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Abstract

We study the impact of corporate taxes on firm-level investments, total output and input usage by exploiting a 4.5 percentage-point corporate tax rate cut in Finland in 2014. We use detailed administrative data and a differences-in-differences method comparing small corporations (tax rate cut) to similar partnerships (no change in tax incentives). We find no significant investment responses. However, we observe an increase in annual sales and variable costs, suggesting that corporate tax rates have an effect on business activity. The effects are driven by entrepreneurs who actively work in their firm, suggesting that the tax cut increased entrepreneurial effort.

Key words: corporate taxation, investments, business activity, small firms

JEL classes: G31, G38, H21, H25

1 Introduction

During the last decade, many developed countries have reduced their corporate tax rates in order to prompt firm-level investments and economic activity. Recently, in 2017, the US cut its corporate tax rate from 35% to 21%. In addition, various other investment stimuli have been introduced in many countries, such as more favorable deduction and depreciation rules. These reforms have reduced the cost of capital and relaxed the financial constraints of firms, creating incentives for new investments and increased business activity. This development has also prompted researchers to study the effects of these reforms using quasi-experimental methods and administrative data, focusing mostly on investment responses and the incidence of corporate taxes (Yagan 2015; Bond and Xing 2015; Suarez Serrato and Zidar 2016; Zwick and Mahon 2017; Ohn 2018; Fuest et al. 2018; Maffini et al. 2019; Liu and Mao 2019; Ohn 2019).

Despite this recent surge in empirical evidence, many key questions are still unanswered. There is only scarce quasi-experimental evidence on the impacts of corporate taxes, a central parameter in policy debate, on firm-level investments and growth. Many of the earlier papers focus on analyzing investment incentives that are targeted at specific types of firms or industries, such as bonus depreciations and special tax deductions. Consequently, there is a lack of knowledge on how changes in firm-level incentives that apply to the universe of the firm population, such as a corporate tax cut, affect investments and economic activity. Furthermore, evidence on the impact of financial incentives among small firms is very limited, even though these firms are argued to play a key role in spurring economic growth and employment (see e.g. Decker et al. 2014).

We contribute to the literature by providing novel evidence of the effects of a corporate tax rate cut on small firms. We study a large 4.5 percentage-point reduction in the corporate tax rate in 2014 in Finland. This tax cut is considerable, and approximately five times larger than the average corporate tax rate variation used in Fuest et al. [2018], who study the corporate tax incidence in Germany. This exogenous variation, together with high-quality administrative data covering all Finnish businesses, enables us to analyze the effect of the tax cut on a range of key firm-level behavioral margins. Moreover, the corporate tax cut in Finland was combined with a dividend tax increase that left the shareholder-level effective dividend tax rate mostly unchanged, allowing us to focus on the effects of firm-level corporate taxes.¹

Our analysis focuses on small firms with annual sales below 2.5 million euros. We use a differences-in-differences method utilizing similar-sized and otherwise comparable partnership firms with no changes in taxes as a control group, allowing for credible and transparent identification of the impact of the tax cut on small firms. We follow a weighting estimation procedure used by Yagan [2015] and Zwick and Mahon [2017] to ensure the comparability of the outcomes between these organizational forms.

First, we show that the development of our outcome variables follows parallel trends for the treatment (corporations) and control (partnerships) groups prior to the corporate tax cut, ensuring the validity of our empirical approach. Then we study the effect of the reform on investments relative to existing capital assets, a main outcome of interest explored in both theoretical and empirical

¹In general, firm-level taxes are argued to be more relevant for new investment and growth. According to the new view of dividend taxation, the dividend tax rate does not affect the marginal cost of capital that determines the level of new investment but the corporate tax rate does [Auerbach, 1979].

corporate tax literature. Importantly, we also examine the impact of the tax cut on other outcomes reflecting the business activity of firms, including sales, labor costs, input use, value added and firm entry. These outcomes are rarely studied in the previous literature but are particularly relevant for small firms as they offer additional measures of firm growth.

We find no significant investment responses in the stock of productive capital after the large corporate tax rate cut. However, we find an increase in sales and inputs for the treated corporations, implying a higher growth rate after the corporate tax rate cut. These results suggest that the overall business activity of small firms increased after the tax cut while investments in the stock of productive capital did not. Therefore, our results highlight that physical investments are not the only relevant firm-level margin to analyze when studying the impact of corporate tax rates on small and growing firms, as overall business activity can also be affected.

We find that the responses are driven by entrepreneurs who actively work and manage their own firms. This indicates that the tax cut increased entrepreneurial effort, which is reflected in larger responses among those firms where the main owner is closely connected to the business operations and decisions. We believe that this is the main mechanism driving the observed responses, a channel that has not been studied before in the corporate tax literature and also rarely in other fields of literature. Moreover, we find no differences in responses for more or less cash-constrained firms and no effects on firm entry, implying that these potential channels do not explain our results.

Our results contribute to the existing literature in many ways. First, we contribute to the literature studying the effects of financial incentives on investments. Most of the previous quasi-experimental literature exploits targeted variation in investment incentives, such as bonus depreciations or special tax deductions, aimed at boosting investments in particular industries or groups of firms. This branch of literature commonly estimates very large investment responses. For example, Ohn [2018] uses changes in deduction regulation in the US and finds a large investment response and an implied elasticity of investments of 6.5. House and Shapiro [2008] and Zwick and Mahon [2017] use changes in depreciation rules in the US and find significant investment responses and very large investment elasticities, 7.7 and 7.2, respectively. Maffini et al. [2019] find similar results in the UK.

In contrast, we find a small and insignificant investment response and elasticity estimate (0.5). One potential reason for the smaller average response is that all firms face a cut in the corporate tax rate regardless of their investment behavior, whereas special tax deductions and accelerated depreciations are typically granted only for new investments. In these cases, tax reductions are materialized only when firms invest. Therefore, our results underline that average responses to a universal cut in a corporate tax rate can be very different and lead to different policy implications compared to the impacts of targeted changes in investment incentives analyzed in the previous literature.

Moreover, only few previous papers study the investment responses of universal business tax reforms using firm-level data. Yagan [2015] studies the massive 2003 dividend tax cut in the US and finds a large response in dividend payments but no effect on new investments, indicating a very small elasticity of investments with respect to dividend tax rates. However, according to our knowledge, our paper is the first that uses firm-level data and quasi-experimental variation to study the investment effects of a universal change in the corporate tax rate.

In addition, we study relatively small firms, which are argued to play a key role in economic development and employment growth [Decker et al., 2014]. Therefore, learning about the responsiveness of these firms is highly relevant but still relatively understudied, although there are some exceptions (see e.g. Benzarti et al. 2020). Our results suggest that firm-level incentives are indeed important for the growth of small firms. Furthermore, we study the responses separately for firms with active and passive main owners. According to our results, the role of the owner-manager is crucial for business activity and growth. This evidence is well in line with a recent paper by Smith et al. [2019] highlighting the importance of active owners in firm performance in the US. However, our results show that firms with active owner-managers also respond more actively to monetary incentives compared to firms with more passive owners.

This paper proceeds as follows. In Section 2, we describe the business tax system in Finland. In Section 3, we provide the details of the data and discuss our methods. Section 4 presents the results and Section 5 concludes.

2 Institutions

In this paper we study the effects of a large corporate tax rate cut in Finland. The tax rate on corporate profits was reduced by 4.5 percentage points from 24.5% to 20% from January 2014 onward. This reform continues the downward trend in corporate tax rates in Finland and many other developed countries. For example, corporate taxes were cut in Germany in 2008, the UK in 2008, 2011, 2012 and 2013, Sweden in 2009, Canada in 2008-2012, and the US in 2017. In Finland, the 2014 tax rate cut was preceded by a smaller 1.5 percentage-point tax cut in 2012. We examine both of these changes, but focus mainly on the latter and larger tax cut.

The corporate tax rate cut affected all public and privately held corporations, but other organizational forms were unaffected by the reform. Therefore, we use partnership firms as a control group for small corporations in the empirical analysis we introduce below. Next we briefly describe the main differences in the taxation of these two organizational forms.

A privately held corporation is the most common organizational form in Finland, representing nearly half of all Finnish firms. Privately held corporations are separately tax-liable, meaning that their profits are taxed at the firm level according to the corporate tax rate. Owners of privately held corporations pay an additional tax on the income withdrawn from the firm. Partnerships are pass-through entities, meaning that their profits are taxed directly at the owner level. Therefore, the corporate tax rate does not affect them.

An owner of a privately held corporation can withdraw income from the firm either as wages or dividends. In Finland, wage and capital income are taxed at different tax rate schedules. The wage tax schedule is progressive, with top marginal tax rates of approximately 55%. The dividend income tax system is rather complicated, including one tax rate kink determined by firm-level net assets and another kink based on the euro amount of the dividends withdrawn. The profits of partnership firms are taxed directly at the owner level based on a predetermined tax schedule. Owners of partnership firms also have a net asset threshold in their tax schedule, which divides profits into capital income and wage income components. Profits that fall under the firm net asset threshold are taxed according to the capital income tax schedule, and any income above the threshold is taxed as the owner's wage

income.

The cut in the corporate tax rate in 2014 was implemented together with a dividend tax increase for the owners of small corporations. At the owner level, the impact of the reduction in the corporate tax rate was largely offset by a dividend tax rate increase that typically increased the effective dividend tax rate by 1.5 percentage points. Therefore, the corporate tax cut mainly affected incentives for investment funded from retained earnings or debt, while the cost of capital for new equity (share issues) remained mostly unchanged or faced only a modest increase. However, for the owners of larger firms with large firm-level net assets, the effective dividend tax rate was typically reduced in 2014. Nevertheless, as we restrict our sample to small firms, this does not concern our empirical analysis. Furthermore, there were no changes in the taxation of partnership firms at the time of the 2014 corporate tax rate cut. Therefore, partnership firms constitute a suitable comparison group for small privately held corporations. A more detailed description of recent changes in the taxation of corporations and partnership firms in Finland is presented in Appendix B.

Finally, there were no other significant changes in business taxation at the time of the corporate tax cut. For example, depreciation rules and the corporate tax base remained unchanged. Furthermore, the depreciation rules are similar for both organizational forms, and investment costs are depreciated over their lifetime following similar category-specific regulations by the Finnish Tax Administration for both corporations and partnerships.

3 Data, Methods and Identification

We use data from the Finnish Tax Administration including all Finnish privately held corporations and partnerships in 2008–2016. These data enable us to access a wide range of firm-level outcomes such as investments, sales, labor costs and other input categories. In addition, we link firm owners to their firms using unique identifiers. The owner-level data include information on, for example, income withdrawn from the firm and the ownership share of the firm. We restrict our sample to firms that are owned by individuals, and thus exclude firms that are owned by other firms, institutional investors, or hedge funds etc. We use these data in an unbalanced panel form.

We use a differences-in-differences method to study the effects of the corporate tax cut. The main outcomes we study are investment per lagged capital, sales, variable costs, labor costs and value added of the firm. Our baseline estimable equation is of the following form:

$$Y_{it} = \alpha_1 + \alpha_2(Treat_i \times Post_t) + \beta_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where Y is the outcome variable of interest, i refers to a firm and t is time. The treatment group ($Treat$) is privately held corporations and the control group is partnership firms. $Post$ refers to the period after the tax rate cut (from 2014 onward). We include firm and year-fixed effects (β_i , λ_t) in the baseline estimation, and ε is the error term. Standard errors are clustered at the firm level.

The main identifying assumption in our differences-in-differences approach is the parallel trends assumption. This means that in the absence of the corporate tax cut, the development of firm outcomes would have been similar among corporations and partnerships. To ensure that the firms are comparable between the organizational forms, we apply two modifications: we restrict our sample

to small firms and use a re-weighting strategy.

First, our baseline sample includes firms with previous year’s annual sales between 100,000–2,500,000 euros and net assets below 750,000 euros. We restrict the sample due to the much longer tail of the size distribution of corporations compared to partnerships, stemming from the fact that a majority of large firms in Finland are corporations. Therefore, partnership firms offer a suitable comparison group only for relatively small corporations. Furthermore, we drop the smallest firms from the sample in order to focus on full-time businesses and more established firms. In more detail, the upper sales limit is based on the 99th percentile of the sales of partnership firms (2,503,624 euros). The net asset limit is set to ensure that firms are affected by the owner-level taxes in a similar way, i.e. we do not include the owners of corporations with large net assets whose effective dividend tax rate was reduced in 2014, as mentioned above in Section 2. Table 1 presents the number of observations dropped when implementing these restrictions.²

Table 2 describes the summary statistics for the restricted sample in 2011. The sales variable contains net-of-tax annual sales of the firm. Investments refer to the purchase price of all newly installed capital assets. These include, for example, machinery and buildings. We winsorize the investment per lagged capital variable at a 95% percentile to avoid the potential impact of extreme outliers. Labor costs include gross wages and other related costs such as mandatory pension contributions (excluding individual-level income taxes). Variable costs refer to all other costs than fixed costs and labor costs, including intermediate goods, materials and services used in production. Value added is defined as sales minus variable costs. Table 3 presents the detailed definition of each variable we use in our empirical analysis.

Table 2 shows that while the organizational forms are relatively similar to each other on average, the partnership firms in the restricted sample are still slightly smaller. Furthermore, both corporations and partnerships operate in similar industries, as shown in Figure 1, but there are some differences in the shares of firms in each industry category between the organizational forms. Therefore, in our baseline regression specification, we follow Yagan [2015] and Zwick and Mahon [2017] and use a non-parametric re-weighting strategy based on DiNardo et al. [1996] to control for any size or industry-specific shocks. First, we assign each observation to one of the ten industry categories presented in Figure 1. Then we divide each industry category into four size groups based on previous years’ annual sales. This creates 40 different industry-size bins for both organizational forms for each year. Following the approach in Yagan [2015], the sum of sales in each bin is weighted to match the base-year group of privately held corporations in 2011. Intuitively, the weight factor is higher than one if the sum of sales of the firms in a group is lower than in the base group, and vice versa.

In order to evaluate the validity of our empirical approach, we examine the evolution of our main outcome variables prior to the corporate tax cut for both organizational forms. As shown and discussed below in Section 4, the trends follow each other reasonably well for all the main outcomes we consider. The fact that the variables follow parallel trends prior to the reform mitigates the potential concern that small firms would not be comparable between the organizational forms. In addition, we control for the potential impact of the small corporate tax cut in 2012 by adding a

²The exact sample restrictions do not affect our results in a meaningful manner, as is visible from Appendix A Table 14. In the table, we vary the sample restrictions by reducing and increasing the upper (2,503,624 euros) and lower (100,000 euros) sales limits of the sample by 20%.

separate control for this for the treated corporations, where we interact the treatment status with the years right after this reform ($Treat_i \times Year_{2012,2013}$).

Finally, the corporate tax rate cut increased incentives for existing partnership firms to change their organizational form to corporations. This would be a concern for our empirical setting if such responses were prevalent. However, Figure 2 shows that this is not the case. We observe only 0.2–0.3% of partnership firms changing their organizational form from partnership to privately held corporation each year, and more importantly, there is no change in this share at the time of the reform. Therefore, we believe that this is not an issue for our empirical analysis. The firms that change their organizational form are included in our sample, but dropping them does not affect our results in any significant manner. In addition, in equation (1) we include an indicator variable denoting whether a firm has changed its organizational form.

4 Results

4.1 Investments

We begin by studying the effects of the corporate tax rate cut on investments. A corporate tax cut affects investment decisions by decreasing the cost of capital. In addition, a reduction in the corporate tax rate increases the amount of retained earnings available for new investment. The corporate tax cut was executed together with an adjustment to dividend tax rates such that the effective owner-level taxation was largely unaffected for the owners of small corporations. According to the new view of dividend taxation, the dividend tax rate does not affect the marginal cost of capital that determines the level of investment, whereas the corporate tax does [Auerbach, 1979]. The reason for this is that, at the margin, new investment is financed by retained earnings or debt.³

Figure 3 shows the development of investments per lagged capital, a variable that is typically used to measure capital investments in the literature (see e.g. Yagan 2015). In the figure, we use the re-weighting strategy described in Section 3. First, the figure illustrates that there is no difference in the development of investments between corporations and partnerships before the tax rate cut, demonstrating that pre-reform trends are parallel between the groups. After the reform, the development of investments remains parallel between the firm groups, indicating no significant investment response to the large corporate tax cut in 2014 for corporations. In addition, the figure shows no response to the smaller corporate tax rate cut implemented in 2012, two years prior to the larger reform. Figure 4 shows the associated differences-in-differences estimates relative to year 2011, which support the visual observations from Figure 3. Finally, Figure 14 in Appendix A shows the unweighted estimates, which confirm the conclusion of no significant investment effects after the tax cut even when not using the re-weighting strategy as in the figures above.

Table 4 quantifies the size of the estimates for investments per lagged capital using different regression specifications. Column (1) shows the estimates with firm and year-fixed effects and controlling for the 2012 reform. Column (2) shows the estimates when using the re-weighting approach described above. The differences-in-differences estimates are rather small, 0.8% and 2.7% relative

³The net cost of investment funded from retained earnings is reduced by dividend taxes at exactly the same dividend tax rate at which the return is eventually taxed. Therefore, these two effects cancel out and leave the rate of return unaffected by dividend taxes.

to mean investments per lagged capital, and neither of the estimates are statistically significant. Therefore, the regression results confirm the graphical evidence presented above.

In order to compare our investment responses to the previous literature, we use the implied estimates to calculate the elasticity of investments per lagged capital with respect to the net-of-tax rate. The estimated elasticities from our analysis are presented in Table 4. Depending on the specification, the elasticity estimates vary between 0.13–0.46 but are clearly statistically insignificant in all specifications. Figure 6 collects some of the most recent elasticity estimates in the literature that uses quasi-experimental variation. The comparison in Figure 6 indicates that the investment elasticities derived in the earlier literature, mostly relying on variation in targeted investment incentives for specific sectors or capital depreciations, are quite large, ranging from 6 to 7, as shown in the first four estimates from the left in the figure. Our elasticity estimate is much smaller, suggesting an elasticity of investment below one. Therefore, our results underline that average responses to a universal cut in a corporate tax rate can be very different and lead to different policy implications compared to the impacts of targeted changes in investment incentives analyzed in the previous empirical literature. One reason for the smaller average response could be that all firms face a cut in the corporate tax rate regardless of their investment behavior, whereas special tax deductions and accelerated depreciations are typically granted only for new investments. Hence, in these cases, tax reductions are materialized only when firms invest.

A potential caveat concerning our negligible investment effect is that young and newly established firms might be more prone to raise new equity instead of using debt or own equity to finance their investments [Auerbach, 1979]. In this case, the corporate tax rate cut would not necessarily improve investment incentives. Since we are studying relatively small firms, it could be that young firms are driving the obtained zero result. However, when we split our sample by the age of the firm in Table 5, we find no evidence that the investment response would be larger for older firms. If anything, younger firms seem to be more responsive in terms of new investments after the tax rate cut, but the estimates are still small and clearly statistically insignificant.

Finally, Figure 5 presents the share of firms with positive new investments in both firm groups in 2008–2016, illustrating the extensive margin of investment decisions. The figure shows no change in the share of corporations investing after 2014, thereby suggesting no extensive margin responses to the reform. Overall, these results indicate that the corporate tax cut did not cause a significant increase in investments among small firms, at least in the short run.

4.2 Economic Activity

Next we focus on outcomes that reflect the overall business activity of firms. In addition to investment responses, the corporate tax rate cut could induce other types of responses. Given the key role of small and growing firms in spurring economic development and employment (see e.g. Decker et al. 2014), it is highly relevant to study also other margins than investments to better understand the responsiveness of these firms. Although the dividend tax increase mostly offsets the corporate tax cut at the owner-level for small firms, the corporate tax cut still creates a mechanical cash injection to the firm through increased net-of-tax retained earnings that could positively impact overall business activity.

Figure 7 shows the development of sales, variable costs, labor costs and value added (sales minus

variable costs) for corporations and partnerships using the re-weighting strategy. First, the figure confirms that the comparison between partnerships and corporations is feasible, as the trends in the outcomes follow each other closely before the reform. The only small deviation from this pattern is in year 2009 when the evolution of the outcomes for corporations were slightly behind those of partnership firms. After 2014, the firm-level sales of corporations increase significantly relative to partnerships. Also, we find a similar increase in variable costs, and a small increase in labor costs. The observed increase in sales, therefore, suggests that the tax cut boosted overall firm production. Moreover, an increase in variable costs indicates that the activity increase is likely to represent a real response instead of a potential reporting response related to tax evasion. Furthermore, we observe no responses in sales or other variables to the smaller corporate tax rate cut implemented in 2012, as the effects are visible only after the larger tax cut in 2014. In addition, both sales and variable costs increase gradually over time instead of a sharp and discontinuous jump right after 2014, indicating that the impact of the tax cut on business activity materialized gradually. Figure 8 presents the associated differences-in-differences estimates relative to year 2011, which confirm the visual observations.⁴

Table 6 shows the differences-in-differences estimates for all four outcomes. These results confirm the visual observations from Figure 7: there is a statistically significant increase in sales and variable costs after the reform. In terms of magnitudes, the sales response represents a 3.2% increase relative to the mean sales of corporations, and a 6.1% increase in variable costs. Furthermore, the point estimates for both labor costs and value added are positive but not statistically significant.⁵ Overall, clear responses in other economic activity measures than capital investments illustrate that the corporate tax cut has spurred the growth of small corporations. This also suggests that the negligible investment effect cannot be easily explained by, for example, unawareness or inattention to corporate taxes.⁶

All of the above specifications included firm fixed effects, concealing a potential entry effect of new firms. Therefore, to ensure that we are not disregarding any potential effects on new business creation, we also examine the entry decisions of firms. Figure 9 plots the share of new corporations and partnerships relative to existing firms. Table 7 also tabulates the number of all firms and the share of new firms in 2008–2016. Overall, during the last decade, privately held corporations have been a more popular organizational form for new firms than partnerships, but the share of new firms has been decreasing in both groups over time.⁷ There appears to be no significant change in this

⁴Table 15 in Appendix A shows that the differences-in-differences estimates for our main outcomes are very similar when we exclude years 2008 and 2009 from the sample and focus on comparing the three years prior to 2014 to the three years after the tax cut. This implies that the minor deviation in 2009 from the overall trend does not drive our results. Figure 15 in Appendix A shows the unweighted estimates. The figure underlines that without the re-weighting strategy, the parallel pre-trend assumption does not hold in years prior to 2011. Therefore, the weighting procedure (or controlling for the pre-trend) is essential for guaranteeing the causal interpretation of the differences-in-differences estimates.

⁵Our measure for labor costs includes wages paid to the main owner. The point estimate for labor costs excluding the owner’s wage is positive and remains insignificant but is approximately half the size of the estimate including all wages paid by the firm.

⁶In Table 16 in Appendix A we winsorize our outcome variables from both ends of the distribution in order to avoid the effects of outliers. Overall, the results using these specifications are similar but the estimates are smaller compared to those in our baseline analysis.

⁷Firm entry rates have also been declining over the last decade in many other developed countries including the US, as documented and discussed in Decker et al. [2016].

longer-run trend that could be clearly associated with the 2014 corporate tax cut. Therefore, we conclude that the corporate tax cut did not accelerate new business creation, although this evidence is mostly descriptive.⁸

Finally, one additional behavioral margin that could be relevant for firm owners is income-shifting between tax bases. These types of responses are well documented in the recent empirical literature studying the effects of income taxes for business owners and entrepreneurs (see e.g. Harju and Matikka [2016] for Finland and le Maire and Schjerning [2013] for Denmark). However, as argued above in Section 2, the tax incentives for withdrawing dividend (or wage) income from firms did not change much due to the corporate tax rate cut for the owners of small corporations. To ensure that the reform did not create any changes in income composition, Figure 18 in Appendix A plots the average share of dividends of total income from firms (wages + dividends) for the main owners of corporations in our baseline sample.⁹ Evidently, the share of dividend income is relatively constant before and after the reform, implying no income-shifting responses, as expected.

4.3 Mechanisms

The results above show that small corporations responded to the tax cut by increasing their overall production, but not by increasing their investments in physical capital. An increase in output without an increase in investment may seem unintuitive given that there was no significant reduction in the owner-level tax burden. However, there are at least two potential underlying mechanisms that could explain these results.

First, as we focus on small firms, a significant share of firms in our sample may be facing cash constraints. After the tax cut, the net-of-tax retained earnings of firms increased mechanically even absent any behavioral responses. Therefore, as a result of such a cash injection, liquidity constraints may be loosened and corporations could now have more liquid funds to boost their business activity. Correspondingly, this could show as increased output by the firm.

Next, we study whether more cash-constrained firms drive the observed average response. We define a firm-level cash constraint measure based on the average share of liquid financial assets (cash, stock holdings etc.) relative to the total assets of the firm in 2010–2011, and divide our sample into firms below and above the median (0.26) of this variable. Figures 10 and 11 present the results using this division, showing that there are no significant differences in responses by cash-to-assets ratios. Therefore, firm-level liquidity constraints alone appear not to explain our findings of increased business activity after the tax cut. Tables 8 and 9 present the associated differences-in-differences estimates using the full set of controls, which confirm the visual observations from the figures.

Another potential explanation for our results could arise from the effort of the main owner. In a recent paper, Smith et al. [2019] find that the entrepreneurial effort and human capital of

⁸In addition, the corporate tax rate cut could affect the exit of firms if, for example, larger firms bought out smaller firms to a larger extent after the tax cut than before it. However, Table 7 shows that there is no clear reduction in the number of existing firms after 2014, suggesting that this type of effect does not appear to be significant.

⁹The income tax system for the owners of partnership firms does not include similar income-shifting incentives as they do not have the opportunity to withdraw income from their firms in the form of dividends. Therefore, the owners of partnership firms are unable to directly shift income from one tax base to another, and we cannot plot a corresponding measure for them in the figure.

the owner can largely explain the success of firms in the US. As we are studying relatively small firms with, on average, only six employees in our baseline sample, entrepreneurial effort is likely to have a particularly significant impact on the firms in our sample. Owners of small firms who are more closely connected to firm operations are presumably more able to utilize the firm as a source of private spending (see e.g. La Porta et al. 2000 and Bennedsen and Wolfenzon 2000) and engage in dynamic tax-planning procedures (see e.g. le Maire and Schjerning 2013), as discussed above. These opportunities could also strengthen the role of financial incentives in firms with active owner-managers.

In our data, we observe if the owner of a firm is an active manager-worker or a more passive investor. Active owner-managers include those who, by themselves or together with family members, own at least 30% of the firm and hold an active leading position in their firm, such as CEO or chairman of the board. This classification is based on mandatory pension insurance regulations in Finland, as these active owner-managers are insured with different regulations compared to other corporate owners. Therefore, we have a reliable register-based indicator for classifying entrepreneurs into more active and passive owners.¹⁰ Our hypothesis is that if the effort of the owner is an important factor explaining our results, we should observe a larger increase in business activity among firms with active manager-workers compared to those with more passive owners.

Figure 12 plots the estimates for investments, sales, variable costs and labor costs for corporations with active owner-managers in comparison to partnerships. Figure 13 shows the same outcomes comparing corporations with more passive owners to partnerships. The figures show that corporations with active owner-managers are indeed the group that increased their business activity after the reform, as we find a significant increase in sales and variable costs for this group. In contrast, there is no response for corporations with more passive owners. As before, we find no impact on investments for either of the groups. These results suggest that entrepreneurial effort is likely to be a key driver behind the observed increase in economic activity. The results also confirm that the role of the active owner-manager is essential for the growth of small firms and that passive and active owners constitute an important division in distinguishing responses to firm-level incentives, a mechanism that has been unexplored in the previous literature. Tables 10 and 11 present the associated regression estimates using the full set of controls for all of the outcomes, which confirm the visual observations from Figure 12.

Finally, Figures 16 and 17 in Appendix A present the results for firms with active owners separately for more or less cash-constrained firms using similar sample division rules as above. The figure shows that the responses are significant regardless of cash constraints for active owner-managers. However, the impact of the tax cut on business activity is greater for firms with smaller cash-to-assets ratios, suggesting that the additional cash injection after the tax rate cut spurred the economic activity of more cash-constrained firms, but only when the firm is actively managed by the owner. Tables 12 and 13 in Appendix A present the associated differences-in-differences estimates using the full set of controls, which confirm the visual observations.

¹⁰See Benzarti et al. [2020] for more details on pension insurance regulations and evidence of how entrepreneurs in Finland respond to changes in insurance contribution rules.

5 Discussion

In this paper we provide novel evidence of how small privately held corporations responded to a sizable 4.5 percentage-point corporate tax rate cut. We find no significant impact of the tax cut on investments per lagged capital when comparing small corporations to otherwise similar partnership firms that were unaffected by the tax cut. This suggests that reducing the corporate tax rate is not a very effective measure to spur capital investments among small firms, at least in the short or medium run. However, we find a clear increase in sales and input usage. We find that these effects are driven by firms that are owned by active owner-managers. This result suggests that entrepreneurial effort is an important factor for the business activity of small firms. Overall, our results illustrate that the owners of small firms are responsive to corporate taxes and that small firms may also respond to tax cuts on other relevant margins than investments.

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Figures

Figure 1: Shares of firms in different industries, corporations and partnerships

Note: Figure presents the shares of firms in different industry categories for both corporations and partnerships in the restricted sample in 2008–2016.

Figure 2: The annual share of partnership firms that change their organizational form to a corporation, 2008–2016

Note: Figure shows the share of partnership firms that change their organizational form to a corporation in 2008–2016.

Figure 3: The development of investment per lagged capital, 2008–2016

Note: Figure plots the development of the ratio of investment per lagged capital assets in 2008–2016 for corporations and partnerships using the restricted sample and the re-weighting procedure and firm-fixed effects. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5% to 20% in 2014.

Figure 4: Estimates for investment per lagged capital, 2008–2016

Note: Figure shows the differences-in-differences estimates between corporations and partnerships and 95% confidence intervals for new investments per lagged capital relative to year 2011 using the baseline restricted sample in 2008–2016. The specification includes firm-fixed effects and uses the re-weighting strategy presented in Section 3. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5 to 20% in 2014.

Figure 5: Firms with positive investments (extensive margin), 2008–2016

Note: Figure shows the shares of firms with positive annual investments for both corporations and partnerships in 2008–2016.

Figure 6: Elasticity of investment with respect to the net-of-tax rate

Note: Figure presents the investment elasticity estimates with respect to the net-of-tax rate and the associated 95% confidence intervals presented in the earlier literature and in this study. House and Shapiro [2008] and Zwick and Mahon [2017] study the effects of a temporary accelerated depreciation policy in the US and Maffini et al. [2019] a similar policy in the UK. Ohn [2018] studies a corporate tax provision (DPAD) in the US, which allows firms to deduct a share of domestic manufacturing income from taxable corporate income. The confidence intervals for Zwick and Mahon [2017], Ohn [2018] and Maffini et al. [2019] are calculated by the authors of this paper using the standard errors for investment effects presented in the original papers. The elasticity estimate for this study included in the figure is presented in column (4) of Table 4.

Figure 7: Development of sales, variable costs, labor costs and value added, 2008–2016

Note: Figure plots the development of sales, variable costs, labor costs and value added in 2008–2016 for corporations and partnerships using the restricted sample and the re-weighting procedure with firm-fixed effects. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5% to 20% in 2014.

Figure 8: Estimates for sales, variable costs, labor costs and value added, 2008–2016

Note: Figure shows the differences-in-differences estimates between corporations and partnerships for firm-level sales, variable costs, labor costs and value added relative to year 2011 using the baseline restricted sample in 2008–2016. The specifications include firm fixed effects and uses the re-weighting strategy presented in Section 3. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5 to 20% in 2014.

Figure 9: Share of new firms, 2008–2016

Note: Figure shows the share of new firms relative to the total number of existing firms for both corporations and partnerships. We define a firm as a new firm based on the year when the firm is first observed in tax record data. The vertical line denotes the larger tax rate cut from 24.5 to 20% in 2014.

Figure 10: Estimates for firms with a cash-to-assets ratio below the median

Note: Figure shows the differences-in-differences estimates between corporations and partnerships for investments per lagged capital, firm-level sales, variable costs and labor costs relative to year 2011 for corporations with a cash-to-assets ratio below the median (0.26) using the baseline restricted sample in 2008–2016. The specifications include firm fixed effects and use the re-weighting strategy presented in Section 3. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5% to 20% in 2014.

Figure 11: Estimates for firms with a cash-to-assets ratio above the median

Note: Figure shows the differences-in-differences estimates between corporations and partnerships for investments per lagged capital, firm-level sales, variable costs and labor costs relative to year 2011 for corporations with a cash-to-assets ratio above the median (0.26) using the baseline restricted sample in 2008–2016. The regressions include firm fixed effects and use the re-weighting strategy presented in Section 3. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5% to 20% in 2014.

Figure 12: Estimates for active owner-managers

Note: Figure shows the differences-in-differences estimates between corporations and partnership for investments per lagged capital, firm-level sales, variable costs and labor costs relative to year 2011 for corporations with active owner-managers using the baseline restricted sample in 2008–2016. The regressions include firm fixed effects and use the re-weighting strategy presented in Section 3. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5% to 20% in 2014.

Figure 13: Estimates for other corporations

Note: Figure shows the differences-in-differences estimates between corporations and partnership for investments per lagged capital, firm-level sales, variable costs and labor costs relative to year 2011 for corporations with an owner other than an active owner-manager as the main owner using the baseline restricted sample in 2008–2016. The regressions include firm fixed effects and use the re-weighting strategy presented in Section 3. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5% to 20% in 2014.

Tables

Table 1: Sample restriction – number of observations excluded

Corporate form	Data restriction 2008-2016								Sample N
	Total		Below		Above		Net assets		
	N	Share	N	Share	N	Share	N	Share	
Corporation	537,501	100.0	138,688	25.8	130,714	24.3	25,468	4.7	242,631
Partnership	303,901	100.0	161,513	53.1	21,162	7.0	7126	2.3	114,100

Note: Table presents the number and share of observations dropped from the full sample for both organizational forms using pooled data from 2008–2016. Table shows the total number of observations for both organizational forms in the unrestricted full data, the number and relative share of observations dropped from below and above the previous year's sales limit of 100,000–2,500,000, and when excluding firms with previous year's net assets above 750,000 euros and in the last column the restricted baseline sample used in the main analysis.

Table 2: Summary statistics of the restricted sample 2011

	Corporations			Partnerships		
	mean	sd	p50	mean	sd	p50
Sales	549,886	584,125	351,281	340,902	373,850	218,716
Labor costs	173,887	203,327	110,680	78,538	110,732	43,850
Variable costs	251,447	393,944	109,749	160,717	266,671	77,598
Value added	325,327	334,899	225,957	190,498	186,642	135,852
Investment	31,510	88,951	2295	21,883	61,846	385
Investment per lagged capital	0.236	0.393	0.033	0.209	0.391	0
Observations	26,739			13,200		

Table 3: Definitions of the variables used in the analysis

Variable	Definition
Sales	Gross annual sales of the firm from its primary operating activity minus any discounts given, valued-added taxes, and other taxes based on sales volumes.
Investments	Annual euro value of gross investments including all newly installed capital assets, such as machinery, buildings and equipment.
Capital assets	Capital assets include balance sheet information of productive capital such as machinery, buildings and equipment.
Labor costs	Annual wages and other wage-related compensations paid by the firm, including social insurance contributions paid on wage income but excluding income taxes.
Variable costs	Annual euro value of the costs used as intermediate inputs in production, such as materials and services used.
Value added	Annual euro value of sales minus variable costs.
Financial assets	Financial assets of the firm including cash, cash at bank, stock holdings, and other liquid funds.
Age of the firm	We measure the age of the firm using the first observation in our full tax record data starting from 1998.
Active owner-managers	Active owner-managers include those owners of corporations who, by themselves or together with family members, own at least 30% of the firm and hold an active leading position in their firm. This classification is based on the Finnish pension insurance regulations included in the data. Active owner-managers are insured under different social insurance regulations compared to other corporate owners.

Table 4: Differences-in-differences results: Investment per lagged capital

	(1)	(2)
Diff-in-diff estimate	0.002 (0.004)	0.006 (0.006)
Firm fixed effects	X	X
Year fixed effects	X	X
Weighting		X
Control for 2012 reform	X	X
Constant	0.302*** (0.005)	0.304*** (0.005)
R2	0.352	0.361
N	322,059	322,059
Elasticity	0.126 (0.300)	0.457 (0.417)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the differences-in-differences estimates and firm-level clustered standard errors (in parentheses) for investments per lagged capital with different estimation specifications. Column (1) shows the results when not using the re-weighting strategy and when controlling for year and firm-fixed effects and the 2012 reform. Column (2) shows the same result when using the re-weighting strategy. In addition, the table includes the implied elasticity estimates of investments relative to the net-of-corporate tax rate and the associated standard errors for both specifications. The elasticity is estimated using the effect relative to the pre-reform mean of 0.23. None of the elasticity estimates are statistically different from zero.

Table 5: Differences-in-differences results: Investment per lagged capital by firm age

	Firms aged 0–10	Firms older than 10
Diff-in-diff estimate	0.033* (0.013)	0.007 (0.006)
Firm fixed effects	X	X
Year fixed effects	X	X
Weighting	X	X
Control for 2012 reform	X	X
Constant	0.345*** (0.009)	0.281*** (0.006)
R2	0.403	0.321
N	133,816	188,243

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the differences-in-differences estimates and firm-level clustered standard errors (in parentheses) for investments per lagged capital for firms of different ages. Column (1) shows the results for firms that are younger than or equal to 10 years old, and column (2) for firms that are older than 10 years. We define the age of the firm based on the year 2013 so that firms older than 10 years were observed in tax record data already in 2002 or earlier.

Table 6: Differences-in-differences results: Economic activity outcomes

	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	17,687** (6053)	15,381*** (4581)	4851* (2397)	4976 (3641)
Firm fixed effects	X	X	X	X
Year fixed effects	X	X	X	X
Weighting	X	X	X	X
Control for 2012 reform	X	X	X	X
Constant	595,592*** (4342)	269,532*** (2624)	181,101*** (1517)	346,865*** (2602)
R2	0.851	0.828	0.902	0.867
N	356,582	331,552	343,481	331,552

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for firm-level sales, variable costs, labor costs and value added. All regressions include firm and year fixed effects, the re-weighting procedure and controls for the 2012 reform. The labor cost variable in the table includes the wages paid to the main owner.

Table 7: New firms of all firms (unrestricted)

Year	Corporate form									
	Old corp.		Old part.		New corp.		New part.		Total	
	No.	Share %	No.	Share %	No.	Share %	No.	Share %	No.	Share %
2008	46,656	50.9	34,344	37.4	7517	8.2	3220	3.5	91,737	100.0
2009	49,052	53.1	34,445	37.3	6868	7.4	2063	2.2	92,428	100.0
2010	51,296	55.4	33,542	36.2	5817	6.3	2011	2.2	92,666	100.0
2011	53,864	57.0	32,976	34.9	5775	6.1	1906	2.0	94,521	100.0
2012	56,011	57.8	32,363	33.4	6658	6.9	1813	1.9	96,845	100.0
2013	59,348	60.1	31,542	31.9	6338	6.4	1592	1.6	98,820	100.0
2014	55,642	60.8	30,640	33.5	3888	4.2	1364	1.5	91,534	100.0
2015	56,102	61.4	29,582	32.4	4475	4.9	1193	1.3	91,352	100.0
2016	57,443	62.8	28,241	30.9	4753	5.2	1064	1.2	91,501	100.0
Total	485,414	57.7	287,675	34.2	52,089	6.2	16,226	1.9	841,404	100.0

Note: Table shows the number of existing firms (old) and newly established firms by year in 2008–2016 separately for corporations (corp.) and partnerships (part.) using the unrestricted data. We define firm as a new firm based on the first observation in our unrestricted tax record data.

Table 8: Differences-in-differences results: Firms with cash-to-assets ratio below median

	Investment	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	0.008 (0.008)	22,726** (8496)	14,986** (5681)	5950* (2957)	8533 (5026)
Firm fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X
Weighting	X	X	X	X	X
Control for 2012 reform	X	X	X	X	X
Constant	0.292*** (0.018)	550,668*** (19,148)	260,860*** (11,131)	124,344*** (6397)	295,694*** (10,346)
R2	0.362	0.857	0.827	0.901	0.862
N	151,140	164,049	155,746	158,607	155,746

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for investment per lagged capital, firm-level sales, variable costs, labor costs and value added for firms with a cash-to-asset ratio below the median (0.26) in the restricted sample. All regressions include firm and year fixed effects, the re-weighting procedure, and controls for the 2012 reform. The labor cost variable in the table includes the wages paid to the main owner.

Table 9: Differences-in-differences results: Firms with cash-to-assets ratio above median

	Investment	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	0.004 (0.008)	14,326* (7234)	12,577* (4992)	6095 (3987)	3486 (5553)
Firm fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X
Weighting	X	X	X	X	X
Control for 2012 reform	X	X	X	X	X
Constant	0.260*** (0.018)	409,745*** (14,104)	175,925*** (7403)	96,502*** (6143)	253,274*** (9971)
R2	0.360	0.852	0.830	0.904	0.871
N	167,880	188,362	174,835	182,987	174,835

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for investment per lagged capital, firm-level sales, variable costs, labor costs, and value added for firms with a cash-to-asset ratio above the median (0.26) in the restricted sample. All regressions include firm and year fixed effects, the re-weighting procedure, and controls for the 2012 reform. The labor cost variable in the table includes the wages paid to the main owner.

Table 10: Differences-in-differences results: Firms with active owner-managers

	Investment	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	0.001 (0.006)	26,212*** (5500)	17,480*** (3750)	6934** (2242)	9160** (3548)
Firm fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X
Weighting	X	X	X	X	X
Control for 2012 reform	X	X	X	X	X
Constant	0.295*** (0.013)	474,422*** (11,422)	213984*** (6560)	106,940*** (3987)	273,074*** (6590)
R2	0.369	0.864	0.844	0.908	0.867
N	264,307	291,181	272,374	284,598	272,374

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for firm-level investment per lagged capital, sales, variable costs, labor costs and value added including only corporations with active owner-managers. All regressions include firm and year fixed effects, the re-weighting procedure, and controls for the 2012 reform.

Table 11: Differences-in-differences results: Firms with other owners

	Investment	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	0.005 (0.008)	-18,259 (9668)	-519 (7750)	-4713 (3685)	-10,912* (5404)
Firm fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X
Weighting	X	X	X	X	X
Control for 2012 reform	X	X	X	X	X
Constant	0.240*** (0.018)	532,979*** (18,998)	251,938*** (9604)	133,537*** (8018)	298,079*** (12,701)
R2	0.417	0.865	0.832	0.923	0.912
N	162,055	179,502	166,772	168,961	166,772

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for firm-level investment per lagged capital, sales, variable costs, labor costs and value added including only corporations with passive owners. All regressions include firm and year fixed effects, the re-weighting procedure, and controls for the 2012 reform.

A Appendix: Additional Figures and Tables

Figure 14: Investment per lagged capital - unweighted estimates, 2008–2016

Note: Figure shows the differences-in-differences estimates between corporations and partnerships for investments per lagged capital relative to year 2011 using the baseline restricted sample in 2008–2016. The regression does not use the re-weighting strategy but includes firm fixed effects.

Figure 15: Sales, variable costs, labor costs and value added - unweighted estimates, 2008–2016

Note: Figure shows the differences-in-differences estimates between corporations and partnerships for firm-level sales, variable costs, labor costs and value added relative to year 2011 using the baseline restricted sample in 2008–2016. The regressions do not use the re-weighting strategy but include firm fixed effects.

Figure 16: Estimates for firms with active owner-managers and cash-to-assets ratio below median

Note: Figure shows the differences-in-differences estimates between corporations and partnerships for investments per lagged capital, firm-level sales, variable costs and labor costs relative to year 2011 for corporations with active owner-managers and cash-to-assets ratio below the median using the baseline restricted sample in 2008–2016. The regressions include firm fixed effects and uses the re-weighting strategy presented in Section 3. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5 to 20% in 2014.

Figure 17: Estimates for firms with active owner-managers and cash-to-assets ratio above median

Note: Figure shows the differences-in-differences estimates between corporations and partnerships for investments per lagged capital, firm-level sales, variable costs and labor costs relative to year 2011 for corporations with active owner-managers and a cash-to-assets ratio above the median using the baseline restricted sample in 2008–2016. The regressions include firm fixed effects and use the re-weighting strategy presented in Section 3. The first vertical line denotes the small tax cut in 2012, and the second line the larger tax rate cut from 24.5 % to 20% in 2014.

Figure 18: The average share of dividends of total income withdrawn from the firm (wages + dividends), 2008–2016

Note: Figure plots the average share of dividends of total income (dividends + wages) withdrawn from the firm for the owners of privately held corporations in the baseline restricted sample in 2008–2016.

Table 12: Differences-in-differences results: Firms with active owner-managers and cash-to-assets ratio below median

	Investment	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	0.002 (0.008)	33,570*** (8569)	20,878*** (5793)	7954** (2936)	12,851* (5211)
Firm fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X
Weighting	X	X	X	X	X
Control for 2012 reform	X	X	X	X	X
Constant	0.309*** (0.018)	549,088*** (17,655)	258,954*** (10,228)	120,620*** (6054)	297,083*** (9828)
R2	0.369	0.870	0.840	0.910	0.862
N	123,462	133,466	127,110	130,911	127,110

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for investment per lagged capital, firm-level sales, variable costs, labor costs, and value added. All regressions include firm and year fixed effects, the re-weighting procedure, and controls for the 2012 reform. The labor cost variable in the table includes the wages paid to the main owner.

Table 13: Differences-in-differences results: Firms with active owner-managers and cash-to-assets ratio above median

	Investment	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	-0.000 (0.008)	18,790** (6865)	13,694** (4696)	7224* (3515)	7079 (5059)
Firm fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X
Weighting	X	X	X	X	X
Control for 2012 reform	X	X	X	X	X
Constant	0.280*** (0.019)	406,183*** (12,952)	171,540*** (7324)	96,474*** (4825)	253,481*** (8256)
R2	0.369	0.863	0.847	0.907	0.872
N	139,108	155,421	144,689	152,540	144,689

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for investment per lagged capital, firm-level sales, variable costs and labor costs. All regressions include firm and year fixed effects, the re-weighting procedure, and controls for the 2012 reform. The labor cost variable in the table includes the wages paid to the main owner.

Table 14: Differences-in-differences results: Varying the baseline sample restrictions

Sample restrictions for previous year's annual sales								
Lower limit	100,000	100,000	80,000	80,000	80,000	120,000	120,000	120,000
Upper limit	2,002,899	3,004,349	2,503,624	2,002,899	3,004,349	2,503,624	2,002,899	3,004,349
Investment per lagged capital								
Diff-in-diff estimate	0.005 (0.006)	0.006 (0.006)	0.007 (0.005)	0.007 (0.005)	0.006 (0.005)	0.008 (0.006)	0.007 (0.006)	0.008 (0.006)
R2	0.362	0.360	0.359	0.360	0.359	0.362	0.363	0.361
N	312,107	323,228	346,302	339,380	350,501	294,352	287,430	298,551
Sales								
Diff-in-diff estimate	14,547** (5280)	21,952*** (6219)	17,179** (5518)	12,366* (4810)	20,368*** (6029)	20,271*** (6118)	14,801** (5316)	23,371*** (6640)
R2	0.844	0.866	0.860	0.849	0.870	0.851	0.838	0.862
N	345,091	356,850	384,377	377,047	388,806	323,854	316,524	328,283
Variable costs								
Diff-in-diff estimate	11,033** (4144)	15,745*** (4284)	14,007*** (4220)	9829** (3770)	15,535*** (4569)	15,381*** (4207)	10,383** (3702)	16,809*** (4597)
R2	0.815	0.844	0.831	0.816	0.845	0.826	0.811	0.841
N	323,363	334,960	357,809	350,582	362,179	305,816	298,589	310,186
Labor costs								
Diff-in-diff estimate	4820* (2031)	6602** (2558)	4970* (2177)	3912* (1843)	5935* (2322)	6117* (2599)	5475* (2269)	6958* (2702)
R2	0.900	0.908	0.905	0.902	0.910	0.902	0.898	0.907
N	334,394	345,981	371,084	363,875	375,462	314,796	307,587	319,174
Value added								
Diff-in-diff estimate	4820* (2031)	6602** (2558)	4970* (2177)	3912* (1843)	5935* (2322)	6117* (2599)	5475* (2269)	6958* (2702)
R2	0.900	0.908	0.905	0.902	0.910	0.902	0.898	0.907
N	334,394	345,981	371,084	363,875	375,462	314,796	307,587	319,174

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for investment per lagged capital, firm-level sales, variable costs, labor costs and value added varying the sample restrictions. All regressions include firm and year fixed effects, the re-weighting procedure, and controls for the 2012 reform. We vary the baseline sample restrictions by reducing and increasing the upper (2,503,624 euros) and lower (100,000 euros) sales limits of the sample by 20%.

Table 15: Differences-in-differences results: Outcomes estimated with years 2010–2016

	Investment	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	0.006 (0.007)	23,702** (7779)	18,737** (6881)	5571* (2578)	7179 (3797)
Firm fixed effects	X	X	X	X	X
Year fixed effects	X	X	X	X	X
Control for 2012 reform	X	X	X	X	X
Weighting	X	X	X	X	X
Constant	0.207*** (0.015)	462,221*** (14,867)	205,126*** (8185)	113,647*** (5121)	271,620*** (8543)
R2	0.392	0.876	0.848	0.920	0.891
N	248,450	275,279	256,285	265,131	256,285

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for firm-level sales, variable costs, labor costs, and investment without the years 2008 and 2009.

Table 16: Differences-in-differences results: Outcomes estimated with winsorized data

	Sales	Var.costs	Labor costs	Value added
Diff-in-diff estimate	15,225*** (4197)	11,026*** (2597)	8524*** (1241)	9762*** (2196)
Firm fixed effects	X	X	X	X
Year fixed effects	X	X	X	X
Control for 2012 reform	X	X	X	X
Weighting	X	X	X	X
Constant	454,076*** (10,721)	204,785*** (5587)	95,434*** (4033)	254,182*** (6470)
R2	0.888	0.886	0.915	0.900
N	356,583	331,553	343,482	331,553

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table shows the difference-in-differences estimates and firm-level clustered standard errors (in parentheses) for firm-level sales, variable costs, and labor costs with data winsorized at 2.5% level from each end.

B Appendix: Business tax system in Finland

In this Appendix, we describe the main features and recent changes in the taxation of privately held (non-listed) corporations and partnership firms.

Privately held corporations

Privately held corporations are separately tax-liable, meaning that their profits are taxed at the firm level according to the corporate tax rate. The tax rate for corporate profits was reduced by 4.5 percentage points from 24.5% to 20% from January 2014 onward. The 2014 tax rate cut was preceded by a smaller 1.5 percentage-point tax cut in 2012.

Owners of privately held corporations pay an additional tax on the income withdrawn from the firm. Income withdrawn from the firm can be paid to the owner either as wages or dividends. The wage income tax schedule is progressive, and the tax rates vary between 0–55%. Wage income taxation contains three different parts: a central government progressive tax schedule, proportional municipal-level taxes and employee’s social security contributions. Over last decade there have not been any significant changes in wage taxation in Finland.

The dividend tax schedule for the owners of privately held corporations includes many different thresholds and rules. The imputed return on the net assets of the firm, calculated as a fixed percentage share of 8% of firm-level net assets (assets minus debt), defines the amount of dividends that are taxed at an effective tax rate of 26%. This rate includes both owner-level dividend taxes and corporate taxes. This dividend income is 75% tax-free and 25% is taxed as personal capital income at a rate of 30%. Combined with the corporate tax of 20%, this yields an effective tax rate of 26% ($0.20 + (0.8 \cdot 0.25 \cdot 0.30 = 0.26)$). The rate increases to 26.8% if the annual personal capital income of the owner exceeds 30,000 euros, since then the personal capital income tax rate increases to 34%. Dividend income above the computational net asset threshold is 15% tax-free and 85% is taxed according to the progressive wage tax schedule excluding social security contributions. Finally, dividends below the net asset threshold but above a predetermined monetary threshold of 150,000 euros are subject to a tax rate of 40.4% (43.1% if personal capital income exceeds 40,000 euros). This dividend income is 15% tax-free and 85% is taxable as personal capital income.

There have been several changes in these rules and thresholds over the last decade in Finland. Table 17 summarizes the thresholds and rules affecting dividend and corporate tax rates from 2006 to 2016, and Table 18 presents the equivalent effective dividend tax rates over time in different regimes. The computational return on net assets was lowered from 9% to 8% in 2014. Also, the share of dividend income below the imputed return on net assets that was taxed as capital income was increased from zero to 25% at the same time as the corporate tax cut in 2014. These led to an increase in the effective dividend tax rate of approximately 1.5 percentage points for the owners of small corporations, as illustrated in the first column of Table 18. Furthermore, in 2012, the monetary threshold was first reduced from 90,000 to 60,000 euros, and then increased to 150,000 euros in 2014. The latter increase in the threshold implied a reduction in the effective dividend tax rate for the owners of large corporations with large firm-level net assets. Also, the share of dividends taxed as wage income above the net asset thresholds increased from 70% to 75% in 2014, and the share of dividends taxed as capital income above the 150,000 euro threshold but below the net asset

threshold increased from 70% to 85% in 2014. Nevertheless, combined with the corporate tax rate cut, these changes did not significantly affect the effective dividend tax rates presented in the second and third columns of Table 18.

Partnership firms

A partnership is a pass-through entity, meaning that its profits are taxed only at the owner level. Owners of partnership firms also have a firm-level net asset threshold in their income tax schedule. Profits that fall under a 20% firm net asset threshold are taxed according to the capital income tax schedule, and any income above the threshold is taxed as the wage income of the owner. The net assets of partnership firms are defined as assets - debt + 30% of labor costs, while corporations follow a simpler assets - debt definition. In 2012, the effective marginal tax rate for profits below the net asset threshold was increased slightly from 26.6% to 28.5% (30.4% if capital income exceeds 30,000 euros). There were no changes in the taxation of partnership firms at the time of the corporate tax rate cut in 2014. The effective owner-level tax rates and their recent changes for the owners of partnership firms are described in Table 19.

Table 17: Dividend tax thresholds and corporate and capital income tax rates, 2006–2016

Year	Net asset threshold (NAT)	Monetary threshold (MT)	Tax-exempted D < NAT	Tax-exempted D < NAT & D > MT	Tax-exempted D > NAT	Corporate tax rate	Capital income tax rate	Capital income threshold
2006–2011	9%	90,000	100%	30%	30%	26%	28%	0
2012–2013	9%	60,000	100%	30%	30%	24.5%	30/32%	50,000
2014	8%	150,000	75%	15%	25%	20%	30/32%	40,000
2015	8%	150,000	75%	15%	25%	20%	30/33%	30,000
2016–2018	8%	150,000	75%	15%	25%	20%	30/34%	30,000

Notes: D refers to dividends, NAT refers to the net asset threshold and MT refers to the monetary threshold. Tax-exempted share denotes the share of tax-free dividends within each regime. When $D > NAT$, the remaining share is taxed as labor income, otherwise the capital income tax schedule is used.

Table 18: Effective dividend tax rates, 2006–2016

Year	D < NAT and D < MT	D < NAT and D > MT	D > NAT
2006-2011	26%	40.5%	54.5%
2012-2013	24.5%	40.3%	53.6%
2014	26% (26.4%)	40.4% (41.8%)	53%
2015	26% (26.6%)	40.4% (42.4%)	53%
2016-2018	26% (26.8%)	40.4% (43.1%)	53%

Notes: D refers to dividends, NAT refers to the net asset threshold and MT refers to the monetary threshold. Figures in brackets refer to effective dividend tax rates above the capital income threshold.

Table 19: Tax rates of partnership firms, 2006–2016

	Effective tax rate below the 20% net asset threshold	Effective rate above the 20% net asset threshold
2006–2011	26,6%	0–~55%
2012–2016	28,5 (30,4%)	0–~55%

Note: Table shows the tax rates on the profits of partnership firms (taxed at the owner-level) in 2006–2016. The progressive wage income tax rate is applied to profits exceeding the imputed 20% return on firm net assets. Figures in brackets refer to effective tax rates above the capital income threshold.