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Causal Effects of a Tax Incentive on SME Capital Investment[*†]

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Abstract

We estimate the causal effects of a tax incentive for specific productivity-enhancing equipment that was introduced in 2014 for Japanese small and medium-sized enterprises. Using firm-level panel data, we obtain the following findings. First, the introduction of the tax incentive did not on average effectively increase the capital investment ratio of eligible firms, which could be due to the small number of firms using the incentives. Second, despite the first finding, the firms using the tax incentive increased their capital investment ratio and improved labor productivity more than the comparable firms did. Third, firms using the tax incentive did not increase capital intensity. Fourth, among the firms using the tax incentive, less cash-rich, smaller, and younger firms increased their capital investment ratio to a greater degree. These results show that the actual use of the tax incentive mitigates financial constraints in upgrading capital and improving labor productivity.

Keywords: Tax incentives; SMEs; Capital investments; Labor productivity; Financial constraint
JEL classification: H32, H25, H26, L25

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1. Introduction

The implications of corporate tax reforms on firms' capital investment have been one of the most important research themes in the field of macroeconomics, public economics, and corporate finance (Jorgenson 1971; Auerbach1983; Chirinko 1993). While early studies used aggregate data and reported the tenuous association between the tax incentives and investments (Eisner 1969, 1970; Eisner and Nadiri 1968; Chirinko and Eisner 1983), more and more empirical studies have used firm-level micro data and institutional changes in tax system over the last three decades (Cummins et al. 1994, 1996; House and Shapiro. 2008; Yagan 2015; Zhang et al. 2018; Liu and Mao 2019). The purpose of the present paper is to provide an additional empirical fact to this theme in the context of Japanese corporate tax reform and capital investments.

Along with the accumulation of the studies that identify the effects of corporate taxes on firms' capital investment, other studies have also proposed two additional research agendas. First, they have paid a great deal of attention to small and medium-sized enterprises (SMEs). In many developed countries, SMEs get various forms of tax incentives from their governments such as reduced tax rates, special cost deductions, accelerated or instantaneous depreciations, tax credits, and exemptions from tax payments. Thus, many recent studies have started to focus on the effect of the tax policies for SMEs on their dynamics such as capital and R&D investment (Maffini et al. 2019;Guceri and Liu 2019).[1] The present paper specifically aims at contributing to this literature by providing not only the effects of the introduction of a SME tax incentive on firms' capital investment but also the effects on their productivity that has so far never been intensively examined.[2] Furthermore, after we follow the quasi-natural experimental approach as

[1] Kobayashi (2014) analyzes the effects of R&D tax credits for SMEs by using propensity score matching and finds that tax credits increased R&D especially for liquidity constrained firms. Tsuruta (2020) examines the effects of a size-dependent policy on firm growth in Japan.

[2] Apart from tax incentives for SMEs' investment, Liu and Mao (2019) examine the effects of VAT reform on firms' investment and productivity.

in Maffini et al. (2019) and Guceri and Liu (2019) and examine the treatment effects on eligible firms, we also examine the treatment effects on the firms that actually have used the incentive. This additional analysis is informative in the context of the Japanese tax reform we examine because the number of firms that have actually used the incentive is quite small relative to the number of eligible firms. In this analysis, we carefully try to avoid a selection bias that may arise from using user firms as a treatment group by controlling for observable firm characteristics such as profitability and size as well as unobservable firm fixed effects.

Second, some studies have paid considerable attention to the potential heterogeneity associated with the effects of corporate taxes. One typical research theme in the literature is the conditional effects of tax reforms on the financial constraints faced by firms (e.g., Liu and Mao 2019). When firms rely on frictional external financing, the provision of tax incentives may effectively mitigate the financial frictions and induce their investments and productivity. Such effects could be present on top of the reduction in capital price due to various tax incentives. Here, some studies (e.g., Edgerton 2010) point out that it could not be the case when the degree of financial friction is prohibitively high.[3] Thus, an empirical question exists as to whether or not the effect of tax reforms that intend to ease financial constraints really work. In the present paper, we explicitly examine such heterogeneous effects of a tax incentive conditional on financial frictions as one of the key research questions on the effects of an SME tax incentive.

In this empirical analysis, we focus on a Japanese tax incentive introduced in 2014 for specific productivity-enhancing equipment. This tax incentive is an add-on to the SME investment promotion tax system that was originally established in 1998 to allow SMEs to use higher cost deductions and tax credits than large firms.

[3] Edgerton (2010) points out that tax incentives do not loosen a constraint on internal financing if firms cannot use external financing such as debt or equity, must pay the full price of capital up front, and can claim the tax incentives only after they make an investment.

First, we use firm-level panel data from 2012 to 2019 to compare the capital investment of the firms with stated capital of 100 million JPY or less who were eligible for the tax incentive after 2014 (treatment group) to firms holding more than 100 million but less than 1 billion JPY (control group). Consistent with the classical literature on the tenuous association between tax incentives and capital investments, the result of this natural experiment indicates that the exogenous decline in the prices of capital goods due to the introduction of the tax incentive in 2014 did not effectively increase the capital investment ratio of the treated firms. We conjecture that this tenuous association between the tax incentive and investments comes from the small proportion of firms that actually use the incentive due to various background issues such as firms' insufficient knowledge on the tax incentive, their tax loss position, and/or the lack of profitable investment opportunities.

Second, taking advantage of our access to a sample of firms that actually used the tax incentive, we compare firms that used the tax incentive (another treatment group) with firms with more than 100 million but less than 1 billion Japanese Yen (JPY; the control group). The estimation results show that the use of the tax incentive in fact results in a higher capital investment ratio for users. This effect is significant mainly in the first year for firms that could use the tax incentive. Furthermore, such an induced capital investment is accompanied by an improvement in their labor productivity measured by sales-per-employee.

Third, we find that users of the tax incentive did not increase their capital intensity as measured by the tangible fixed assets per employee, although they increased their labor productivity. This increase in labor productivity is caused mainly by an upgrade in capital quality.

Fourth, we also specifically find a larger increase in the capital investment ratio in 2014 for less cash-rich, smaller, and younger firms that used the tax incentive. Such a heterogeneous effect regarding financial constraints is not observed for labor productivity. These results show

that the use of the tax incentive not only lowered the capital cost but also resolved the financial constraint faced by those firms. Those financially constrained firms implemented adequate investment to upgrade their capital and to achieve comparable improvement of their performance to unconstrained firms thanks to the tax incentive.

The organization of the paper is as follows: In the section 2, we summarize the tax incentive for SME capital investment featured in our empirical analysis. Section 3 has an overview of our methods of a quasi-natural experiment and regression analyses as well as the exposition of the data we use for our empirical study. In Sections 4 and 5, we present the empirical results and conclude, respectively.

2. Japanese tax incentive for SME investment

In this section, we focus on the tax incentive for SME investment that the Japanese government introduced as SME investment promotion tax system in 1998. This incentive provided SMEs (firms with stated capital of 100 million JPY or less) with special depreciation allowances (SDAs) for machinery; a measuring instrument; a testing instrument; software, the price of which was more than or equal to a specific level; a motor-truck with a weight at a specific level or more; and a domestic vessel.[4] SMEs could use SDAs of 30% on their investment as well as ordinary depreciation allowances in the first year. In addition, smaller SMEs (firms with stated capital of 30 million JPY or less) could select either SDAs of 30% or tax credits of 7% on their investment. Tax credits were limited to 20% of the corporate income taxes that they paid under this tax incentive.

In 2014, as a temporary measure, the special tax incentive for specific productivity-

[4] In this tax system, SMEs are defined as firms that submit a blue return to file an income tax return and satisfy one of the following conditions: (1) corporations with the stated capital of 100 million JPY or less, (2) corporations with 1,000 employees or less among the corporations without stated capital, (3) sole proprietors with 1,000 employees or less, and (4) cooperative unions. We focus on type (1) in this paper.

enhancing equipment were added to SME investment promotion tax system. The special tax incentive targeted the cutting-edge equipment that was released during a specific period and improved productivity by 1% on average annually in comparison with the old model (i.e., A type equipment), and the equipment that contributed to improving the production line and operation and achieves the profits-to-investment ratio of 5% or more in the investment plan that the Minister of Economy, Trade and Industry approved (i.e., B type equipment).[5] As the special tax incentive, SMEs could select either immediate depreciation allowances (IDAs) of 100% or tax credits of 7% (10% for smaller SMEs) on their investment. Tax credits were limited to 20% of the corporate income taxes that they paid. Although this special tax treatment for specific productivity-enhancing equipment expired at the end of 2016, it was reorganized as SME management strengthening tax system in 2017 and has continued to exist up to the present.

A special tax incentive for productivity-enhancing equipment was also provided for large-sized enterprises (firms with stated capital of more than 100 million JPY) by productivity-enhancing investment promotion tax system established in 2014, although they were applied to more types of equipment and were less attractive than those provided to SMEs. Large-sized enterprises could select either IDAs of 100% (SDAs of 50% in 2016) or a tax credit of 5% (4% in 2016) on their investment. This tax incentive was abolished at the end of 2016.

Firms that were eligible for the special tax incentives did not necessarily use them for several reasons. First, they might not conduct their investment owing to the lack of profitable opportunities. Second, they might not be aware of the tax incentive even if they make an investment. Third, their investment might not satisfy the above-mentioned criteria even if they knew about the tax incentive. Fourth, they might be in a loss position even if their investment

[5] In the tax incentive, productivity of type A equipment is measured in terms of output per unit of time, accuracy, energy efficiency and so forth. Profit-to-investment ratio of type B equipment is measured in terms of a three-year average of an increase in cash flow (operating profits plus depreciation) after investment divided by the sum of investment.

satisfied such criteria.[6] Due to these various reasons, the ratio of SMEs that used the incentive to eligible SMEs was quite small. While the data for the utilization rate of the incentive introduced in 2014 are not available, those for the tax incentive provided by SME management strengthening tax system show that the annual utilization rates of IDAs and tax credits were between 0.4% and 0.68% and between 0.13% and 0.32%, respectively, over the period from 2017–2020.[7]

3. Empirical Method and data

3.1. Empirical Method

We focus on the special tax incentive added in 2014 to examine how and to what extent they affected SMEs' investment and labor productivity. To achieve this aim, we compare firms with stated capital of 100 million JPY or less that were eligible to use the new tax incentive for SMEs after 2014 (treatment group) to firms with capital of more than 100 million JPY but less than 1 billion JPY (control group). As already mentioned, although firms in the control group are also eligible to use the tax incentive targeted at large-sized enterprises, this incentive was less attractive than that for SMEs. We consider the difference between the tax incentive for SMEs and large firms as the treatment for SMEs in our empirical analysis.

Figure 1 shows the predicted change in the average investment rate (i.e., investment divided by lagged tangible fixed assets) by group. The average investment rate of the treatment group might increase much more than that of the control group in 2014. While this rate maintains its level after 2014 (as long as they use the tax incentive), then the rate of the control group might

[6] Kitchen and Knittel (2016) show that 50-60% of eligible C corporations did not claim bonus depreciation in the US over the period from 2002–2014 because of their tax loss position. Pham (2019) finds that 40% (55%) of eligible firms did not claim the corporate income tax cut in Vietnam in 2009 (2011) because they were either not aware of the policy or were afraid of a tax audit. Cui et al. (2021) find that over 80% of firms with eligible investment failed to claim accelerated depreciation benefit in China over the period from 2014–2016 that was caused by their tax loss position or unawareness of the policy.

[7] We calculate these ratios using data provided by the Ministry of Finance and National Tax Administration Agency in Japan. Note that they are overestimated because we calculate them as the ratio of the number of firms that used the special tax incentive to the total number of SMEs whose denominator does not include firms such as sole proprietors that are eligible for the incentive because of a data limitation.

begin to decline after 2016 (when the tax incentive targeted at large-sized firms was weakened) and back to the original level in 2017 when the tax incentive targeted at large-sized enterprises were removed. We define the treatment effect of the tax incentive on SMEs' investments as the difference-in-differences of each group (DIDs), where the difference of each group is defined as the difference between the average investment rate in each year and that in the pre-treatment year (i.e., 2013).

(Insert Figure 1)

First, to examine how the firms that were eligible to use the new tax incentive changed their investment, we estimate the following specification:

$$INVRATE_{i,t} = \alpha + \beta^{2014} FY2014_t \times Eligible_i + \sum_{T \neq 2014} \beta^{T} FYT_t \times Eligible_i + \boldsymbol{X_{i,t-1}\gamma} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (1)$$

Here, $INVRATE_{i,t}$ represents the investment rate defined by the investment divided by lagged tangible fixed assets. FYT_t represents a dummy variable that takes one if fiscal year t is T, and zero otherwise ($T = 2012, \ldots, 2019$). $Eligible_i$ represents a dummy variable that takes one if firm i belongs to the treatment group and zero if it belongs to the control group. Here, the treatment group includes firms that did not use tax incentive. The coefficient β^{T} represents the treatment effect of tax incentive on the investment rate of SMEs if T is the treatment year (i.e., $T \geq 2014$) and the pre-trend if $T = 2012$. The coefficient β^{2014} represents the short-run average treatment effect of the SME tax incentive on the investment rate in 2014. The vector $\boldsymbol{X_{i,t-1}}$ is a set of control variables that consists of the lagged profitability that is defined by

operating profits divided by tangible fixed assets and the lagged natural logarithm of one plus fixed assets. The dummies μ_t and η_i represent a year fixed effect and a firm fixed effect, respectively.

Second, to examine how users of the tax incentive for SMEs changed their investment and labor productivity, we estimate the following specification:

$$Y_{i,t} = \alpha + \beta^{first} FYfirst_{i,t} \times User_i + \sum_{T \neq first\ year} \beta^{T} FYT_t \times User_i + \boldsymbol{X_{i,t-1}\gamma} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (2)$$

Here, $Y_{i,t}$ represents the investment rate or labor productivity. We use sales per employee ($SALPE_{i,t}$) as a proxy for labor productivity.[8] Furthermore, we use tangible fixed assets per employee ($TANPE_{i,t}$) as a dependent variable to investigate whether the change in sales per employee is induced by the change in capital intensity or not. $FYfirst_{i,t}$ represents a dummy variable that takes one if the fiscal year t is the first year when firm i used the tax incentive for the first time, and zero otherwise. $User_i$ represents a dummy variable that takes one if firm i belongs to the treatment group, that is, if it used the tax incentive for SMEs in the first year and takes zero if it belongs to the control group. The definition of the control group is the same as that in the case of $Eligible_i$. We focus on two treatment groups: the firms that first used the incentive in 2014 and 2015. Given the possible selection mechanism associated with these treatments, we use the vector of control variables $\boldsymbol{X_{i,t-1}}$ to take care of firms' attributes that potentially determine the use of the tax incentive. Specifically, we focus on (1) whether firms are taxable or not, and (2) whether firms are aware of the tax incentive or not, as the preceding studies do (e.g., Cui et al., 2021). Here, we regard the lagged profitability as the proxy for taxable income. We

[8] Foster et al. (2001) show that the sales per employee is informative as a proxy for labor productivity. Following their discussion, for example, Alon et al. (2018) use sales per employee as a proxy for labor productivity.

also regard the lagged natural logarithm of firm size measured by fixed assets as the proxy for awareness of tax incentive because larger firms are more likely to employ accountants and tax experts. The coefficient β^{first} represents the short-run average treatment effect of SME tax incentive on the investment rate and labor productivity in the first year.

We further investigate the long-run average treatment effects of SME tax incentive on productivity during the period between the first year and the end of our sample period (i.e., 2019) using the following specification:

$$Y_{i,t} = \alpha + \beta FYfirst\_19_t \times User_i + \sum_{T<first\ year} \beta^T FYT_t \times User_i + \boldsymbol{X_{i,t-1}\gamma} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (3)$$

Here, $FYfirst\_19_t$ represents a dummy variable that takes one if fiscal year t is between the first year and 2019, and zero otherwise. The coefficient β represents the long-run average treatment effect of the tax incentive on labor productivity.

To examine heterogeneity of the short-run treatment effect on investment and productivity with respect to financial constraints, we estimate the following specification:

$$Y_{i,t} = \alpha + \beta^{first} FYfirst_t \times User_i + \beta^{FCshort} TightFC_{i,t} \times FYfirst_t \times User_i + \beta_3 TightFC_{i,t} \times FYfirst_t + \sum_{T\neq first\ year} \beta^T FYT_t \times User_i + \boldsymbol{X_{i,t-1}\gamma} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (4)$$

Here, $TightFC_{i,t}$ represents a dummy variable that takes one if the proxy of financial slack is less than the threshold value that we chose as the quartile or median value, and zero otherwise. Following the preceding studies (e.g., Liu and Mao, 2019; Maffini et al., 2019), we use three

variables as the proxies for financial slack of firms: the lagged cash flow defined by the sum of operating profits and depreciation, the lagged size in terms of sales, and the lagged age. The coefficient $\beta^{FCshort}$ represents the difference between the short-run treatment effect of SMEs with tighter financial constraints and that of SMEs with looser financial constraints.

We further examine the heterogeneity of the long-run average treatment effects on productivity with respect to financial constraints using the following specification:

$$Y_{i,t} = \alpha + \beta FYfirst\_19_t \times User_i + \beta^{FClong} TightFC_{i,t} \times FYfirst\_19_t \times User_i + \beta_2 TightFC_{i,t} \times User_i + \beta_3 TightFC_{i,t} \times FYfirst\_19_t + \sum_{T<first\ year} \beta^{T} FYT_t \times User_i + \boldsymbol{X_{i,t-1}\gamma} + \mu_t + \eta_i + \varepsilon_{i,t} \quad (5)$$

Here, the coefficient β^{FClong} represents a difference between the long-run average treatment effect of SMEs with tighter and looser financial constraints.

3.2. Data

When we regard eligibility for the tax incentive as the treatment, we use firm-level data during the period from 2011–2019 provided by Tokyo Shoko Research Ltd (TSR) that is one of the largest Japanese credit reporting agencies.[9] It records basic information on firm characteristics and financial statement information during that period. We define the treatment group as a set of firms that kept their stated capital at or below 100 million JYP during the period 2011–2014 and continued to survive through 2019. The number of firms that satisfy the definition of the treatment group is 33,677. In addition, we define the control group as a set of firms that maintained their stated capital above 100 million JYP and at or below 1 billion JPY during the

[9] Another large credit reporting agency in Japan is Teikoku Databank Ltd. (TDB). See, e.g., Coad and Kato (2021), among others, that use this database to examine SMEs' behavior.

period from 2011–2019. The number of firms that satisfy this definition is 553.

When we regard the use of the tax incentive as the treatment, we obtain the firm-level data for user firms from "Survey on SME Tax System" that is conducted by the Small and Medium Enterprise Agency of Japan.[10] This survey targets firms that answered that they had used tax incentive for SME investment in the past questionnaire surveys and firms whose plans for management enhancement were approved because they were likely to use tax incentive. It records basic information on firm characteristics and financial information, such as gross investment before depreciation and retirement during the period from 2011–2019 and the information on whether or not the firm used the special tax incentive for SME productivity-enhancing equipment during the period from 2014–2019. We define the treatment group as a set of firms that used the incentive for the first time in 2014 or 2015 and kept their stated capital at or below 100 million JYP from 2011 to the year when they first used the tax incentive. The number of firms that satisfy the definition of the treatment group is 610; the numbers of firms that used the incentive for the first time in 2014 and 2015 are 422 and 188, respectively. The definition of the control group and the number of firms in that group are the same as those in the case of using eligibility as the treatment.

Although the information on the treatment and control groups that come from different sources is comparable enough, there are some limitations. First, in the case of the first use as the treatment, investment for the treatment group equals the gross investment before depreciation and retirement; while for the control group, it is investment before depreciation but after retirement, that is, the increase in tangible fixed assets from the previous year plus depreciation because TSR does not provide information on the gross investment. Therefore, we overestimate the treatment effect of the SME tax incentive on the investment rate if the average retirement rate (i.e.,

[10] We rely on the data from the survey because the whole list of firms using the tax incentive is not provided to the Small and Medium Enterprise Agency of Japan or us by the tax authority.

retirement of old equipment divided by lagged tangible fixed assets) of the control group increases by more than that of the treatment group, which is not likely to occur.[11] Second, we cannot exclude firms that used the tax incentive targeted at large-size firms from the control group because information on whether firms used this tax incentive or not is not available. This inclusion causes underestimation of the treatment effects of the SME tax incentive. In this sense, our estimates are conservative. Third, some firms that used IDAs to invest did not increase their on-the-book capital because of the accounting method they chose. This accounting leads to the underestimation of the treatment effect on the capital intensity that is measured by the tangible fixed assets per employee that we examine along with labor productivity.

Table 1 shows the number of observations by fiscal year when firms first used the SME tax incentive for equipment of any type. The number of observations is the largest in 2014 when the SME tax incentive was introduced. It is the second largest in 2017 when the SME tax incentive was reorganized as SME management strengthening tax system. As Table 1 shows, many SMEs did not use special tax incentive in the year of introduction. This finding indicates that a large fraction of firms did not use the tax incentive because of the lack of investment opportunity, ignorance of the tax incentive, unfulfillment of conditions for qualified equipment, or being in a deficit position.

(Insert Table 1)

When we focus on equipment type, firms are likely to use the tax incentive for

[11] As firms in the control group are also eligible to use a tax incentive, some firms in the control group may use the incentive and increase their retirement rate. However, because the tax incentive applied to large-sized enterprises are less attractive than that for SMEs, the proportion of actual users in the control group are likely to be quite small. While information on the utilization rate of the incentive provided by productivity-enhancing investment promotion tax system for the large-sized enterprises is not available, that of IDAs and tax credits for all users including SMEs were between 0.58% and 1.03% and between 0.2% and 0.28%, respectively, over the period from 2016–2018.

equipment of type A. Among those that used them at least once between 2014 and 2019, the firms that used the incentive for type A, type B, and an unknown type are 1,043, 220, and 337, respectively (not shown in Table 1). In addition, the classification of the tax incentive by type shows that firms are likely to use IDAs rather than tax credits. Among the total number of times that firms used the tax incentive between 2014 and 2019, the shares of selecting IDAs, tax credits, both, and unknown are 73.8%, 19.4%, 3.4%, and 3.4%, respectively (not shown in Table 1). The fact that more than 70% of the tax incentive that firms selected were IDAs means that many firms used it to obtain cash immediately to loosen financial constraints; financially unconstrained firms would select tax credits because they only delay the tax payment and give firms few tax benefits due to the near-zero interest rate during this period.[12]

Table 2 shows the frequency distribution of using the SME tax incentive for equipment of any type by fiscal year when firms first used them. First, a large fraction of firms used the incentive more than twice. For example, about 93% (86%) of firms that used the incentive for the first time in 2014 (2015) used it more than once. Second, a small fraction of firms continued to use the incentive every year. For example, about 21% (19%) of firms that first used it in 2014 (2015) continued to use it every year.

(Insert Table 2)

Table 3 shows the descriptive statistics of the sample we use for estimation. To remove the effect of outliers, we winsorize the top and bottom 1% for all variables except for the dummy variables.

[12] For a smaller SME that makes 1-JPY investment, for example, cash obtained when it uses tax credits is 0.1JPY while cash obtained when it uses IDAs is $(1-\delta)\times\tau$ JPY, where δ and τ are the depreciation rate and the corporate tax rate, respectively. Thus, if $\tau = 0.34$, then the cash obtained from IDAs is larger than the tax credit if $\delta < 0.71$, which holds for most of the equipment and other capital goods.

(Insert Table 3)

4. Results

In this section, we present the results from estimating Equations (1) to (5) that capture the treatment effects of the tax incentive on capital investment and labor productivity.

4.1 Results from using Eligibility as Treatment

In this subsection, we present the results for the investment ratio when we use the firms that were eligible for the tax incentive as a treatment group and non-eligible firms as a control group. Specifically, the firms that had stated capital of 100 million JPY or less at least during the period from 2011–2014 are the treatment group regardless of whether they used the tax incentive or not while the firms with stated capital above 100 million JPY but below 1 billion JPY during the period from 2011–2019 comprise the control group.

Table 4 shows the results for Equation (1) that captures the treatment effects of the tax incentive on the investment ratio. In Column (1) of Table 4, we do not control for firm characteristics but in Column (2) we do. In both cases, the treatment effect is not significant.

(Insert Table 4)

We further estimate the treatment effect of the tax incentive on capital investment for each year from 2014 to 2019 using the same treatment and control groups as in Table 4. Figure 2 shows the results. It also depicts the estimated change in the difference between the treatment and control groups before the introduction of the incentive. First, we observe that the investment ratio

increased more for the treatment group than for the control group in 2013. Nonetheless, we find no significant treatment effect for any single year in 2014 and afterwards.

(Insert Figure 2)

These results indicate that the introduction of the tax incentive in 2014 per se did not increase the capital investment ratio for eligible firms on average. Presumably, SMEs' lack of knowledge concerning the tax incentive, losses, or their lack of timely investment opportunities led to a small proportion of SMEs that actually used the incentive that in turn, could account for the treatment effects on eligible firms not being significant.

4.2 Results from using use as the treatment

4.2.1 Baseline results for capital investment

In this subsection, we choose two treatment groups: the firms that first used the incentive in 2014 or in 2015, which we call 2014 and 2015 users hereafter, although some of the 2014 users used the tax incentive in 2015 as well. For the control group, we choose the firms with capital above 100 million JPY but below 1 billion JPY during the period from 2011–2019.

Table 5 shows the results estimating Equation (2) for the investment ratio. Columns (1) to (2) show the results for the 2014 users while Columns (3) and (4) show the results for the 2015 users. In Columns (1) and (3), we do not control for firm characteristics while in Columns (2) and (4), we do. In all of these specifications, the estimated treatment effects are positive and significant. Columns (2) and (4) indicate that the incentive increased the investment rate by 0.154 and 0.288 percentage points for the 2014 and 2015 users, respectively.

(Insert Table 5)

We further estimate the treatment effect of the tax incentive on capital investment for each year from either 2014 or 2015 to 2019. Panels A and B of Figure 3 show the results for the 2014 and 2015 users, respectively. They also depict the estimated changes in the differences between the treatment and control groups before the treatment groups used the incentive. First, there is no pre-trend in the difference between the treatment and control groups. Second, the treatment effects were significant and the largest in the first year that the treatment groups used the incentive. In the case of the 2015 users, the treatment effect was still positive and significant in the second year although the magnitude was smaller than in the first year. A decrease in the treatment effect after the first year that is shown in the case of both users is consistent with the fact that a small fraction of firms that first used the tax incentive in 2014 or 2015 continued to use it every year (shown in Table 2).

(Insert Figure 3)

4.2.2 Financial Constraints

Next, we examine whether the treatment effect is different between the firms that were likely to face tighter financial constraints and those with looser constraints. As we have explained in Section 3, we measure the degree of financial constraints with three proxies: lagged cash flow, lagged sales, and lagged age of the firm. We construct two financial constraint dummies $TightFC_{i,t}$ for each of these three measures that take one if the corresponding measure is below the quartile or median. Then, we estimate Equation (4) by using the term that interacts with one of these six financial constraint dummies and the treatment effect variable that is

$FYfirst_t \times Treated_i$, where $FYfirst_t$ is a dummy that takes one for FY 2014 or 2015 depending on the year of the first use of the tax incentive.

Panels A and B of Table 6 shows the results for the 2014 and 2015 users, respectively. In each panel, columns (1)-(6) show the results from using the six financial constraint dummies. For both of the treatment groups, the treatment effects take positive and significant coefficients that indicate the positive effect of the incentive on investment is observed even for firms with relatively looser financial constraints. Moreover, all the interaction terms of the constraint dummies and the treatment effect are positive, and three or four of the six interaction terms are significant (with one only marginally significant for each treatment group). The results show that the effect of the tax incentive is greater for firms with relatively tight financial constraints.[13]

(Insert Table 6)

4.3 Productivity

4.3.1 Baseline Results

In this section, we examine the treatment effect of the tax incentive on labor productivity as represented by sales per employee ($SALPE$) (e.g., Foster et al. 2001; Alon at al. 2018). Furthermore, to investigate whether an increase in labor productivity, if any, is caused by an increase in capital intensity (quantity channel) or an upgrade in capital (quality channel), we examine the treatment effect on the capital intensity in terms of tangible fixed assets per employee ($TANPE$) as well.

Table 7 shows the results for Equations (2) and (3) that capture the short-run and long-

[13] The results suggest that using tax incentive enables financially constrained firms to finance the full price of capital up front even if they can claim the tax incentive only after they make an investment, which is inconsistent with what Edgerton (2010) presumes.

run treatment effects of the tax incentive on productivity. In Table 7, Panels A and B show the results for the 2014 and 2015 users, respectively. In both panels, Columns (1) and (2) show the short-run treatment effects for the first year that the treated firms used the tax incentive while Columns (3) and (4) show the long-run treatment effects for the five or six years that followed since they first used it. For the long-run effects, we use the dummies for the periods from 2014 or 2015 to 2019 depending on the year of the first use of the tax incentive. Columns (1) and (3) show the results for $SALPE$ while Columns (2) and (4) show those for $TANPE$. Table 7 shows that for both of the 2014 and 2015 users, the treatment effects on $SALPE$ are positive and significant both in the short and long runs. On the other hand, the treatment effect on$TANPE$ is not positive and significant for 2014 or 2015 users in the short or the long run. While the tax incentive increased the investment ratio, firms may replace old capital with new capital. Another possible reason is the accounting issue that we have mentioned in Section 3.2. In sum, our results indicate that the tax incentive increased labor productivity both in the short and long runs and that such an increase in labor productivity is mainly caused by an upgrade in the capital that is consistent with a main aim of the incentive introduced in 2014.

(Insert Table 7)

We further estimate the treatment effect of the tax incentive on $SALPE$ for each year from 2014 or 2015 to 2019 using the 2014 and 2015 users as treatment groups. Panels A and B in Figure 4 show the results for the 2014 and 2015 users, respectively. They also depict the estimated difference between the treatment and control groups before treatment. Both panels show that there is no pre-trend between the two groups and that the treatment effect was persistent: the effect was positive and significant almost up to five years after first use of the incentive.

(Insert Figure 4)

4.3.2 Financial Constraints

We examine whether the short-run and long-run treatment effects of the tax incentive on productivity depend on the degree of financial constraints using the same financial constraint indicators as in Section 4.1.2. The results after estimating Equations (4) and (5), as shown in the appendix, indicate that there is little difference in the short- or long-run treatment effects on labor productivity between firms with tighter and looser constraints (with marginally significant positive differences in 3 out of 24 specifications).

As depicted in the previous section, the use of the tax incentive allows firms with tighter financial constraints to invest more that possibly leads to the upgrading of their capital. Here, our results concerning the effects on productivity are different from the evidence from China: Liu and Mao (2019) find that a reform of capital taxation due to a reform of the VAT in China had larger positive effects both on investment and productivity for financially constrained firms than for unconstrained firms. Given the larger treatment effect on the constrained firms' capital investment ratio, it might be natural to presume that the treatment effect on their productivity should be higher than that for unconstrained firms. Our results, which are contrary to this presumption, indicate the possibility that constrained firms were still suffering from frictions to invest in other capital such as intangibles while unconstrained firms were not. Such constraints on intangible investment could be typical for SMEs. This limitation might generate the difference between the result of our study and that reported in Liu and Mao who use data that include not only small but also large firms. It could also be the case that the contents of capital investments implemented by constrained and unconstrained firms are different and thus the treatment effect on financially

constrained firms' productivity is not higher than that for unconstrained firms.

5. Conclusion

In the present paper, we focus on specific tax incentive for productivity-enhancing equipment that was introduced in 2014 to estimate its causal effects on the capital investment and productivity of Japanese SMEs. First, when using the eligibility for the tax incentive as a treatment, we find that the exogenous decline in the prices of capital goods due to the introduction of the tax incentive in 2014 did not effectively increase the capital investment ratio of the eligible firms. This result could be due to the small number of firms using the tax incentive that might reflect SMEs' lack of knowledge concerning the tax incentive, losses, or their lack of timely investment opportunities. Second, using the actual use of the tax incentive as a treatment results in a higher capital investment ratio for the users mainly in the first year when they used the tax incentive as well as short-term and long-term improvements in their labor productivity when measured by sales-per-employee. Third, an increase in labor productivity for a user of the tax incentive is not accompanied by an increase in capital intensity when measured by tangible fixed assets per employee that indicates an increase in labor productivity is mainly caused by an increase in the quality of capital. Fourth, we find a larger increase in the capital investment ratio for less cash-rich, smaller, and younger firms that used the tax incentive. These results show that the actual use of the tax incentive mitigates the financial constraints to upgrade capital and improve labor productivity.

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Table 1 Use for the SME tax incentive for equipment of any type (type A, type B, or unknown type)

Firms that first used tax incentives in:	Number of obs.	Percent
FY2014	422	29.63
FY2015	188	13.2
FY2016	163	11.45
FY2017	263	18.47
FY2018	229	16.08
FY2019	159	11.17
Total	1,424	100

Table 2 Distribution of frequency of using the SME tax incentive for equipment of any type

Firms that first used tax incentives from:	Frequency of claiming tax incentives						
	1	2	3	4	5	6	Total
FY2014	29	65	72	78	89	89	422
	(6.87)	(15.40)	(17.06)	(18.48)	(21.09)	(21.09)	(100)
FY2015	27	48	48	30	35	0	188
	(14.36)	(25.53)	(25.53)	(15.96)	(18.62)	(0.00)	(100)
FY2016	49	47	34	33	0	0	163
	(30.06)	(28.83)	(20.86)	(20.25)	(0.00)	(0.00)	(100)
FY2017	114	66	83	0	0	0	263
	(43.35)	(25.10)	(31.56)	(0.00)	(0.00)	(0.00)	(100)
FY2018	140	89	0	0	0	0	229
	(61.14)	(38.86)	(0.00)	(0.00)	(0.00)	(0.00)	(100)
FY2019	159	0	0	0	0	0	159
	(100.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(100)
Total	518	315	237	141	124	89	1424
	(36.38)	(22.12)	(16.64)	(9.90)	(8.71)	(6.25)	(100)

Table 3 Descriptive statistics for dataset for estimating the treatment effects

Panel A: Using eligibility as treatment

Variable	N	Mean	SD	Min	Max
INVRATE	251137	0.164	0.704	-1	5.235
Eligible	251137	0.983	0.131	0	1
Lagged profitability	251137	0.400	1.454	-4	9.83
Lagged ln fixed assets	251137	4.086	1.751	0	8.377

Panel B: Using first use of the tax incentive in 2014 as treatment

Variable	Unit	N	Mean	SD	Min	Max
INVRATE		7393	0.230	0.575	-0.091	6.135
User		7393	0.410	0.492	0	1
Lagged profitability		7393	0.433	1.608	-1.322	17.67
Lagged ln fixed assets		7393	6.900	1.656	0.610	9.842
SALPE	Million JYP	7386	52.77	60.29	3.348	314.2
TANPE	Million JYP	7385	15.26	22.27	0.016	131.7
Lagged cash flow	Million JYP	7371	404	598	-70	2898
Lagged sales	Million JYP	7393	7891	11733	22.11	54791
Lagged firm age		7129	56	37	0	797

Panel C: Using first use of the tax incentive in 2015 as treatment

Variable	Unit	N	Mean	SD	Min	Max
INVRATE		5644	0.189	0.541	-0.091	6.135
User		5644	0.227	0.419	0	1
Lagged profitability		5644	0.420	1.712	-1.322	17.67
Lagged ln fixed assets		5644	7.193	1.540	0.610	9.842
SALPE	Million JYP	5691	58.72	64.58	3.348	314.2
TANPE	Million JYP	5691	17.70	24.88	0.016	131.7
Lagged cash flow	Million JYP	5600	441	619	-70	2898
Lagged sales	Million JYP	5644	9193	12541	22.11	54791
Lagged firm age		5436	57	48	0	797

Notes: INVRATE is defined as investment divided by the lagged tangible fixed assets. Eligible is a dummy that takes one if firm i is eligible to use the SME tax incentive and zero if firm i is not eligible to use the SME tax incentive. User is a dummy variable that takes one if firm i first used the tax incentive in 2014 (or 2015) and zero if it is not eligible to use the tax incentive. Profitability is the operating profit divided by the lagged tangible fixed assets. Cash flow is defined as the sum of operating profit and depreciation. Firm age is defined as the difference between the present year t and the founding year of firm. SALPE and TANPE represent sales per employee and tangible fixed assets per employee, respectively.

Table 4 The results from using eligibility as treatment

	Dependent variable: INVRATE			
	(1)		(2)	
Eligible*FY2014	-0.027		-0.003	
	(0.017)		(0.016)	
Lagged profitability			0.082	***
			(0.003)	
Lagged ln fixed assets			-0.643	***
			(0.008)	
Constant	0.216	***	2.749	***
	(0.004)		(0.034)	
Eligible*each FY dummy	Y		Y	
Eligible*FY2012 only	N		N	
Year fixed effects	Y		Y	
Firm fixed effects	Y		Y	
Number of obs	251,137		251,137	
R-squared	0.003		0.140	

Notes: INVRATE is defined as investment divided by the lagged tangible fixed assets. Eligible is a dummy that takes one if firm i is eligible to use the SME tax incentive and zero if firm i is not eligible to use the SME tax incentive. FY2014 is a dummy that takes one if fiscal year t is 2014 and zero otherwise. Profitability is the operating profit divided by the lagged tangible fixed assets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels respectively. Clustered robust standard errors are in the parentheses.

Table 5 The results from using first use of the tax incentive as treatment

	Dependent variable: INVRATE			
	First year: 2014		First year: 2015	
	(1)	(2)	(3)	(4)
User*FYfirst	0.158 ***	0.154 ***	0.287 ***	0.288 ***
	(0.045)	(0.043)	(0.087)	(0.072)
Lagged profitability		0.131 ***		0.149 ***
		(0.032)		(0.042)
Lagged ln fixed assets		-0.409 ***		-0.404 ***
		(0.064)		(0.085)
Constant	0.210 ***	2.964 ***	0.171 ***	3.000 ***
	(0.013)	(0.443)	(0.015)	(0.610)
User*each FY dummy	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y
Number of obs	7,393	7,393	5,644	5,644
R-squared	0.008	0.141	0.014	0.159

Notes: Treatment group consists of the firms that first used the tax incentive either in 2014 or 2015. INVRATE is defined as investment divided by the lagged tangible fixed assets. User is a dummy variable that takes one if firm i first used the tax incentive in 2014 (or 2015) and zero if it is not eligible to use the tax incentive. First year is a dummy variable that takes one if fiscal year t is 2014 in columns (1) and (2) and 2015 in columns (3) and (4) while it is zero otherwise. Profitability is the operating profit divided by the lagged tangible fixed assets. ***, **, and * indicates statistical significance at the 1%, 5%, and 10% level respectively. Clustered robust standard errors are in the parentheses.

Table 6 Heterogeneous treatment effects of the tax incentive on investment ratio that depends on financial constraints

Panel A. 2014 users

	Dependent variable: INVRATE					
	TightFC: Lagged cash flow below		TightFC: Lagged sales below		TightFC: Lagged firm age below	
	quartile	median	quartile	median	quartile	median
	(1)	(2)	(3)	(4)	(5)	(6)
User*FY2014	0.116 ***	0.078 **	0.107 ***	0.107 ***	0.126 ***	0.086 **
	(0.039)	(0.036)	(0.037)	(0.039)	(0.041)	(0.041)
TightFC*User*FY2014	0.291 *	0.196 **	0.325 **	0.089	0.234	0.199 **
	(0.175)	(0.088)	(0.146)	(0.093)	(0.148)	(0.084)
TightFC*FY2014	0.044	0.025	-0.029	0.018	-0.024	-0.065 **
	(0.031)	(0.037)	(0.031)	(0.065)	(0.057)	(0.033)
Constant	2.968 ***	2.968 ***	2.963 ***	2.959 ***	2.981 ***	2.995 ***
	(0.441)	(0.443)	(0.442)	(0.442)	(0.453)	(0.454)
User*each FY dummy	Y	Y	Y	Y	Y	Y
Control variables	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Number of obs	7,371	7,371	7,393	7,393	7,129	7,129
R-squared	0.144	0.144	0.143	0.141	0.144	0.144

Panel B. 2015 users

	Dependent variable: INVRATE					
	TightFC: Lagged cash flow below		TightFC: Lagged sales below		TightFC: Lagged firm age below	
	quartile	median	quartile	median	quartile	median
	(1)	(2)	(3)	(4)	(5)	(6)
User*FY2015	0.277 ***	0.216 **	0.244 ***	0.169 **	0.225 ***	0.133 **
	(0.077)	(0.087)	(0.075)	(0.073)	(0.072)	(0.063)
TightFC*User*FY2015	0.061	0.147	0.280	0.302 **	0.404 *	0.355 ***
	(0.249)	(0.131)	(0.206)	(0.132)	(0.223)	(0.129)
TightFC*FY2015	0.0002	0.030	-0.063	-0.027	-0.016	-0.039
	(0.042)	(0.032)	(0.038)	(0.032)	(0.051)	(0.027)
Constant	3.012 ***	3.014 ***	3.000 ***	3.013 ***	2.966 ***	2.977 ***
	(0.612)	(0.613)	(0.608)	(0.608)	(0.618)	(0.618)
User*each FY dummy	Y	Y	Y	Y	Y	Y
Control variables	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Number of obs	5,600	5,600	5,644	5,644	5,436	5,436
R-squared	0.160	0.161	0.160	0.162	0.163	0.163

Notes: Treatment group consists of firms that first used the tax incentive in 2014 in Panel A and 2015 in Panel B. INVRATE is defined as investment divided by the lagged tangible fixed assets. User is a dummy variable that takes one if firm i first used the tax incentive in 2014 (or 2015) and zero if it is not eligible to use the tax incentive. TightFC is a dummy that takes one if the proxy for financial constraint is less than the threshold of each year and zero otherwise. Cash flow is defined as the sum of operating profit and depreciation. Firm age is defined as difference between the present year t and the founding year. Control variables are the operating profit divided by the lagged tangible fixed assets, and the natural logarithm of one plus fixed assets. ***, **, and * indicates statistical significance at the 1%, 5%, and 10% levels respectively. Clustered robust standard errors are in parentheses.

Table 7. Treatment effects of the tax incentive on labor productivity and capital intensity

Panel A. 2014 users

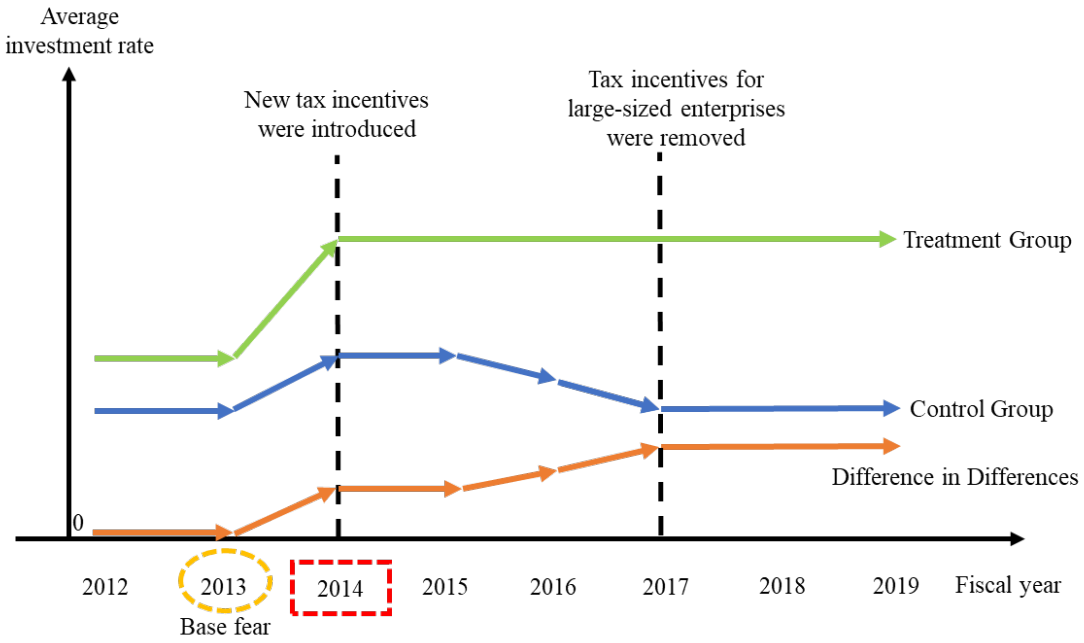
	Dependent variable:			
	SALPE	TANPE	SALPE	TANPE
	(1)	(2)	(3)	(4)
User*FY2014	2.787 **	-0.363		
	(1.259)	(0.287)		
User*FY2014_19			2.331 **	-0.624 *
			(0.922)	(0.370)
Constant	48.32 ***	-17.36	46.49 ***	-16.93 **
	(5.214)	(6.729)	(5.061)	(6.688)
User*each FY dummy	Y	Y	N	N
User*FY2012 only	N	N	Y	Y
Control variables	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y
Number of obs	7,386	7,385	7,386	7,385
R-squared	0.006	0.046	0.005	0.046

Panel B. 2015 users

	Dependent variable:			
	SALPE	TANPE	SALPE	TANPE
	(1)	(2)	(3)	(4)
User*FY2015	2.260 ***	-0.421		
	(0.719)	(0.807)		
User*FY2015_19			2.558 ***	-0.874
			(0.804)	(0.896)
Constant	62.75 ***	-16.77 **	60.78 ***	-16.20 **
	(7.310)	(8.353)	(7.210)	8.222
User*each FY dummy	Y	Y	N	N
User*FY2012 and User*FY2013 only	N	N	Y	Y
Control variables	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y
Number of obs	5,691	5,691	5,691	5,691
R-squared	0.005	0.040	0.005	0.039

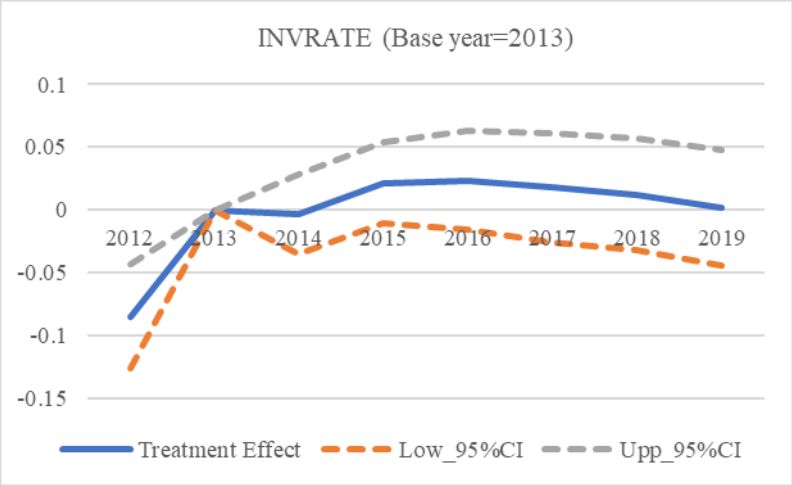
Notes: Treatment group consists of firms that first used the tax incentive in 2014 in Panel A and 2015 in Panel B. SALPE and TANPE represent sales per employee and tangible fixed assets per employee, respectively. User is a dummy variable that takes one if firm i first used the tax incentive in 2014 (or 2015) and zero if it is not eligible to use the tax incentive. FY2014_19 is a dummy that takes one if year t is between fiscal year 2014 and 2019, and zero otherwise. FY2014 is a dummy that takes one if year t is fiscal year 2014 and zero otherwise. FY2015_10 and FY2015 are similarly defined. Control variables are the operating profit divided by the lagged tangible fixed assets, and the natural logarithm of one plus fixed assets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Clustered robust standard error are in the parentheses.

Figure 1: Predicted change in average investment rate by group



Notes: Difference is defined as the difference between average investment rate in each year and that in base year (2013).

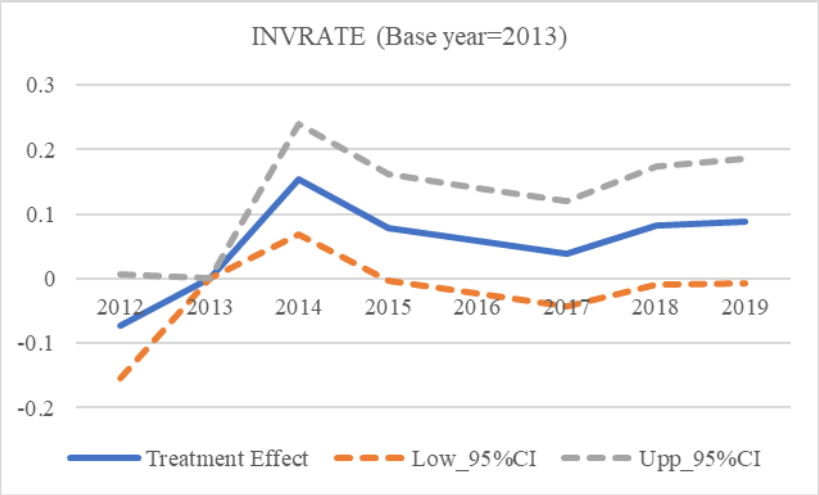
Figure 2 Treatment effect of the tax incentive on investment ratio in each year: the results from using eligibility as treatment



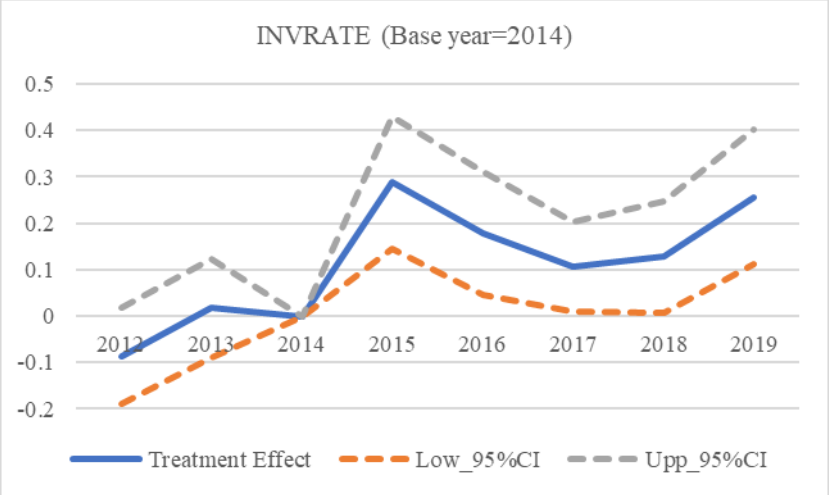
Notes: Treatment group consists of firms that were eligible for the tax incentive in 2014. We estimate the treatment effect of the tax incentive on investment rate in each year using Equation (1).

Figure 3. Treatment effect of the tax incentive on investment ratio in each year: the results from using first use as the treatment

Panel A. 2014 users



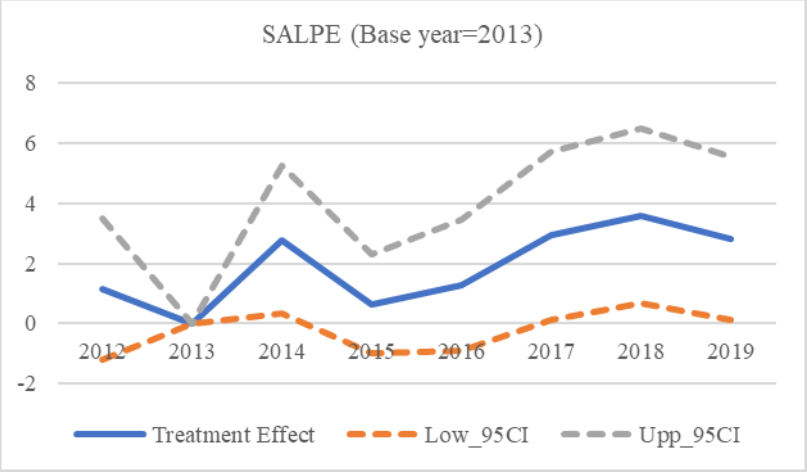
Panel B. 2015 users



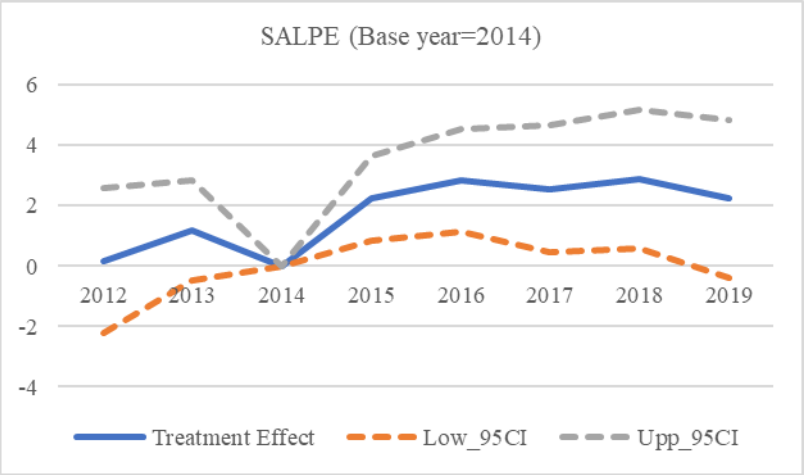
Notes: Treatment group consists of firms that first used the tax incentive in 2014 in Panel A and 2015 in Panel B. We estimate the treatment effect of the tax incentive on investment rate for each year using Equation (2).

Figure 4. Treatment effects of the tax incentive on labor productivity in each year

Panel A. 2014 users



Panel B. 2015 users



Notes: Treatment groups consist of the firms that first used the tax incentive in 2014 in Panel A and 2015 in Panel B. We estimate the treatment effect of tax incentive on sales per employee in each year using Equation (2).

Appendix: Heterogeneous treatment effects on labor productivity that depend on financial constraints

Panel A1. Short-run effects for 2014 users

	Dependent variable: SALPE					
	TightFC: Lagged cash flow below		TightFC: Lagged sales below		TightFC: Lagged firm age below	
	quartile	median	quartile	median	quartile	median
	(1)	(2)	(3)	(4)	(5)	(6)
User*FY2014	2.241	1.323	2.514 *	3.665 *	2.447 *	3.183
	(1.378)	(1.398)	(1.418)	(2.100)	(1.475)	(1.970)
TightFC*User*FY2014	5.021	5.649 *	5.652	-1.377	3.186	-0.619
	(3.161)	(2.942)	(4.037)	(2.859)	(2.911)	(2.395)
TightFC*FY2014	-2.152 *	-3.611 ***	-5.036	-0.700	-1.450	-1.219
	(1.277)	(1.069)	(3.267)	(1.794)	(1.528)	(1.068)
Constant	48.25 ***	48.14 ***	48.24 ***	48.40 ***	46.659 ***	46.859 ***
	(5.235)	(5.243)	(5.226)	(5.195)	(5.279)	(5.323)
User*each FY dummy	Y	Y	Y	Y	Y	Y
Control variables	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Number of obs	7,357	7,357	7,386	7,386	7,119	7,119
R-squared	0.006	0.007	0.006	0.006	0.006	0.006

Table A2 Long-run effects for 2014 users

	Dependent variable: SALPE					
	TightFC: Lagged cash flow below		TightFC: Lagged sales below		TightFC: Lagged firm age below	
	quartile	median	quartile	median	quartile	median
	(1)	(2)	(3)	(4)	(5)	(6)
User*FY2014_19	2.347 **	1.849 *	2.584 ***	1.663	2.780 ***	2.981 **
	(0.952)	(0.946)	(0.985)	(1.094)	(1.076)	(1.392)
TightFC*User*FY2014_19	-0.013	2.331	0.021	4.645	-2.238	-1.398
	(2.111)	(1.919)	(3.801)	(4.454)	(2.901)	(1.913)
TightFC*FY2014_19	-2.468 *	-2.438	-2.209	-4.191	0.479	0.346
	(1.493)	(1.607)	(3.686)	(4.332)	(2.409)	(1.482)
Constant	47.661 ***	47.560 ***	46.741 ***	47.538 ***	44.922 ***	45.086 ***
	(5.080)	(5.213)	(5.113)	(5.286)	(5.247)	(5.217)
User*FY2012	Y	Y	Y	Y	Y	Y
Control variables	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Number of obs	7,357	7,357	7,386	7,386	7,119	7,119
R-squared	0.006	0.006	0.005	0.006	0.005	0.005

Panel B1. Short-run effects for 2015 users

	Dependent variable: SALPE					
	TightFC: Lagged cash flow below		TightFC: Lagged sales below		TightFC: Lagged firm age below	
	quartile	median	quartile	median	quartile	median
	(1)	(2)	(3)	(4)	(5)	(6)
User*FY2015	2.479 ***	1.930 **	2.141 ***	1.281	1.524 *	1.532
	(0.798)	(0.975)	(0.802)	(0.935)	(0.810)	(1.016)
TightFC*User*FY2015	-1.471	1.058	4.495	2.797 *	4.268 *	1.779
	(1.614)	(1.499)	(4.427)	(1.618)	(2.544)	(1.523)
TightFC*FY2015	-0.493	-0.646	-4.477	-0.668	-1.955	-1.324
	(0.900)	(0.926)	(4.273)	(1.180)	(1.491)	(0.957)
Constant	63.230 ***	63.275 ***	62.756 ***	62.888 ***	61.333 ***	61.418 ***
	(7.445)	(7.439)	(7.313)	(7.312)	(7.438)	(7.429)
User*each FY dummy	Y	Y	Y	Y	Y	Y
Control variables	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Number of obs	5,630	5,630	5,691	5,691	5,484	5,484
R-squared	0.005	0.005	0.005	0.005	0.005	0.005

Panel B2. Long-run effects for 2015 users

	Dependent variable: SALPE					
	TightFC: Lagged cash flow below		TightFC: Lagged sales below		TightFC: Lagged firm age below	
	quartile	median	quartile	median	quartile	median
	(1)	(2)	(3)	(4)	(5)	(6)
User*FY2015_19	2.473 ***	2.570 ***	2.682 ***	2.130 **	2.144 **	3.103 **
	(0.797)	(0.856)	(0.857)	(0.915)	(0.966)	(1.236)
TightFC*User*FY2015_19	0.737	0.515	-1.016	3.591	1.450	-1.535
	(1.910)	(1.810)	(2.830)	(3.627)	(2.597)	(1.755)
TightFC*FY2015_19	-2.086	-1.335	0.362	-3.524	1.084	0.881
	(1.562)	(1.652)	(2.614)	(3.477)	(1.873)	(1.337)
Constant	62.502 ***	62.271 ***	60.839 ***	62.182 ***	60.438 ***	59.471 ***
	(7.365)	(7.532)	(7.241)	(7.474)	(7.138)	(7.227)
User*FY2012 and User*FY2013	Y	Y	Y	Y	Y	Y
Control variables	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Number of obs	5,630	5,630	5,691	5,691	5,484	5,484
R-squared	0.006	0.005	0.005	0.006	0.005	0.005

Notes: Treatment groups consist of the firms that first used the tax incentive in 2014 in Panels A1 and A2 and 2015 in Panels B1 and B2. SALPE is sales per employees. User is a dummy variable that takes one if firm i first used the tax incentive in 2014 (or 2015) and zero if it is not eligible to use the tax incentive. FY2014 is a dummy that takes one if year t is fiscal year 2014 and zero otherwise. FY2014_19 is a dummy that takes one if year t is between fiscal year 2014 and 2019 and zero otherwise. FY2015_19 and FY2015 are similarly defined. TightFC is a dummy that takes one if the proxy for a financial constraint is less than the threshold of each year and zero otherwise. Cash flow is defined as the sum of operating profit and depreciation. Firm age is defined as difference between the present year t and the founding year of the firm. Control variables are the operating profit divided by the lagged tangible fixed assets, and the natural logarithm of one plus fixed assets. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels respectively. Clustered robust standard errors are in parentheses.