from (t-1) to (t)	-0.070	0.080	-0.880	0.382	0.071	0.069	1.030	0.303	0.022	0.098	0.220	0.824
SALES_G_from (t-1) to (t+1)	-0.018	0.070	-0.260	0.796	0.020	0.060	0.340	0.736	0.027	0.085	0.320	0.750
SALES_G_from (t-1) to (t+2)	-0.056	0.064	-0.880	0.381	0.028	0.055	0.520	0.607	0.039	0.078	0.510	0.613
SALES_G_from (t-1) to (t+3)	0.010	0.069	0.140	0.885	0.121	0.060	2.030	0.044 **	-0.053	0.084	-0.630	0.528
ASSET_G_from (t-1) to (t)	0.046	0.067	0.690	0.488	0.105	0.057	1.840	0.068 *	-0.060	0.081	-0.730	0.464
ASSET_G_from (t-1) to (t+1)	0.012	0.051	0.230	0.820	0.046	0.043	1.050	0.297	-0.013	0.062	-0.210	0.835
ASSET_G_from (t-1) to (t+2)	-0.051	0.050	-1.020	0.307	0.043	0.043	1.000	0.318	0.051	0.061	0.830	0.409
ASSET_G_from (t-1) to (t+3)	-0.005	0.049	-0.110	0.912	0.101	0.042	2.390	0.018 **	-0.001	0.060	-0.020	0.986
I_K_from (t-1) to (t)	0.130	0.072	1.800	0.074 *	0.006	0.062	0.100	0.922	-0.139	0.088	-1.590	0.115
I_K_from (t-1) to (t+1)	-0.101	0.076	-1.330	0.186	-0.064	0.065	-0.980	0.326	0.133	0.092	1.440	0.153
I_K_from (t-1) to (t+2)	0.012	0.077	0.160	0.874	-0.015	0.066	-0.230	0.816	0.042	0.094	0.450	0.655
I_K_from (t-1) to (t+3)	0.422	0.272	1.550	0.123	0.050	0.234	0.210	0.833	-0.420	0.331	-1.270	0.207
RD_SALES_from (t-1) to (t)	0.002	0.002	0.970	0.335	0.001	0.002	0.490	0.623	-0.003	0.003	-1.240	0.217
RD_SALES_from (t-1) to (t+1)	0.002	0.003	0.670	0.505	-0.002	0.003	-0.580	0.565	-0.003	0.004	-0.610	0.544
RD_SALES_from (t-1) to (t+2)	0.009	0.004	2.100	0.037 **	0.002	0.004	0.430	0.670	-0.011	0.005	-2.100	0.038 **
RD_SALES_from (t-1) to (t+3)	0.007	0.004	1.710	0.089 *	0.000	0.004	-0.060	0.951	-0.009	0.005	-1.660	0.099 *
LNDEBT_from (t-1) to (t)	0.053	0.059	0.910	0.367	0.045	0.051	0.900	0.371	-0.066	0.072	-0.930	0.355
LNDEBT_from (t-1) to (t+1)	0.084	0.080	1.050	0.296	0.022	0.069	0.320	0.750	-0.085	0.097	-0.870	0.385
LNDEBT_from (t-1) to (t+2)	0.037	0.089	0.420	0.676	-0.042	0.077	-0.550	0.581	0.015	0.109	0.140	0.888
LNDEBT_from (t-1) to (t+3)	0.073	0.095	0.770	0.441	-0.021	0.082	-0.260	0.795	0.018	0.115	0.160	0.875
DEBTRATIO_from (t-1) to (t)	-0.026	0.013	-1.980	0.050 *	0.007	0.011	0.650	0.515	0.007	0.016	0.440	0.657
DEBTRATIO_from (t-1) to (t+1)	-0.046	0.021	-2.190	0.030 **	0.006	0.018	0.310	0.758	0.015	0.025	0.580	0.565
DEBTRATIO_from (t-1) to (t+2)	-0.064	0.023	-2.810	0.006 ***	-0.005	0.020	-0.240	0.808	0.046	0.028	1.660	0.098 *
DEBTRATIO_from (t-1) to (t+3)	-0.076	0.024	-3.190	0.002 ***	-0.012	0.020	-0.580	0.565	0.064	0.029	2.220	0.028 **
LNTFP_from (t-1) to (t)	-0.079	0.103	-0.760	0.447	0.144	0.089	1.620	0.108	0.085	0.126	0.680	0.501
LNTFP_from (t-1) to (t+1)	-0.058	0.143	-0.410	0.686	0.272	0.123	2.210	0.028 **	0.125	0.174	0.720	0.472
LNTFP_from (t-1) to (t+2)	-0.007	0.167	-0.040	0.968	0.222	0.143	1.550	0.123	0.077	0.203	0.380	0.705
LNTFP_from (t-1) to (t+3)	-0.008	0.207	-0.040	0.969	0.269	0.178	1.510	0.132	0.127	0.251	0.500	0.615
ROA_from (t-1) to (t)	-0.003	0.014	-0.240	0.811	0.009	0.012	0.780	0.434	-0.002	0.017	-0.120	0.903
ROA_from (t-1) to (t+1)	-0.002	0.013	-0.150	0.878	0.016	0.011	1.430	0.156	-0.003	0.016	-0.170	0.866
ROA_from (t-1) to (t+2)	-0.008	0.016	-0.500	0.615	0.017	0.014	1.210	0.228	-0.004	0.020	-0.210	0.836
ROA_from (t-1) to (t+3)	-0.005	0.015	-0.370	0.712	0.021	0.013	1.660	0.098 *	-0.002	0.018	-0.140	0.890

*** p<0.01, ** p<0.05, * p<0.1

B. Wholesale

	Treatment				Post				Treatment*Post			
	Coef.	Std. Err.	t	P>|t|	Coef.	Std. Err.	t	P>|t|	Coef.	Std. Err.	t	P>|t|
LNEMP_from (t-1) to (t)	0.053	0.060	0.870	0.386	0.025	0.057	0.440	0.664	0.060	0.081	0.750	0.454
LNEMP_from (t-1) to (t+1)	0.051	0.076	0.670	0.501	0.027	0.071	0.380	0.707	0.197	0.101	1.950	0.053 *
LNEMP_from (t-1) to (t+2)	-0.013	0.085	-0.150	0.881	0.028	0.080	0.350	0.727	0.270	0.113	2.390	0.018 **
LNEMP_from (t-1) to (t+3)	-0.036	0.094	-0.380	0.702	0.015	0.089	0.170	0.866	0.273	0.125	2.180	0.031 **
SALES_G_from (t-1) to (t)	0.026	0.078	0.330	0.740	0.061	0.074	0.830	0.410	0.060	0.104	0.570	0.568
SALES_G_from (t-1) to (t+1)	0.069	0.089	0.780	0.434	0.035	0.084	0.420	0.677	0.101	0.118	0.850	0.395
SALES_G_from (t-1) to (t+2)	-0.044	0.051	-0.870	0.386	0.048	0.048	1.000	0.318	0.039	0.068	0.580	0.565
SALES_G_from (t-1) to (t+3)	0.065	0.049	1.320	0.187	0.089	0.046	1.920	0.057 *	-0.026	0.065	-0.400	0.690
ASSET_G_from (t-1) to (t)	0.089	0.088	1.010	0.314	0.059	0.083	0.700	0.482	-0.035	0.117	-0.300	0.767
ASSET_G_from (t-1) to (t+1)	-0.001	0.103	-0.010	0.990	-0.002	0.098	-0.020	0.987	0.107	0.138	0.780	0.438
ASSET_G_from (t-1) to (t+2)	-0.078	0.054	-1.430	0.156	0.020	0.051	0.380	0.703	-0.035	0.073	-0.480	0.635
ASSET_G_from (t-1) to (t+3)	0.013	0.047	0.280	0.779	0.020	0.044	0.440	0.658	-0.011	0.063	-0.170	0.862
I_K_from (t-1) to (t)	0.047	0.450	0.100	0.917	0.033	0.425	0.080	0.939	0.532	0.600	0.890	0.377
I_K_from (t-1) to (t+1)	-0.072	0.325	-0.220	0.824	0.015	0.307	0.050	0.961	0.319	0.434	0.730	0.464
I_K_from (t-1) to (t+2)	0.019	0.107	0.180	0.860	-0.013	0.101	-0.130	0.896	-0.008	0.143	-0.050	0.956
I_K_from (t-1) to (t+3)	-0.026	0.098	-0.260	0.794	0.103	0.092	1.120	0.263	-0.119	0.130	-0.910	0.363
RD_SALES_from (t-1) to (t)	-0.004	0.003	-1.570	0.120	0.000	0.003	0.140	0.892	0.004	0.004	1.190	0.236
RD_SALES_from (t-1) to (t+1)	-0.003	0.003	-0.990	0.325	0.002	0.003	0.770	0.443	0.003	0.004	0.810	0.418
RD_SALES_from (t-1) to (t+2)	-0.004	0.003	-1.560	0.121	0.000	0.003	0.160	0.876	0.005	0.004	1.220	0.226
RD_SALES_from (t-1) to (t+3)	-0.003	0.003	-1.090	0.276	0.001	0.003	0.430	0.668	0.003	0.004	0.790	0.430
LNDEBT_from (t-1) to (t)	0.110	0.084	1.300	0.195	0.058	0.080	0.730	0.464	-0.042	0.113	-0.370	0.709
LNDEBT_from (t-1) to (t+1)	0.148	0.107	1.380	0.168	0.058	0.101	0.570	0.566	0.094	0.143	0.660	0.509
LNDEBT_from (t-1) to (t+2)	0.098	0.116	0.840	0.400	0.074	0.109	0.670	0.502	0.077	0.155	0.500	0.619
LNDEBT_from (t-1) to (t+3)	0.137	0.122	1.120	0.263	0.099	0.115	0.860	0.394	0.088	0.163	0.540	0.590
DEBTRATIO_from (t-1) to (t)	-0.009	0.013	-0.720	0.471	0.009	0.012	0.740	0.463	-0.021	0.018	-1.180	0.239
DEBTRATIO_from (t-1) to (t+1)	-0.002	0.015	-0.110	0.914	0.019	0.014	1.320	0.189	-0.018	0.020	-0.870	0.383
DEBTRATIO_from (t-1) to (t+2)	-0.005	0.019	-0.270	0.785	0.024	0.018	1.330	0.186	-0.022	0.026	-0.840	0.405
DEBTRATIO_from (t-1) to (t+3)	-0.005	0.025	-0.210	0.832	0.033	0.024	1.380	0.169	-0.022	0.033	-0.660	0.509
LNTFP_from (t-1) to (t)	-0.056	0.083	-0.670	0.505	-0.042	0.079	-0.530	0.595	0.154	0.111	1.380	0.169
LNTFP_from (t-1) to (t+1)	-0.013	0.092	-0.140	0.886	-0.051	0.087	-0.590	0.557	0.206	0.123	1.680	0.095 *
LNTFP_from (t-1) to (t+2)	-0.027	0.125	-0.220	0.828	-0.112	0.118	-0.950	0.345	0.090	0.167	0.540	0.588
LNTFP_from (t-1) to (t+3)	0.159	0.130	1.220	0.224	0.052	0.123	0.420	0.672	-0.006	0.173	-0.040	0.972
ROA_from (t-1) to (t)	-0.005	0.007	-0.720	0.476	-0.001	0.007	-0.080	0.935	0.016	0.010	1.620	0.109
ROA_from (t-1) to (t+1)	-0.007	0.009	-0.740	0.464	-0.008	0.009	-0.970	0.332	0.020	0.012	1.680	0.095 *
ROA_from (t-1) to (t+2)	-0.015	0.010	-1.460	0.145	-0.016	0.010	-1.700	0.091 *	0.027	0.014	1.990	0.048 **
ROA_from (t-1) to (t+3)	0.005	0.012	0.420	0.675	-0.002	0.011	-0.150	0.880	0.012	0.016	0.770	0.443

*** p<0.01, ** p<0.05, * p<0.1

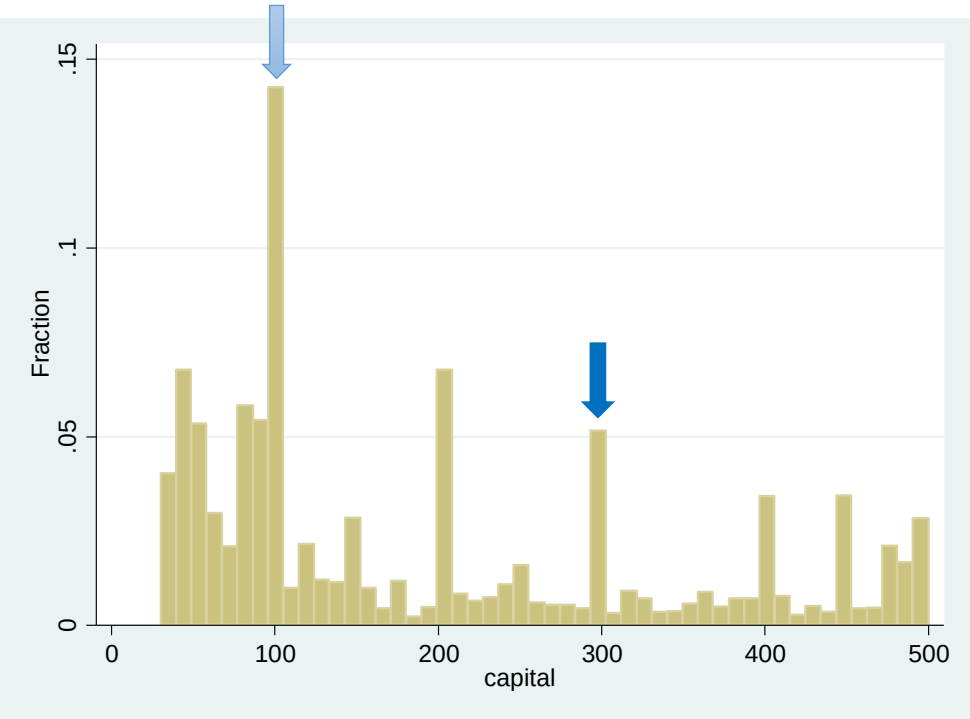
C. Retail

	Treatment				Post				Treatment*Post			
	Coef.	Std. Err.	t	P>|t|	Coef.	Std. Err.	t	P>|t|	Coef.	Std. Err.	t	P>|t|
LNEMP_from (t-1) to (t)	0.092	0.058	1.590	0.114	-0.009	0.053	-0.180	0.860	-0.022	0.075	-0.290	0.768
LNEMP_from (t-1) to (t+1)	0.128	0.077	1.650	0.100	0.016	0.071	0.230	0.821	-0.011	0.101	-0.110	0.911
LNEMP_from (t-1) to (t+2)	0.200	0.084	2.370	0.019 **	0.080	0.078	1.030	0.307	-0.043	0.110	-0.390	0.695
LNEMP_from (t-1) to (t+3)	0.197	0.095	2.080	0.039 **	0.084	0.088	0.960	0.339	0.013	0.124	0.100	0.917
SALES_G_from (t-1) to (t)	0.013	0.052	0.240	0.810	0.013	0.048	0.280	0.782	0.024	0.068	0.350	0.729
SALES_G_from (t-1) to (t+1)	0.020	0.066	0.300	0.761	-0.020	0.061	-0.330	0.741	0.068	0.086	0.790	0.428
SALES_G_from (t-1) to (t+2)	0.037	0.053	0.710	0.479	0.011	0.048	0.220	0.826	0.003	0.069	0.050	0.961
SALES_G_from (t-1) to (t+3)	0.013	0.051	0.250	0.805	-0.011	0.047	-0.230	0.819	0.029	0.067	0.440	0.663
ASSET_G_from (t-1) to (t)	0.047	0.062	0.750	0.454	-0.014	0.057	-0.240	0.811	0.021	0.081	0.260	0.792
ASSET_G_from (t-1) to (t+1)	0.035	0.048	0.720	0.472	0.000	0.044	-0.010	0.994	0.016	0.063	0.260	0.793
ASSET_G_from (t-1) to (t+2)	0.008	0.043	0.180	0.854	0.023	0.039	0.590	0.556	-0.031	0.055	-0.560	0.574
ASSET_G_from (t-1) to (t+3)	0.026	0.049	0.540	0.591	0.020	0.045	0.440	0.661	-0.016	0.063	-0.260	0.799
I_K_from (t-1) to (t)	0.165	0.197	0.840	0.405	0.169	0.182	0.930	0.355	-0.267	0.257	-1.040	0.300
I_K_from (t-1) to (t+1)	0.024	0.105	0.230	0.819	0.133	0.097	1.380	0.170	-0.141	0.136	-1.030	0.303
I_K_from (t-1) to (t+2)	-0.052	0.098	-0.530	0.597	0.056	0.090	0.620	0.534	0.011	0.128	0.090	0.932
I_K_from (t-1) to (t+3)	0.006	0.105	0.060	0.951	-0.016	0.096	-0.160	0.869	0.025	0.136	0.180	0.854
RD_SALES_from (t-1) to (t)	0.000	0.000	-0.370	0.715	0.000	0.000	0.000	1.000	0.000	0.000	-0.820	0.415
RD_SALES_from (t-1) to (t+1)	0.000	0.000	1.290	0.200	0.000	0.000	0.000	1.000	0.000	0.000	-1.300	0.194
RD_SALES_from (t-1) to (t+2)	0.000	0.000	-0.680	0.501	0.000	0.000	0.180	0.854	0.000	0.000	-0.870	0.387
RD_SALES_from (t-1) to (t+3)	0.000	0.000	-0.330	0.743	0.000	0.000	0.000	1.000	0.000	0.000	-1.070	0.286
LNDEBT_from (t-1) to (t)	0.039	0.057	0.680	0.497	-0.028	0.053	-0.530	0.595	0.040	0.074	0.540	0.589
LNDEBT_from (t-1) to (t+1)	0.094	0.071	1.330	0.184	-0.041	0.065	-0.630	0.530	0.044	0.092	0.470	0.636
LNDEBT_from (t-1) to (t+2)	0.115	0.075	1.540	0.125	-0.013	0.069	-0.190	0.846	0.019	0.097	0.200	0.845
LNDEBT_from (t-1) to (t+3)	0.150	0.087	1.720	0.087 *	-0.009	0.080	-0.110	0.911	0.012	0.113	0.100	0.919
DEBTRATIO_from (t-1) to (t)	-0.021	0.010	-2.160	0.032 **	-0.016	0.009	-1.760	0.080 *	0.016	0.013	1.250	0.212
DEBTRATIO_from (t-1) to (t+1)	-0.021	0.014	-1.450	0.149	-0.030	0.013	-2.240	0.027 **	0.006	0.019	0.300	0.763
DEBTRATIO_from (t-1) to (t+2)	-0.029	0.017	-1.720	0.088 *	-0.033	0.016	-2.100	0.037 **	0.012	0.022	0.540	0.590
DEBTRATIO_from (t-1) to (t+3)	-0.037	0.019	-2.020	0.046 **	-0.049	0.017	-2.850	0.005 ***	0.018	0.024	0.760	0.448
LNTFP_from (t-1) to (t)	0.011	0.050	0.220	0.823	0.133	0.046	2.900	0.004 ***	-0.022	0.065	-0.340	0.733
LNTFP_from (t-1) to (t+1)	-0.092	0.095	-0.980	0.331	0.152	0.087	1.740	0.083 *	0.067	0.123	0.540	0.588
LNTFP_from (t-1) to (t+2)	0.028	0.070	0.400	0.687	0.255	0.065	3.950	0.000 ***	0.021	0.091	0.230	0.820
LNTFP_from (t-1) to (t+3)	0.163	0.081	2.010	0.046 **	0.294	0.075	3.920	0.000 ***	-0.104	0.106	-0.980	0.328
ROA_from (t-1) to (t)	-0.003	0.009	-0.360	0.718	0.017	0.008	2.180	0.031 **	-0.004	0.011	-0.380	0.702
ROA_from (t-1) to (t+1)	-0.014	0.011	-1.200	0.232	0.016	0.010	1.560	0.122	0.019	0.015	1.290	0.200
ROA_from (t-1) to (t+2)	-0.002	0.012	-0.190	0.847	0.016	0.011	1.510	0.134	0.010	0.015	0.630	0.528
ROA_from (t-1) to (t+3)	0.012	0.012	1.060	0.289	0.019	0.011	1.740	0.084 *	-0.006	0.015	-0.390	0.695

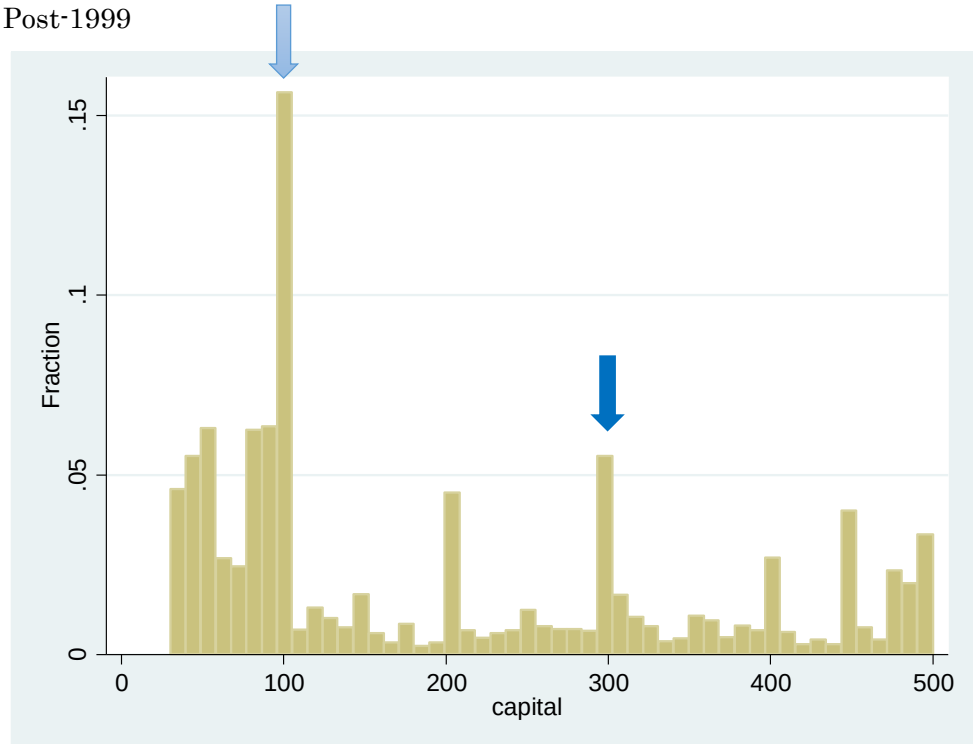
*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Distribution of stated capital for firms with regular workers above the threshold.

A. Manufacturing: Pre-1998

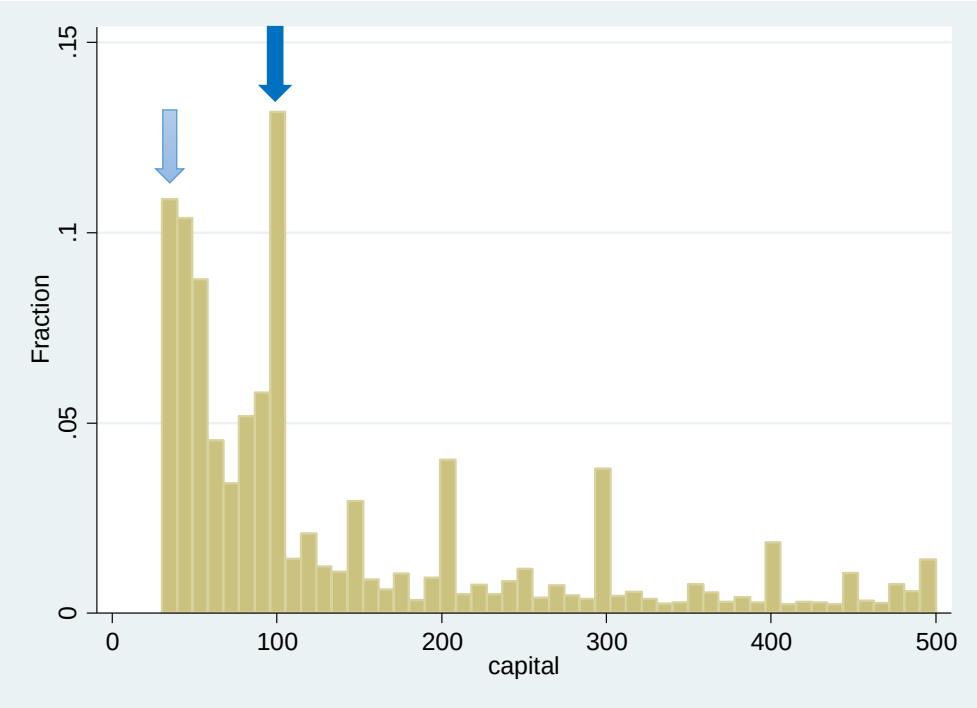


Post-1999



B. Wholesale

Pre-1998



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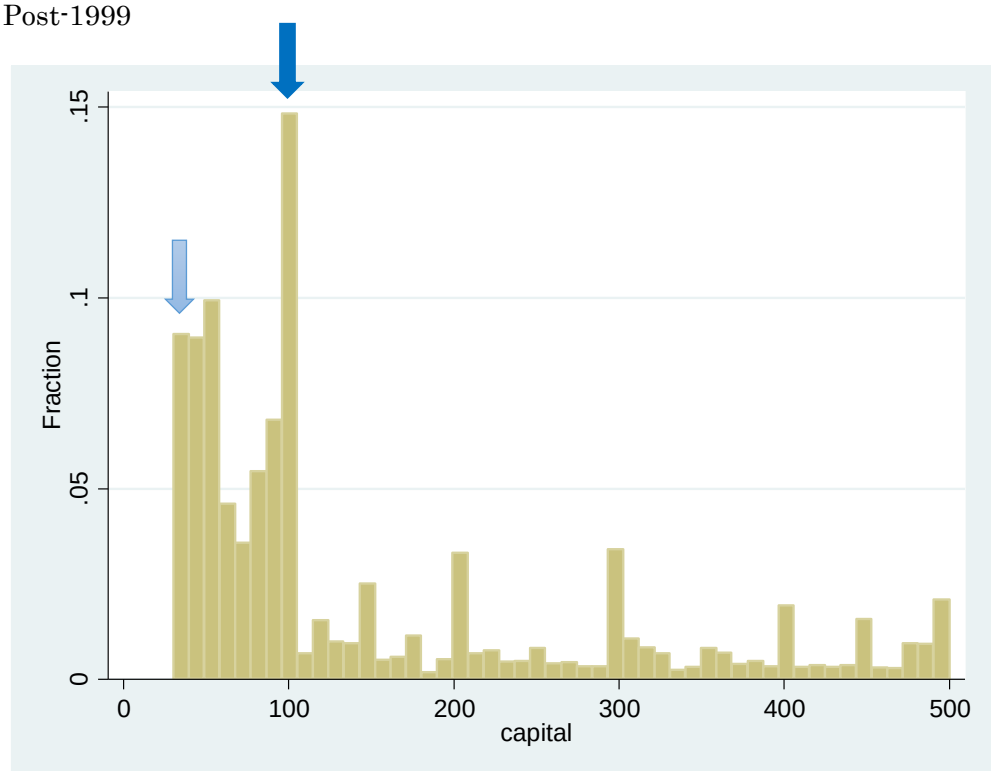
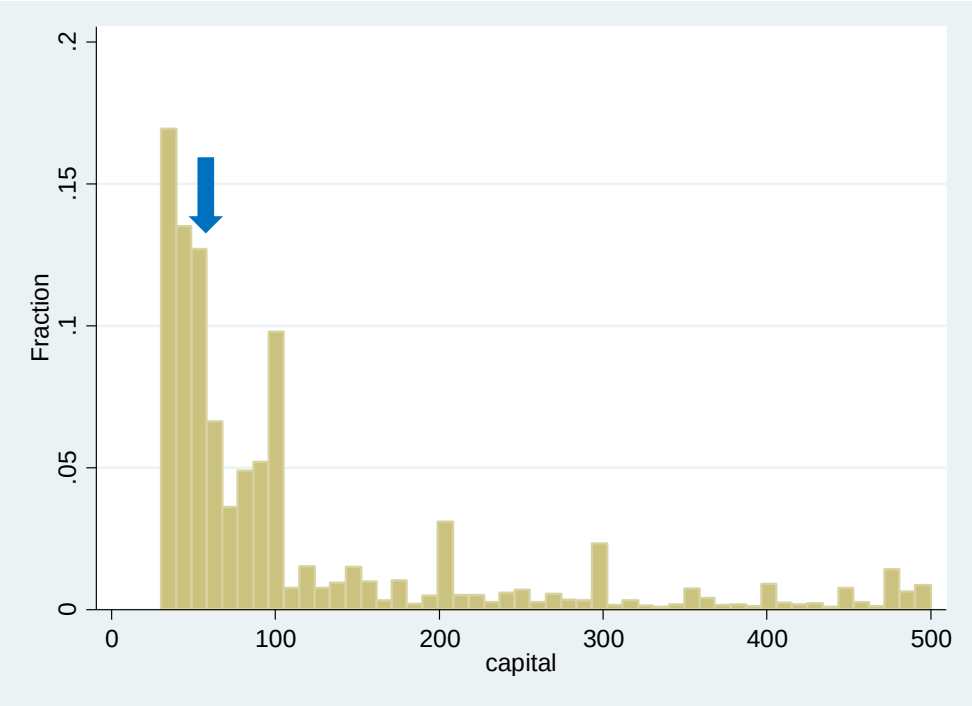
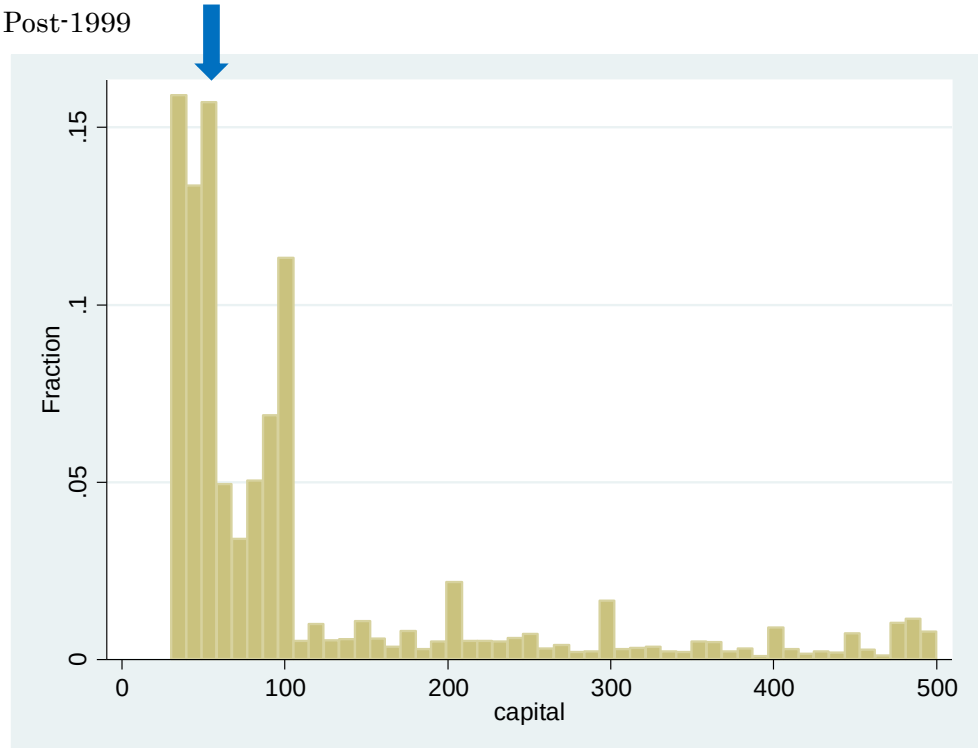


C. Retail

Pre-1998

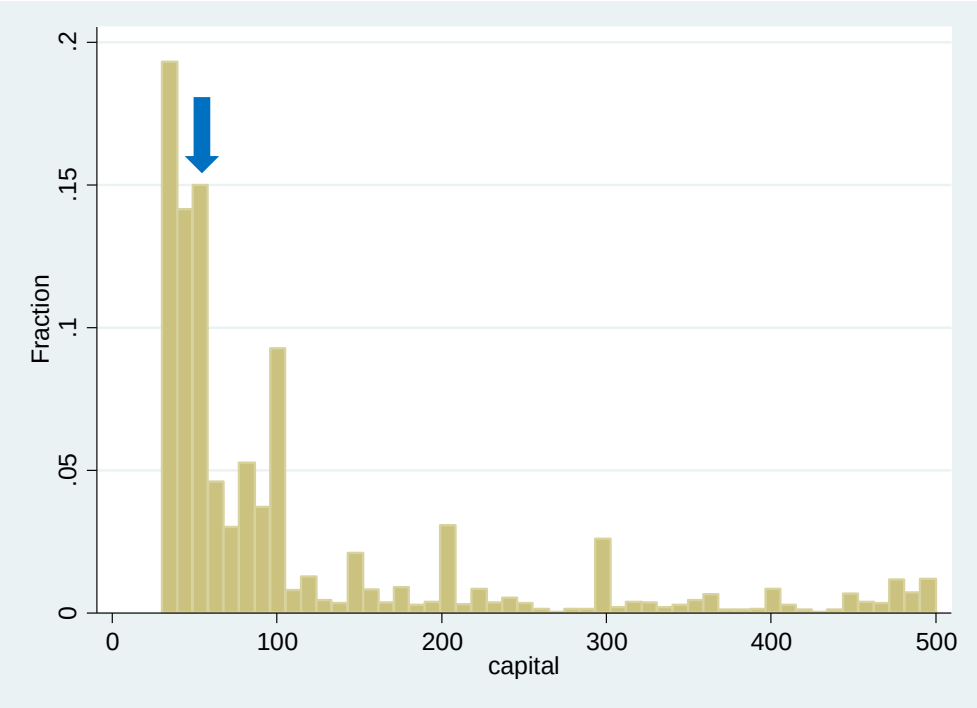


Post-1999

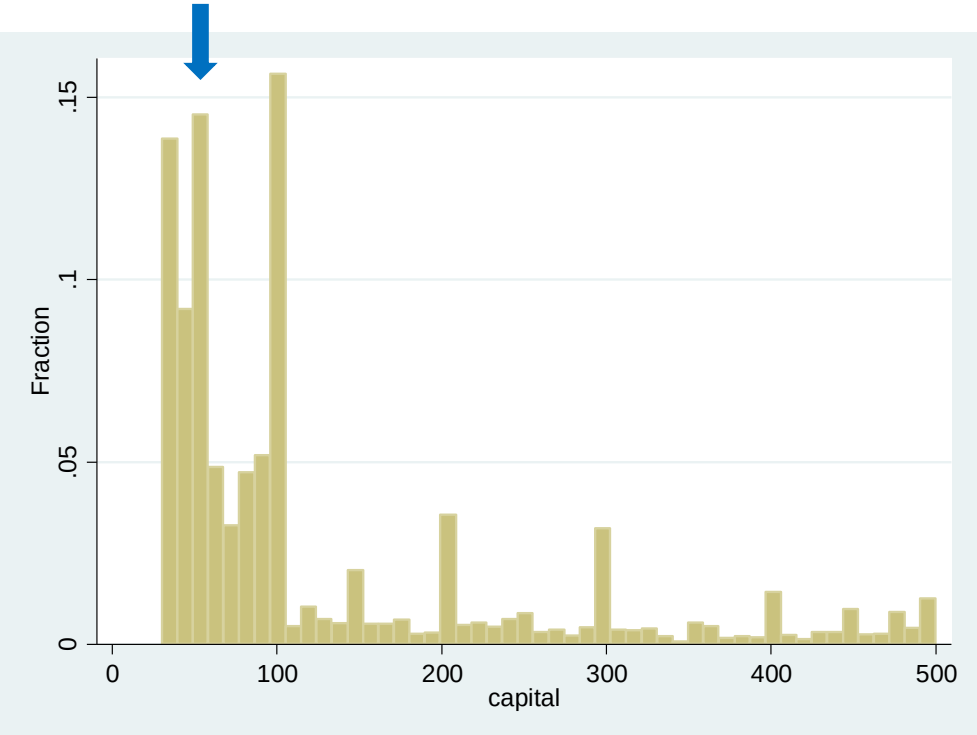


D. Services

Pre-1998

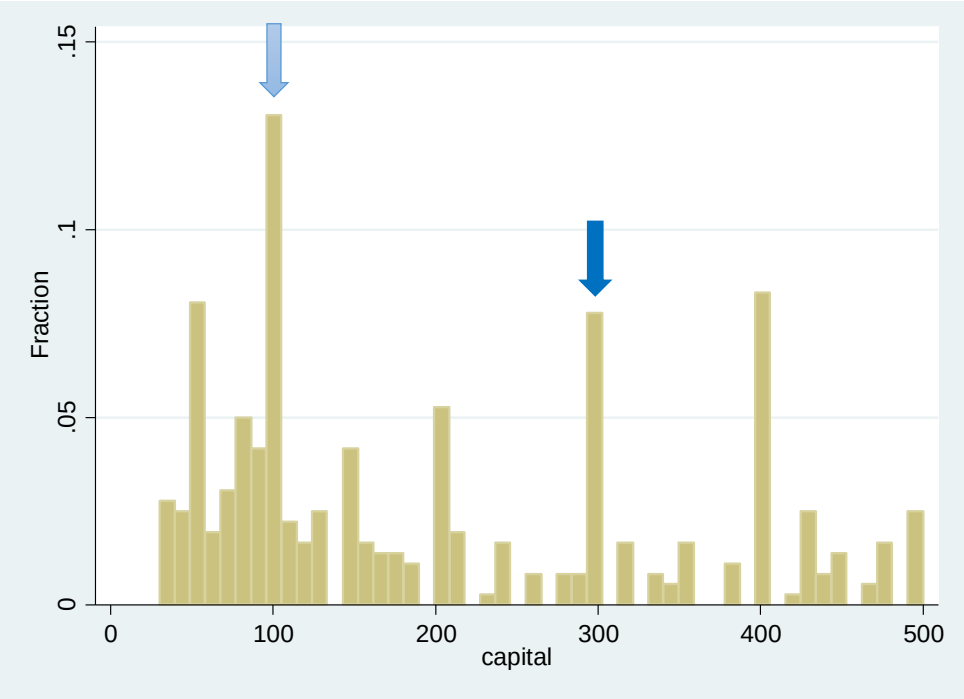


Post-1999



E. Other industries

Pre-1998



Post-1999

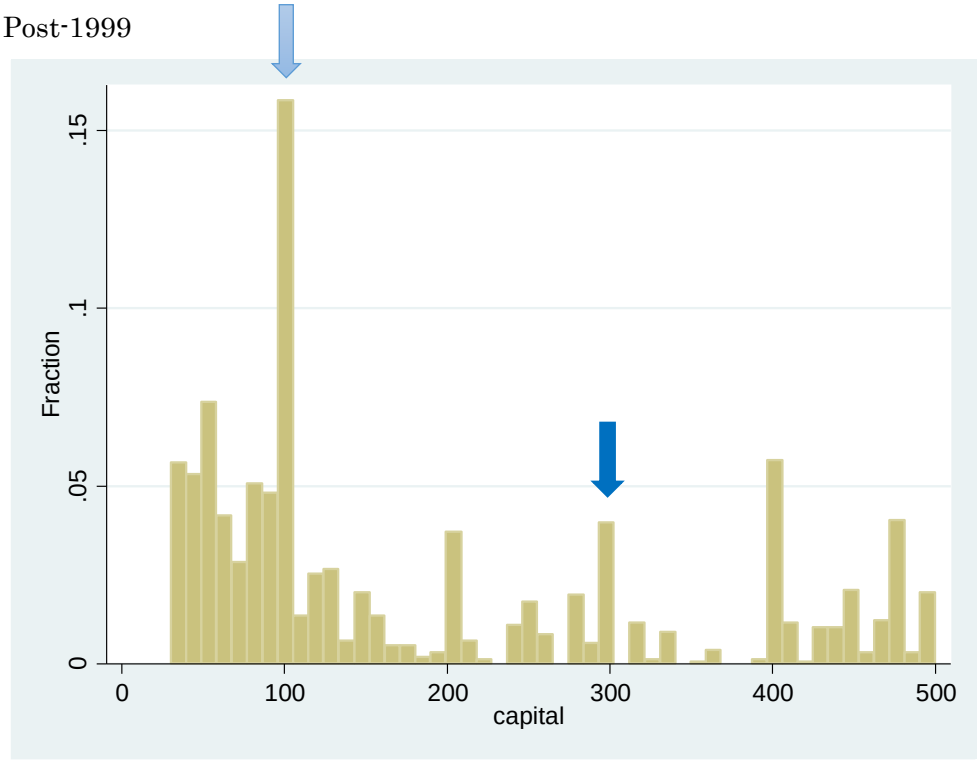
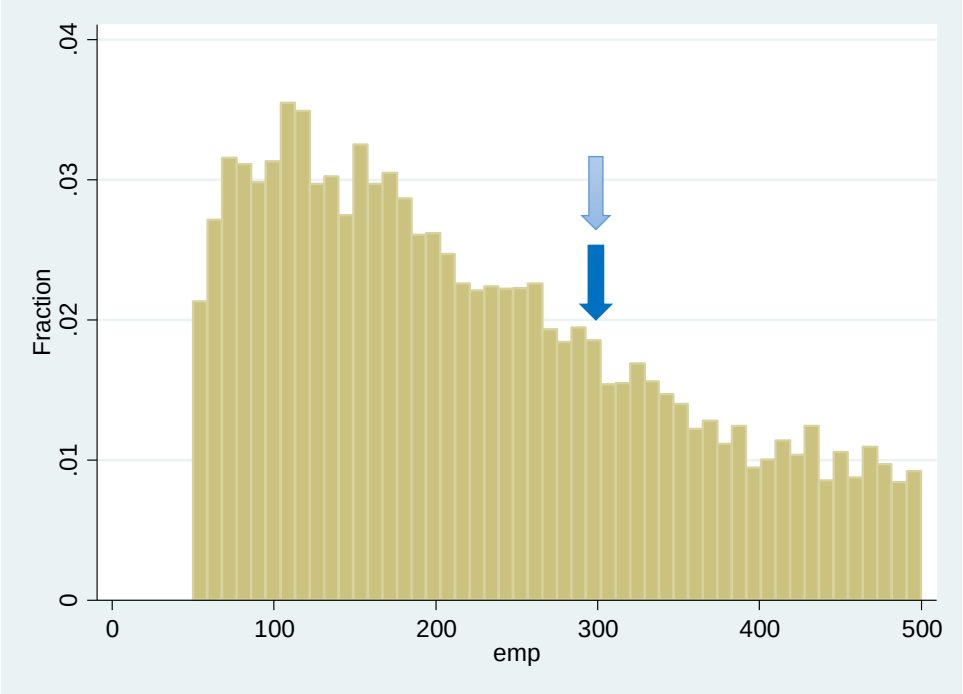
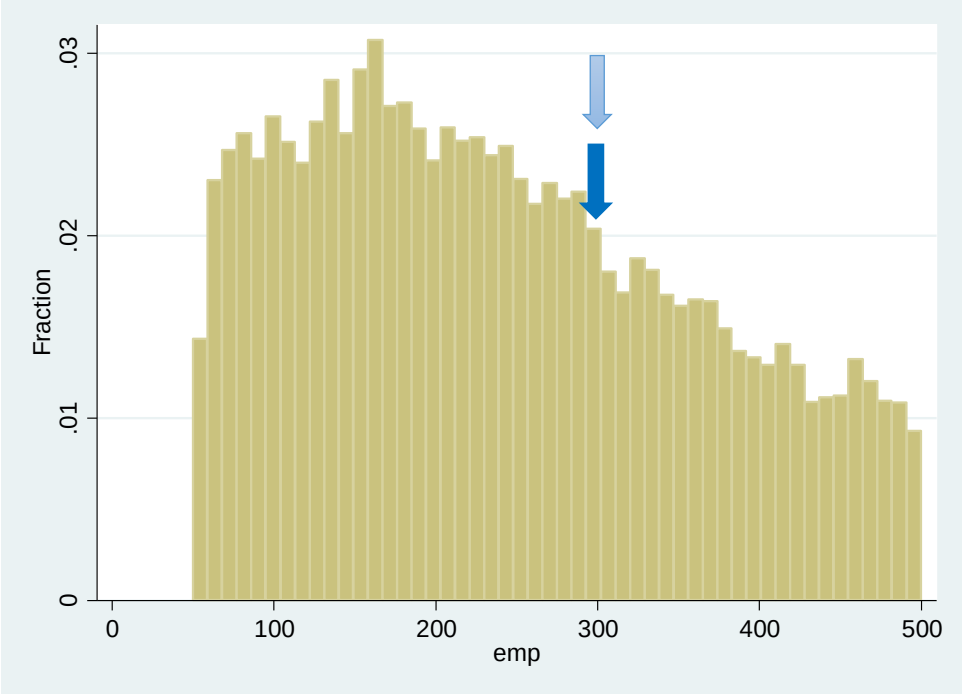


Figure 2. Distribution of regular workers of firms with stated capital above the threshold.

A. Manufacturing: Pre-1998

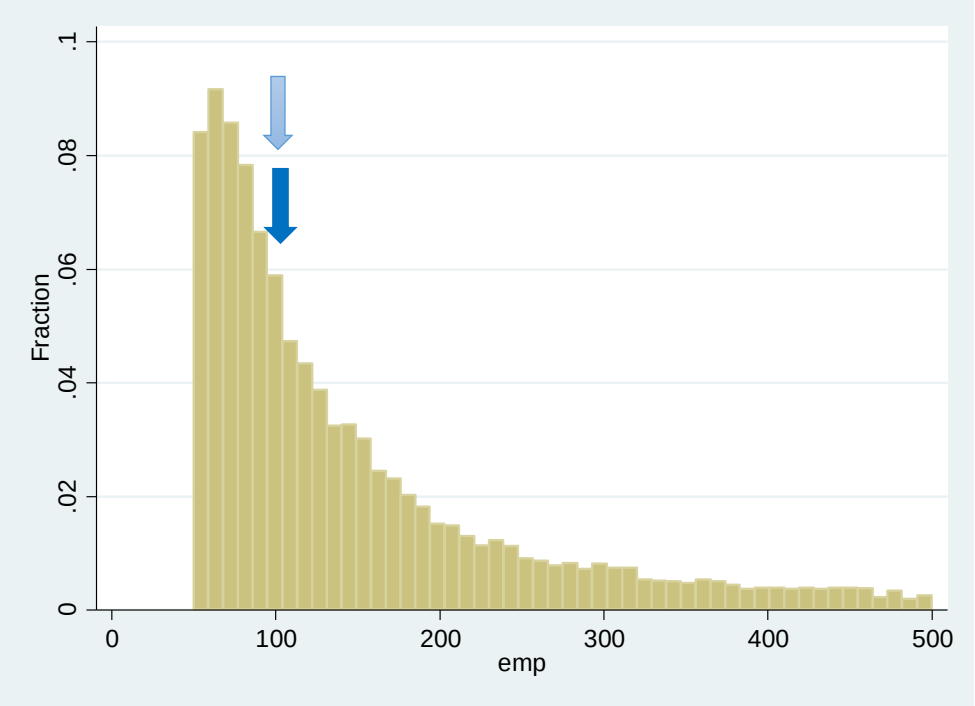


Post-1999

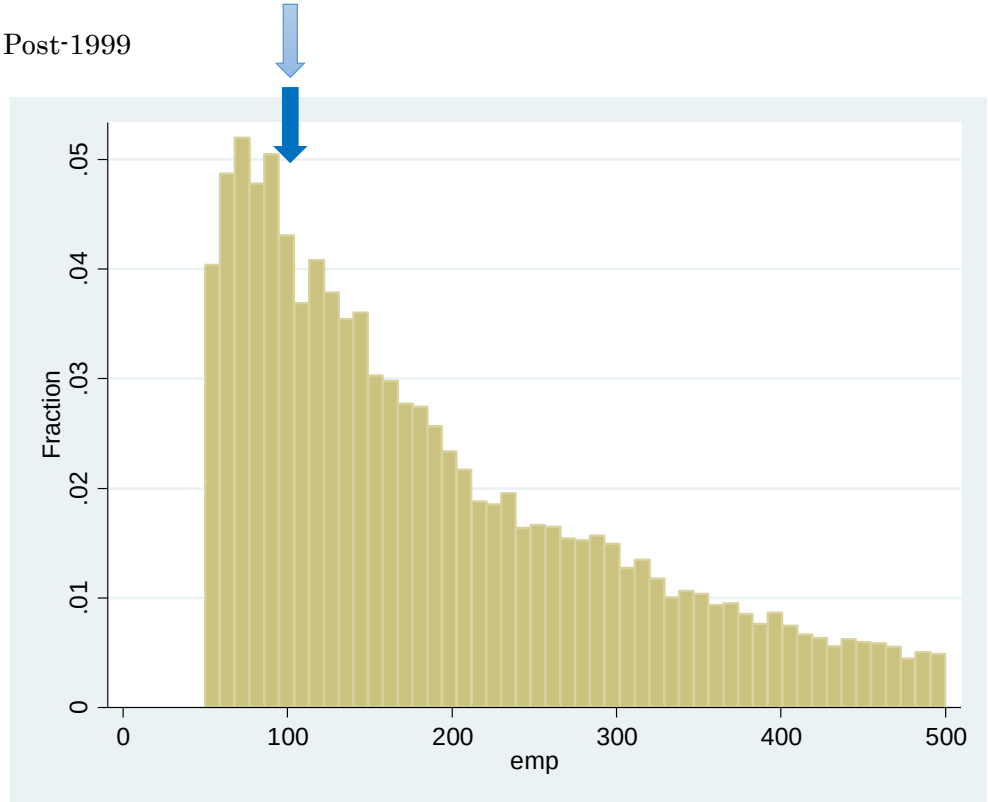


B. Wholesale

Pre-1998

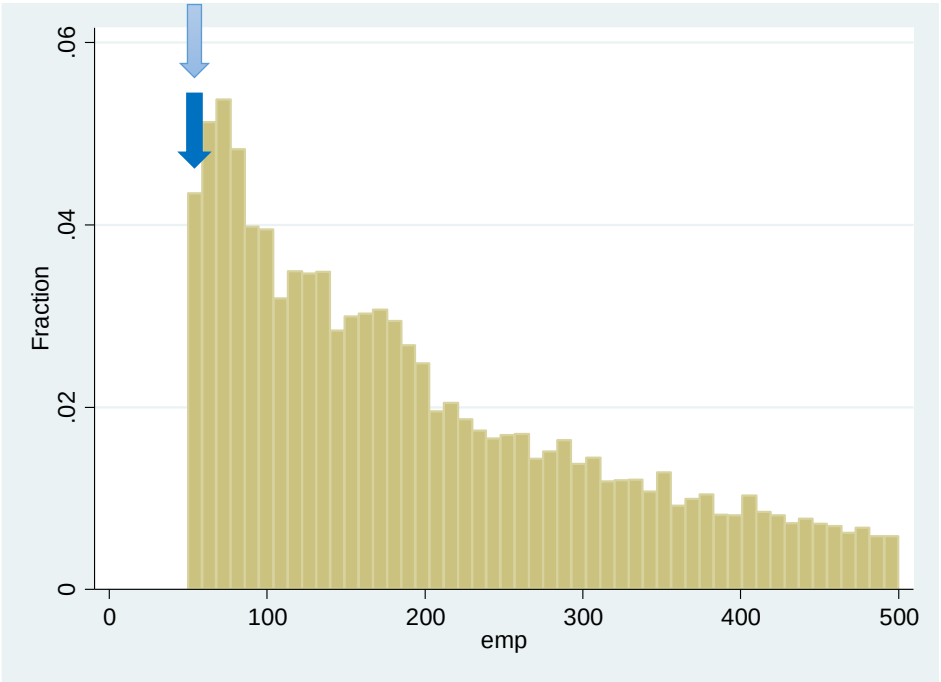


Post-1999

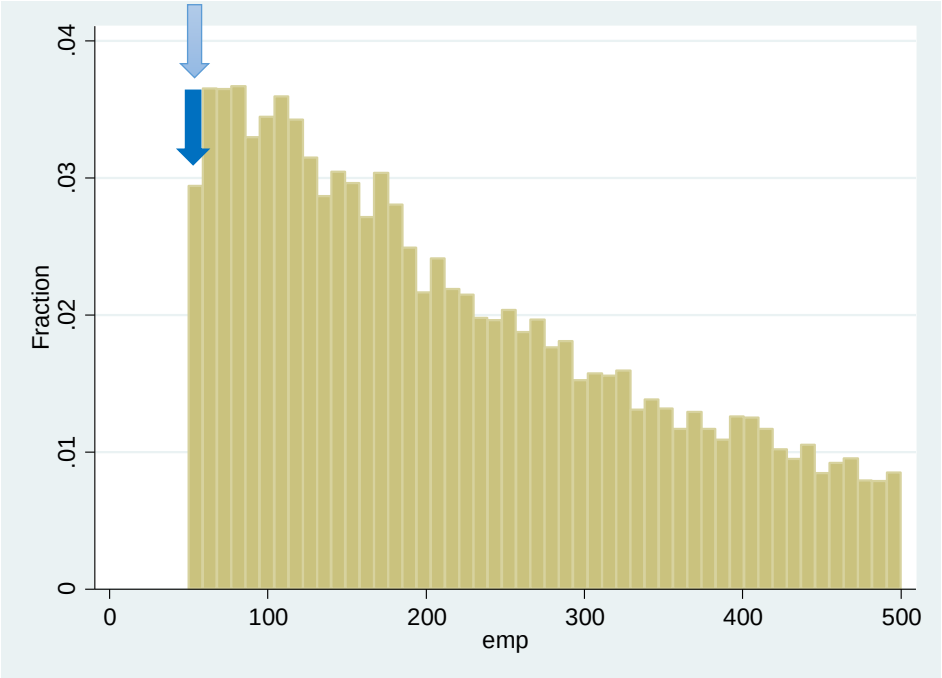


C. Retail

Pre-1998

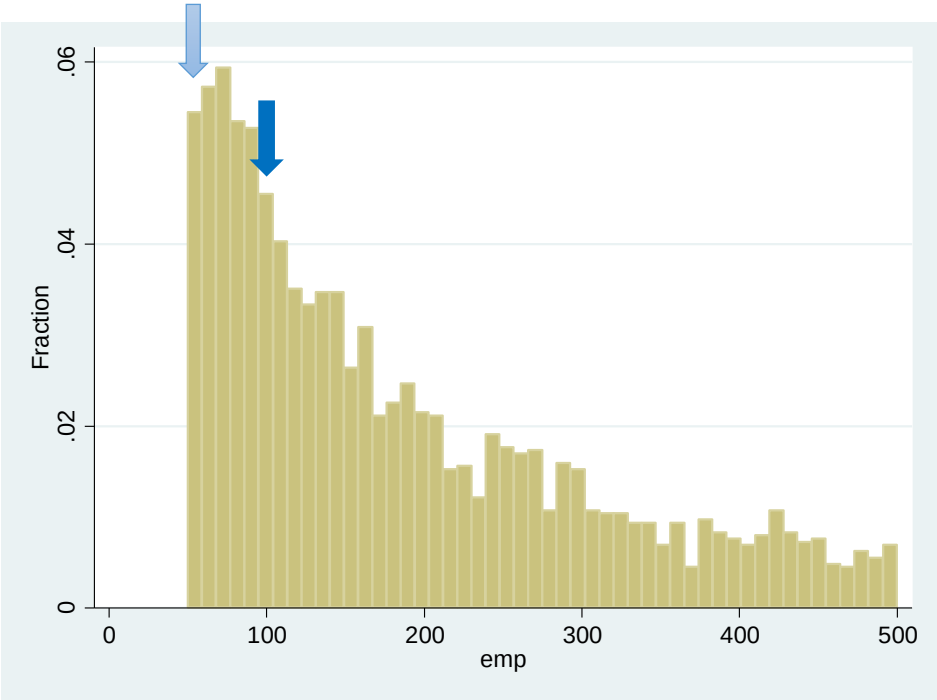


Post-1999

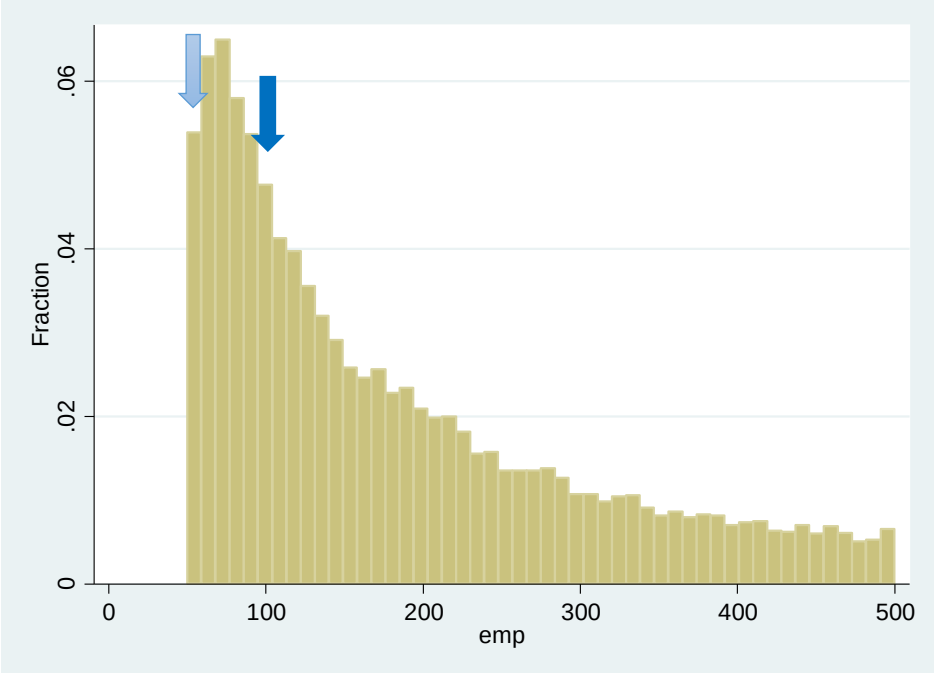


D. Services

Pre-1998

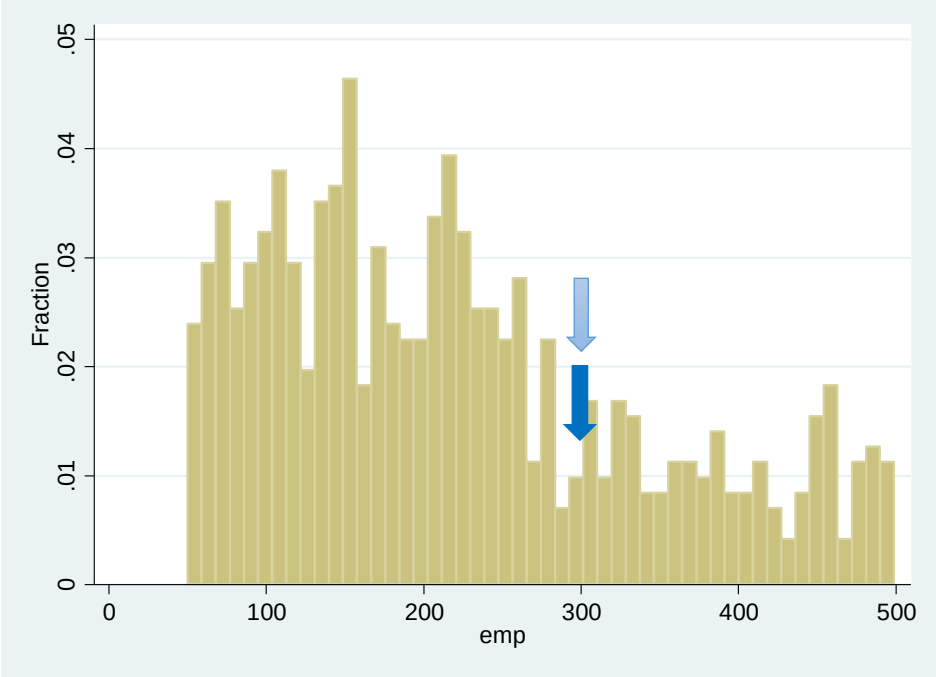


Post-1999



E. Other industries

Pre-1998



Post-1999

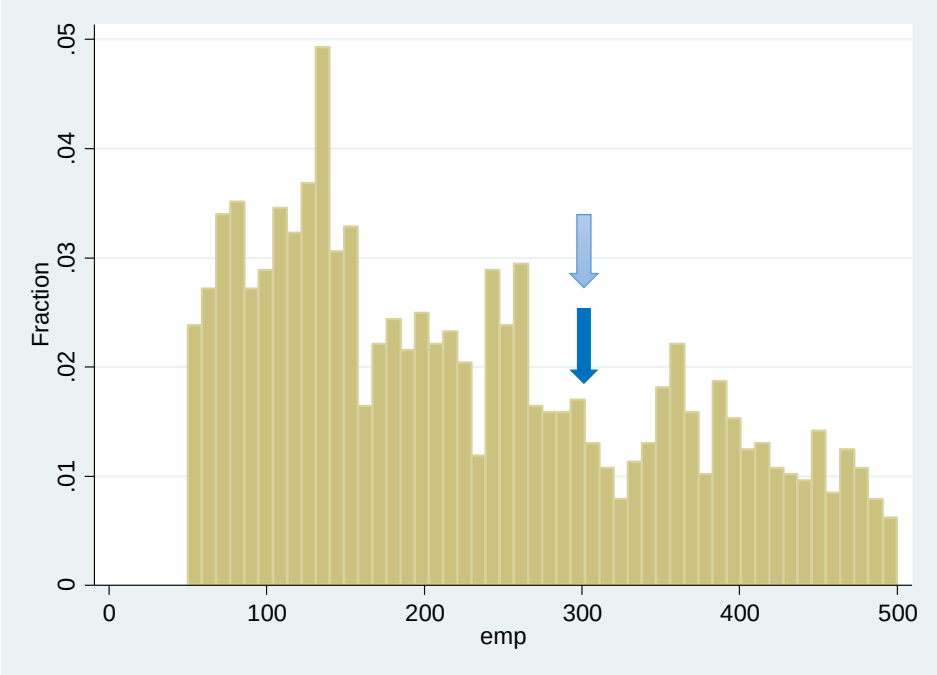
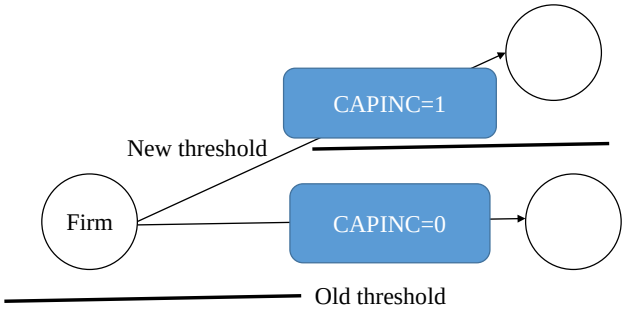


Figure 3. Dummy variables.

A. CAPINC



B. CAPDEC