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Abstract

This paper estimates the effect of relaxing the social insurance mandate on entrepreneurial activity using rich administrative data from Finland. We find that relaxing the social insurance mandate leads entrepreneurs to reduce their contributions by 16%, which they channel instead into their firms. While young firms use the saved cash to increase their sales by 11% and labor costs by 6%, older firms use it to improve their net lending position by purchasing stocks. Our results imply that the impact of the social insurance mandate on business activity is heterogeneous and depends on the age of the firm.

Key words: Social insurance, entrepreneurs, economic activity

JEL classes: H25, H32, H55

Tiivistelmä

Tässä artikkelissa tutkitaan yrittäjien eläkevakuutusmaksun vaikutusta yritystoiminnan aktiivisuuteen. Vuoden 2011 uudistus laajensi yrittäjien eläkevakuutusjärjestelmää (YEL) koskemaan aiempaa suurempaa osaa listaamattomien osakeyhtiöiden omistajista. Uudistuksen piirissä olleet yrittäjät vähensivät eläkevakuutusmaksujaan keskimäärin noin 16 % sen jälkeen, kun heidän valinnanvapautensa vakuutusmaksujen tasosta lisääntyi uudistuksen myötä. Tulosten perusteella nuoret yritykset – alle 6 vuotiaat – kasvattivat yrityksen taloudellista aktiivisuutta eläkemaksujen vähentämisen myötä. Näiden yritysten liikevaihto kasvoi noin 11 % ja palkkakulut noin 6 % uudistuksen jälkeen. Sen sijaan vanhojen yritysten – yli 5 vuotiaat – taloudellinen aktiivisuus ei kasvanut uudistuksen jälkeen, mutta nämä yritykset kanavoivat vähentyneet eläkevakuutusmaksut yrityksen kautta osakesäästöihin. Tulosten perusteella eläkevakuutusmaksujen vaikutukset yritysten käyttäytymiseen ovat hyvin erilaisia riippuen yrityksen iästä.

Asiasanat: Eläkevakuutusmaksut, yrittäjät, yritysten kehitys

JEL-luokat: H25, H32, H55

1 Introduction

Dubbed “the engine of growth”, entrepreneurship plays a central role in modern economies. In the US, for example, new businesses account for 20% of total gross job creation.¹ While entrepreneurs can be very successful and accumulate large amounts of wealth, entrepreneurship remains one of the most economically risky lines of activity and can result in large wealth losses.² For this reason, mandating social insurance for this population can prove to be a first-order welfare improvement: without insurance, entrepreneurs face substantial old-age, disability and sickness risk. However, the marginal value of resources for entrepreneurs can be substantial, given how cash-constrained they often are. Therefore, mandating social insurance, while reducing risks, could significantly affect entrepreneurial activity.

In this paper, we offer novel causal evidence of the effects of relaxing the social insurance mandate on entrepreneurs and their business activity.³ We exploit quasi-experimental variation in the amount of mandatory social insurance contributions and rich firm- and individual-level administrative data on the full population of Finnish entrepreneurs to address this question. While social insurance contribution rates are the same across all entrepreneurs in Finland, the base over which the rate applies is not. Once entrepreneurs own more than a certain share of their firm, 30% currently and 50% in earlier years, they have a lot more discretion over how much social insurance contributions to pay, irrespective of their compensation. In contrast, below this ownership share threshold, entrepreneurs cannot choose their contribution rates, as their contributions are directly based on their earned income.

We use a standard differences-in-differences strategy and exploit a reform in 2011 that changed the ownership share rule from 50 to 30% to assess how relaxing the social insurance mandate affects entrepreneurial activity. We com-

¹See, for example, [Decker et al. \[2014\]](#).

²This argument is articulated, for example, in [Hall and Woodward \[2010\]](#).

³We use “entrepreneur”, “firm owner” and “firm” interchangeably throughout the paper because there are very few individuals who own more than one firm at a time. Our analysis is robust to excluding owners with multiple firms, as discussed in [Section 2.2](#) below.

pare firm owners with 30 to 50% pre-reform ownership shares (treatment) to firm owners with 51 to 70% pre-reform ownership shares (control). Importantly, our empirical analysis shows that entrepreneurs have not manipulated their ownership shares as a response to the reform, which would otherwise invalidate our research design.

We find that entrepreneurs in the treatment group chose to reduce their social insurance contributions by an average of 16% after given more discretion over insurance contributions. This observed response is equivalent to, on average, a 5 percentage-point reduction in their corporate taxes. This variation is substantial, approximately five times larger than the average corporate tax rate changes used by [Fuest et al. \[2018\]](#) to estimate the incidence of corporate taxes, and three times larger than the variation used in [Chetty et al. \[2014\]](#) to estimate the crowd-out effect of subsidized pension plans. When we consider all firms together, we estimate that the effects of relaxing the social insurance mandate on business activity are limited, as we observe no significant responses in the main firm-level outcomes, such as sales, investments or labor costs.

However, this average analysis masks important heterogeneity by firm age. Following [Decker et al. \[2014\]](#), we break down our sample into owners of young and older firms based on a five-year cutoff. As the social insurance mandate is relaxed, we observe a decrease in social insurance contributions of similar size for both types of firms. For the owners of younger firms, the cash saved from the lower contributions is channeled into their firms, as we observe an increase in both labor and variable costs, and an increase in sales after the reform. We also observe that the owners of older firms channel the additional cash into their firms. However, instead of boosting business activity, as young firms do, they use the saved cash to increase the net lending position of the firm by increasing long-term investments in the form of stock holdings. As a consequence, the social insurance mandate has no effect on the business activity of the owners of older firms: we observe no changes in sales or labor and variable costs in response to the decrease in contributions. This differential response for the owners of young versus older firms could be due to entrepreneurs in

younger firms being more liquidity-constrained and having access to better growth opportunities than more mature firms.

These findings imply that the effect of mandating social insurance for entrepreneurs is very different for the owners of young versus older firms since the social insurance mandate affects them very differently. While virtually all countries in the OECD mandate that wage earners contribute to some form of old-age, disability and sickness insurance program, there is wide variation in the treatment of non-wage earners, including entrepreneurs. The OECD countries address the issue of insuring non-wage earners in three different ways: (1) 73% of countries do not differentiate between wage and non-wage earners, and mandate the participation of non-wage earners in the regular social insurance program. The remaining 27% either (2) mandate that non-wage earners participate in a special social insurance program specifically designed for them (15%) or (3) allow non-wage earners to opt into the regular social insurance program, with no specific mandate (12%).⁴ This variation in the coverage of non-wage earners begs the question of which approach is better suited to insuring non-wage earners. While fully addressing the question of the optimal design of social insurance for entrepreneurs is beyond the scope of this paper, as it would also require estimating the benefit of social insurance, we make progress on this question by focusing on the impact of mandating social insurance on the business activity of entrepreneurs.

There is limited evidence of the effects of mandating social insurance on entrepreneurship, and we believe that this is the first paper to shed light on this question. However, our paper is also tangentially related to the following three literatures. The first literature estimates the crowd-out effect of subsidized pension contributions on savings. [Chetty et al. \[2014\]](#) show, using a compelling quasi-experimental setting in Denmark, that pension contributions tend not to crowd out other savings by wage earners when individuals are defaulted into increasing their savings.⁵ Our paper complements the analysis of [Chetty](#)

⁴Source: Authors' calculations based on data from the International Social Security Association.

⁵See also [Poterba et al. \[1996\]](#), [Engen et al. \[1996\]](#), [Benjamin \[2003\]](#), [Engelhardt and Kumar \[2007\]](#) and [Gelber \[2011\]](#).

et al. [2014] by focusing on a population of active savers, i.e. individuals who actively decide their level of contributions, and provides an answer to what outcomes are crowded out by subsidized pension savings for entrepreneurs.

Second, our paper is related to a literature that estimates the effect of regulation on entrepreneurial activity. This literature has mostly focused on the role of entry regulation on entrepreneurship. For example, Djankov et al. [2002] and Klapper et al. [2006] show that entry regulations are likely to reduce firm entry. More recently, Aghion et al. [2017], Harju et al. [2019], and Tazhitdinova [2019] estimate the effect of the hassle costs of complying with the tax code on entrepreneurs and incorporation. We focus on a different type of regulation – the social insurance mandate – and its effect on the intensive entrepreneurial margin.⁶

Third, this paper is related to corporate finance and public finance literatures that estimate the effect of taxes on entrepreneurial activity. This is a central question as it matters for both tax policy and economic growth.⁷ For example, Cullen and Gordon [2007] use time series variation in tax rates to estimate the effect of taxes on risk-taking by entrepreneurs, and Gentry and Hubbard [2000] use a discrete-choice model to estimate the effect of tax progressivity on entrepreneurial entry. The remaining research has mostly focused on cross-country comparisons of the level of taxes and entrepreneurial activity and found negative correlations between these two variables.⁸

This paper is organized as follows. Section 2 describes the institutions and the data we use. Section 3 presents our estimation strategy and the descriptive statistics. Section 4 presents the results, and Section 5 concludes.

⁶However, we also estimate the effect of the reform on entry and exit.

⁷See for example Schumpeter [2013] and Baumol et al. [2007] on the importance of entrepreneurship for growth.

⁸See for example Djankov et al. [2010], who find strong negative relationships between the level of corporate income taxes and entrepreneurship using data from 85 countries.

2 Institutional Background and Data

2.1 The Finnish Social Insurance System

The Finnish social insurance system is funded by government-mandated contributions. The system includes pension contributions paid by both employees and employers, and health and unemployment insurance contributions paid by wage earners based on their earnings and predetermined contribution rates. In addition to earnings-related insurance benefits, there are regulated minimum guarantee pensions and sickness and unemployment allowances for those with no or very small earnings and short work histories. Overall, the mandatory insurance system covers the vast majority of pension, health and unemployment benefits in Finland, as there is only limited private provision of insurance.

2.2 Social Insurance Contributions of Entrepreneurs

In this paper, we study the impact of mandating social insurance contributions on entrepreneurial activity. In the remainder of the text, we use the terms “firm owner”, “entrepreneur” and “firm” interchangeably because we exclude entrepreneurs who own more than one firm. We discuss this restriction in Section 2.3 and show that our analysis is robust to including entrepreneurs who own more than one firm.

Finland has a special social insurance scheme for entrepreneurs, called the Self-employed Persons’ Pension Act, referred to as YEL.⁹ The YEL insurance scheme applies to all self-employed individuals and excludes wage earners. In addition, to qualify for YEL, self-employed individuals must meet the following conditions: they have to be 18 to 67 years old, their firm must be at least four months old, and the income they derive from the firm has to be at least 7,557 euros per year (in 2016).¹⁰

⁹YEL stands for “Yrittäjän eläkelaki” in Finnish.

¹⁰The Self-employed Persons’ Pension Act (HE 1272/2006) is available online here (in Finnish): <https://www.finlex.fi/fi/laki/alkup/2006/20061272> (accessed May 24, 2019). More information in English can be found here: <https://www.ilmarinen.fi/en/self-employed-person/self-employed-persons-pension-insurance/yel-contributions> (accessed May 24, 2019).

The YEL insurance scheme also applies to all partners of partnership firms and to owners of privately held corporations who own, alone or together with family members, at least 50% of their firm. In addition, owners who hold a leading position in a privately held corporation (such as CEO or chairman of the board) and own over 30% of the company's shares are considered to be YEL entrepreneurs. The above conditions are binding, and entrepreneurs cannot opt out of the YEL insurance scheme.

If the above conditions are not met, entrepreneurs are automatically subject to the TyEL insurance scheme, which is the same insurance program as for wage earners. Hereafter, we refer to all entrepreneurs to whom YEL rules are applied as Y owners, and all other entrepreneurs who do not fulfill these requirements as T owners.

The main difference between Y and T owners is that T owners pay a set contribution rate on the income they earn from their firm, with no discretion over contribution levels, while Y owners can freely set the base over which the social insurance contribution rate applies as long as it falls between two bounds. In 2016, these bounds were 7,557 and 171,625 euros, respectively. Therefore, Y owners have significantly more discretion over their level of mandatory social insurance contributions. They can also adjust their contributions at any point in time. The contributions of T owners, on the other hand, are set automatically via a formula defined by a function of their earned income and the contribution rate. Despite the difference in the base for the contribution, the contribution rates of Y and T owners are very similar, 23.6% and 23.7% in 2016, respectively.¹¹

Future benefit entitlements are tied to contribution levels, and therefore, by reducing their contributions, Y owners are entitled to lower benefits. Note also that social insurance benefits are subsidized in Finland, implying that the

¹¹Both the YEL and TyEL contribution rates and the minimum and maximum YEL income levels vary slightly over time and are usually determined annually. The contribution rates also vary by age, and are higher for older individuals. In 2016, the TyEL rate is 25.2% for persons aged 53 or older, and the YEL contribution rate is 25.1% for persons aged 53 to 62. In addition, the contribution rates are lower for starting businesses of Y owners: 19.6% for persons aged 53 to 62, and 18.4% for others.

contributions are more than actuarially fair.¹² In addition, insurance contributions can be deducted from income taxes. Otherwise, the insurance status of an entrepreneur does not affect income taxation in any way, i.e. there is no difference in income taxation between Y and T owners.

Ownership share threshold and the 2011 reform. Before 2011, the owners of privately held corporations with an active role in their firm and owning over 50% of the company shares were treated as Y owners, i.e. they had more freedom to choose their level of insurance contributions. In 2011, this threshold was decreased to the current level of 30%. This meant that from 2011 onward, owners with a 30–50% ownership share could now more freely determine their level of social insurance contributions. We use this variation, along with a differences-in-differences strategy discussed in Section 3, to investigate the effects of mandating social insurance on the economic activity of entrepreneurs.¹³ Note that, in principle, T owners with ownership shares above 30% after the reform could opt out of switching to Y owners for 3 years. However, we observe that all of the switches from T to Y status occur at the time of the reform. Apart from this reform, there were no other notable changes to the social insurance program during the time period we analyze.

2.3 Data

We use two data sets: (1) data from the two largest Finnish pension companies managing the mandatory social insurance contributions of entrepreneurs, and (2) linked corporate tax and individual tax return data covering both firm and owner-level outcomes and characteristics. We use unique identifiers to link these data sets together. We use these data as unbalanced panel. Moreover, we exclude the owners of multiple firms from the sample. However, our results

¹²In addition to old-age and disability pensions, the level of insurance contributions directly affects other social insurance benefits provided by the Social Insurance Institution of Finland in a similar way. These mainly include sickness and parental allowances and unemployment benefits.

¹³More information about the reform (HE 135/2010) can be found here (in Finnish): <https://www.finlex.fi/fi/esitykset/he/2010/20100135> (accessed May 24, 2019).

are robust to including them, as only 7.3% of the entrepreneurs in our data own more than one firm at a time. The results using all owner-firm pairs are presented in Appendix Table [A.4](#).

Insurance Contribution Data. Contribution levels for T owners can be calculated using our data set, since they have no discretion over how much to contribute (the contribution level depends directly on their earned income and the contribution rate). Since contributions are not directly observable in tax data, and since Y owners have discretion over their level of contributions, the only available source of contribution data for these entrepreneurs is the pension companies that manage the public insurance system in Finland. We were able to access individual-level contribution data from the two largest Finnish pension companies, which cover approximately 70% of all entrepreneurs. These data are available from 2006 to 2014.

Tax Return Data. We use tax return data covering the full population of entrepreneurs and their firms, extracted from the Finnish Tax Administration database. The data include information on the financial statements and tax records of all Finnish businesses and their main owners. Since we only focus on Y and T owners of privately-held corporations, we exclude all other businesses from the sample. The data contain information on key measures of economic activity such as sales, profits, intermediate inputs and labor costs. In addition, the data contain detailed balance sheet information, including, for example, various investment categories. In this paper, we focus on the impact of social insurance contributions on firm-level economic activity. We describe the main variables we use in our analysis in more detail below.

3 Empirical approach

Estimation. In order to estimate the effect of mandating social insurance on entrepreneurs and their business activity, we use a differences-in-differences approach where we take advantage of the fact that the ownership share thresh-

old changed due to the 2011 reform. Prior to 2011, entrepreneurs who owned less than 50% of their firm were considered T owners, and they had no direct control over their level of mandatory social insurance contributions. In contrast, entrepreneurs who owned more than 50% of their firm were considered Y owners, and they had more freedom to decide their level of social insurance contributions. In 2011, the threshold changed from 50 to 30%, such that now only entrepreneurs with ownership shares below 30% were considered T owners. In other words, the social insurance mandate was relaxed for entrepreneurs who owned 30 to 50% of their firm. We compare these entrepreneurs to those who owned 51 to 70% of their firm, thus being subject to the Y ownership status both before and after the 2011 reform.¹⁴

Formally, we estimate the following specification using unbalanced panel data:

$$Y_{i,t} = \alpha_0 + \alpha_1 Treat_i + \alpha_2 Post_t + \alpha_3 (Treat_i * Post_t) + \lambda_t + \varepsilon_{i,t} \quad (1)$$

where Y is the outcome variable of interest (in logs) for a given entrepreneur/firm owner i , and t is time. $Treat$ is a dummy variable equal to 1 for the treated entrepreneurs, and equal to 0 for the control group. $Post$ refers to the period after the reform (from 2011 onward). λ_t are year fixed effects and ε represents the error term.¹⁵

Our main outcome variables are the following: the amount of annual mandatory social insurance contributions paid by the entrepreneur, firm-level sales excluding VAT and other sales-based taxes, labor costs including all wages and wage-related compensations paid by the firm excluding taxes, variable costs which consist of annual costs used as intermediate inputs in production, the value of annual gross investments in machines and equipment, and the

¹⁴The results are not sensitive to the choice of the 70% upper bound. In Appendix Table A.5, we use an alternative definition for the control group with ownership shares between 51 to 80% prior to the reform. The results are quantitatively and statistically very similar to our baseline results.

¹⁵We also run specification (1) while controlling for firm- and owner-level characteristics. In Appendix Table A.6, we include owner-level controls such as age, age squared, gender and ownership share of the firm. In addition, we include municipality and one-digit industry dummies. Adding controls has no meaningful impact on the estimates.

value of stock holdings in listed companies owned by the firm. All of these outcomes are in monetary values. In addition, we also analyze the effect of the reform on the total number of employees who worked in a given firm during a given year. Detailed definitions for all the variables can be found in Appendix Table [A.3](#).

Identification. The identifying assumption for the differences-in-differences design is *not* random assignment to the treatment and control groups, but that the treatment (30–50% ownership share) and control (51–70% ownership share) groups would have behaved similarly in the absence of the 2011 reform. This is commonly referred to as the parallel trends assumption. We test this assumption by comparing the evolution of our main outcome variables for the treatment and control groups prior to the reform. This assumption holds for all the main outcomes we consider, as shown below in Section [4](#). The fact that the outcome variables follow parallel trends prior to the reform and that the summary statistics are very similar for the treatment and control groups prior to 2011 (as shown in Table [1](#)) validates our empirical approach and mitigates the potential concern that the two groups would not be comparable.

Furthermore, a potential threat to identification is that ownership shares can, in principle, respond to the 2011 reform. Entrepreneurs could manipulate their ownership shares in order to self-select into Y or T insurance status. However, we find no empirical evidence supporting this threat. Appendix Figure [A.4](#) shows the changes in ownership shares for owners with more than 50% ownership shares to less than 50% (first panel), less than 50% ownership shares to more than 50% (second panel) and less than 30% ownership shares to more than 30% (third panel) in 2006-2016. Overall, there are no significant changes across these thresholds over time nor around the 2011 reform. This alleviates the concern that owners might intentionally manipulate their ownership shares as a response to the 2011 reform.

Note that, in principle, we could also use a regression discontinuity design (RDD) instead of a differences-in-differences strategy. However, the following two reasons make such a design challenging: (1) RDD is very data-intensive,

and the number of entrepreneurs just around the ownership share threshold is not large enough to provide very accurate results, particularly when analyzing responses separately for the owners of young and older firms; (2) firms are unevenly distributed across the ownership share distribution, as there is a large number of entrepreneurs with certain ownership shares (e.g. 33% and 50% for firms with three or two owners), posing a challenge in defining the bandwidths in the RDD approach. Overall, as the treatment and control groups have parallel trends prior to the reform and have very similar pre-reform characteristics, we believe that the differences-in-differences design provides more robust and accurate results.

Descriptive Statistics. Table 1 shows the pre-reform descriptive statistics separately for the treatment and control groups for all firm owners in our sample, and separately for younger and older firms. Following Decker et al. [2014], we break down our sample into owners of younger and older firms based on a five-year cutoff. In the data, we do not observe the exact starting date of a firm, but instead we observe the year in which a firm reported its first tax filing, and use this information to determine the age of the firm.

The key variables we use in our analysis are very similar across the control and treatment groups prior to the reform. The only money-metric variable that differs across the control and treatment groups is the level of mandatory insurance contributions, which are significantly lower in the control group prior to 2011. This is consistent with the fact that, for the treated firms, these contributions were mandatory prior to the 2011 reform, while they were voluntary in the control group, providing prima facie evidence that the social insurance mandate has an effect on the level of insurance contributions, which we show causally below.

4 Results

Social Insurance Contributions. Figure 1 plots the average annual change in social insurance contributions from 2006 to 2014 for all entrepreneurs in the

upper panel, and for the owners of younger firms in the bottom-left panel and older firms in the bottom-right panel. First, the pre-reform period clearly supports the parallel trends assumption, as insurance contributions in both the treatment and control groups evolve very similarly in all three panels prior to 2011. In contrast, at the time of the 2011 reform, there is a discontinuous decrease in the level of social insurance contributions in the treatment group. This implies that entrepreneurs chose to reduce their social insurance contributions after given more discretion over their contributions. The trends in contributions are also parallel after 2011, suggesting that most of the response to the policy change occurs in the year of the reform.

The corresponding regression estimates, using specification (1), are reported in column (1) of Table 2. We estimate that, on average, insurance contributions are reduced by 16.4% after the reform (see the bottom panel of Table 2). The observed response in social insurance contributions is slightly larger among younger firms, 20.2%, compared to older firms, 15.1%. However, the difference of the estimates between the groups is not statistically significant, as shown in the bottom row of Table 2.¹⁶

Overall, the observed response in social insurance contributions among the treated entrepreneurs is approximately equivalent to a 5 percentage-point cut in their corporate tax rate (on average).¹⁷ This decrease in contributions is substantial, and is approximately five times larger than the average corporate tax rate changes used by Fuest et al. [2018] to estimate the incidence of corporate taxes, and three times larger than the variation used in Chetty et al. [2014] to estimate the crowd-out effect of subsidized pension plans. Given the magnitude of this response, one could expect it to affect firm-level outcomes.

¹⁶Furthermore, on average, the observed reduction in social insurance contributions represents 19% of the potential maximum reduction. In other words, entrepreneurs reduced their contributions by approximately one fifth compared to what they could have reduced, i.e. reducing their contributions all the way to the lower limit. The observed response relative to the maximum potential response is similar for the owners of both young and older firms (21% and 18%, respectively).

¹⁷The corporate tax rate is currently 20% in Finland, but the rate has been reduced several times in recent years, from 26% to 24.5% in 2012 and from 24.5% to 20% in 2014.

Business Activity Outcomes. Figure 2 shows the effect of the 2011 reform on business activity for the owners of young firms that are equal to or younger than five years old. The figure shows a positive effect on firm sales, and an increase in labor costs. However, we find no increase in investments and stock holdings for these young firms. The corresponding regression estimates are reported in the first panel of Table 2. These results are consistent with the graphical evidence: we estimate an 11.1% increase in sales and a 5.9% increase in employee labor costs. Column (6) of Table 2 shows an increase in variable costs of 11.7%, reflecting increased input usage. In addition, we find a small increase in the number of employees of 4.2% (although the estimate is only weakly statistically significant). This suggests that the increase in labor costs is likely to include both an increase in the number of employees and an increase in their wages. Altogether, these results imply that the owners of young firms use the saved contributions to pay for additional intermediate inputs and labor in order to increase sales, and suggest that these firms might be facing liquidity constraints.

Figure 3 shows the effects of the reform for firms that are older than five years old. They respond to the reform very differently compared to young firms: sales, labor costs and investments do not increase due to the reform, but firm-level stock holdings increase instead. This suggests that the owners of these firms accumulate firm-level stock holdings as a response to the reform. Therefore, the money saved is used to increase the net lending position of the firm by buying more stocks. The second panel of Table 2 shows the regression estimates, which confirm the graphical evidence discussed above: the only variable that responds to the reform is firm-level stock holdings, which increased by 14.4% as a response to the reform. This implies that the additional cash is reinvested by the owners of mature firms, not to increase business activity, but instead to increase the net lending position of their firm. Finally, in the bottom row of Table 2, we test whether or not the differences-in-differences estimates between the owners of young and older firms are statistically different from each other. These tests confirm that the responses of old and young

firms to the reform are different.¹⁸

When pooling young and old firms together in the bottom panel of Table 2, we find no effects on business activity measures but do observe an increase in stock holdings.¹⁹ These results reflect more those of older firms because they cover nearly three quarters of the overall sample. Consequently, our split sample results show that average responses to the reform mask important and significant heterogeneity by firm age.

Finally, the 2011 reform could have affected entry and exit, which could create compositional changes and affect the interpretation of our results, given that we use an unbalanced panel. However, this concern is mitigated by the fact that we do not observe any differential entry or exit responses around the 2011 reform. Appendix Figure A.7 plots firm exit and entry in both the treatment and control groups over time, showing no effect of the 2011 reform on entry and exit.²⁰ Note that, as has been also documented by Decker et al. [2016] in the US, the general trends show that the number of entering firms and the entry rate have reduced while the number of exiting firms and the exit rate have remained stable over the last decade.

5 Conclusions

This paper estimates the effects of relaxing the social insurance mandate on entrepreneurs. Using quasi-experimental variation and a differences-in-differences design, we find that entrepreneurs substantially reduce their contributions to the social insurance program when these contributions are not

¹⁸In addition, Appendix Figure A.6 plots the estimates for separate firm age groups (firms aged 0-2, 3-5, 6-8, 9-10 and older than 10 years). These results show that the business activity effects are concentrated on young firms under 6 years of age and are insignificant for older firms. Similarly, increase in stock holdings is significant only for the older firms, therefore supporting the results and implications of our baseline differences-in-differences analysis.

¹⁹Appendix Figure A.5 plots the main business activity outcomes using the pooled sample, including both young and older firms.

²⁰The fact that the reform does not affect entry and exit is consistent with Benzarti et al. [2017], who find no effect on firm entry or exit of a 15 percentage-point VAT cut in the hairdressing industry in Finland.

mandatory, implying that the social insurance mandate is binding for entrepreneurs. The money saved is channeled into firms differently depending on the age of the firm. The owners of younger firms tend to use the money to increase their business activity, while the owners of more mature firms use it to improve their net lending position by purchasing stocks. Overall, this implies that, while the social insurance mandate for entrepreneurs crowds out business activity for young firms, it tends to depress stock holdings for more mature ones without a significant impact on business activity.

Our results also suggest that it could be beneficial to apply firm-age-dependent social insurance policies for entrepreneurs. These types of schemes already exist, e.g. in France, where new small firms are exempted from paying social insurance contributions for as long as 12 months after their creation. However, estimating the benefit of social insurance for entrepreneurs is an additional key factor needed in order to fully assess the optimality of such social insurance schemes, which we leave for future research to investigate.

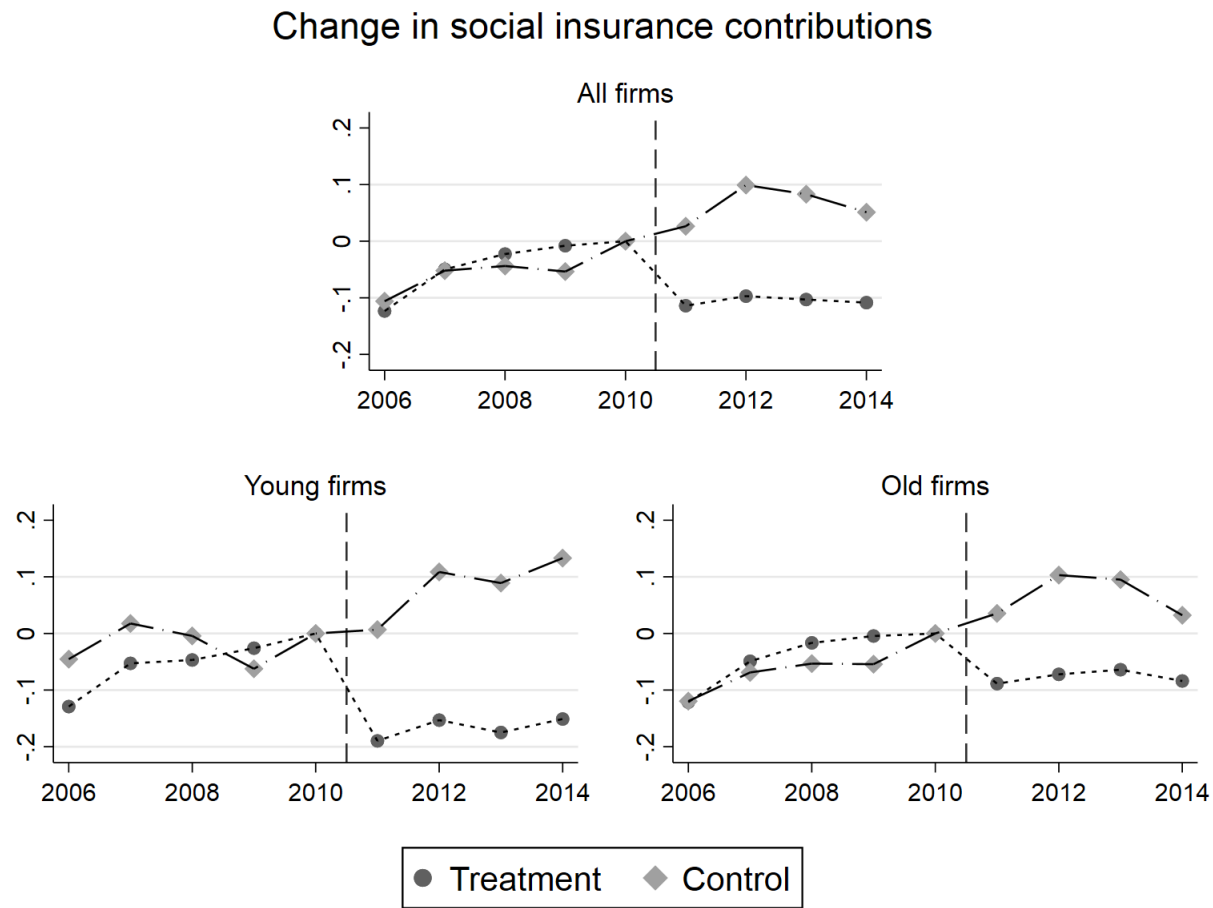
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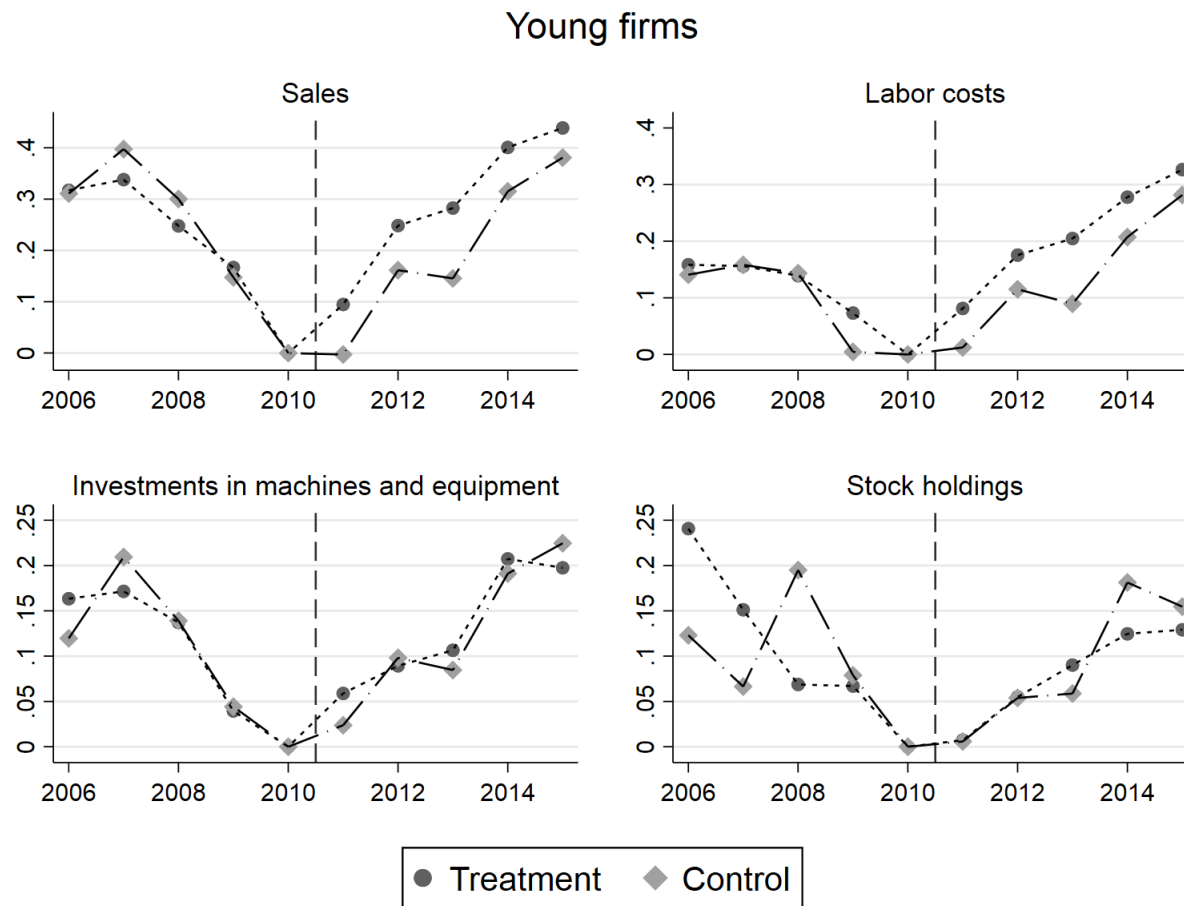
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Figure 1: Social insurance contributions over time: Treatment and control groups.



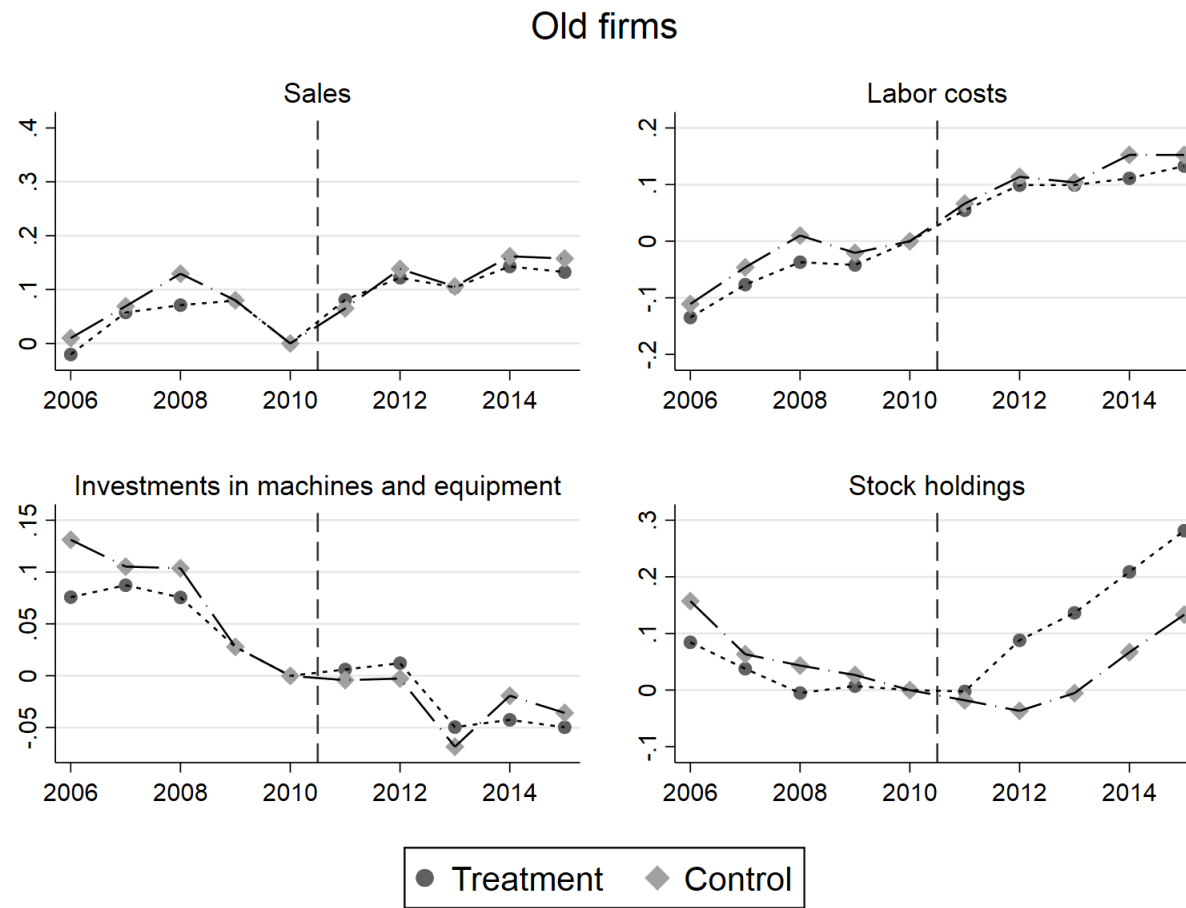
Notes: This figure plots social insurance contributions (in logs) over time relative to 2010 for the treatment (30-50% ownership) and control (51-70% ownership) groups for all firms (top panel), young firms (second panel) and old firms (third panel). We define young firms as firms that are equal to or younger than 5 years of age, and old firms as firms that are older than 5 years of age.

Figure 2: Effects on firm-level outcomes for young firms



Notes: This figure plots the responses of firm-level outcomes to the 2011 reform for the treatment (30-50% ownership) and control (51-70% ownership) groups for young firms, which we define as firms that are equal to or younger than 5 years of age. Sales, labor costs, investments in machines and equipment and stock holdings (in logs) relative to 2010 are plotted in the first, second, third and fourth panels, respectively.

Figure 3: Effects on firm-level outcomes for older firms



Notes: This figure plots the responses of firm-level outcomes to the 2011 reform for the treatment (30-50% ownership) and control (51-70% ownership) groups for old firms, which we define as firms that are older than 5 years of age. Sales, labor costs, investments in machines and equipment and stock holdings (in logs) relative to 2010 are plotted in the first, second, third and fourth panels, respectively.

Table 1: Descriptive statistics: 2006-2010 by treatment status and age of the firm

		Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
All	<u>Treatment</u>							
	Mean	7,799	1,150,961	196,588	79,770	10,963	663,074	10.326
	Median	6,696	306,153	71,820	13,961	0	63,235	4
	N	51,284	57,282	57,282	57,282	57,282	57,282	57,282
	<u>Control</u>							
	Mean	6,073	1,186,131	186,568	82,717	13,539	714,903	9.762
	Median	4,849	288,438	65,783	16,667	0	63,628	4
	N	24,489	32,219	32,219	32,219	32,219	32,219	32,219
	Young	<u>Treatment</u>						
Mean		7,584	952,128	185,143	66,949	5,622	497,520	10.445
Median		6,487	206,782	45,902	7,152	0	33,125	3
N		11,176	12,358	12,358	12,358	12,358	12,358	12,358
<u>Control</u>								
Mean		5,664	930,864	176,177	70,756	6,384	536,052	9.721
Median		4,422	210,753	48,299	9,995	0	39,656	3
N		4,943	6,358	6,358	6,358	6,358	6,358	6,358
Old		<u>Treatment</u>						
	Mean	7,859	1,205,658	199,736	83,296	12,432	708,616	10.293
	Median	6,755	332,339	78,597	16,096	0	73,133	4
	N	40,108	44,924	44,924	44,924	44,924	44,924	44,924
	<u>Control</u>							
	Mean	6,177	1,248,889	189,122	85,658	15,298	758,874	9.772
	Median	4,965	306,729	69,500	18,169	0	69,787	4
	N	19,546	25,861	25,861	25,861	25,861	25,861	25,861

Notes: This table shows the descriptive statistics for the treatment (30-50% ownership) and control (51-70% ownership) groups. The samples include firms belonging to the treatment and control groups for the time period 2006-2010. We define young firms as firms that are equal to or younger than 5 years of age, otherwise they are defined as old. Monetary variables are presented in current euros. The variable “investments” includes investments in machines and equipment.

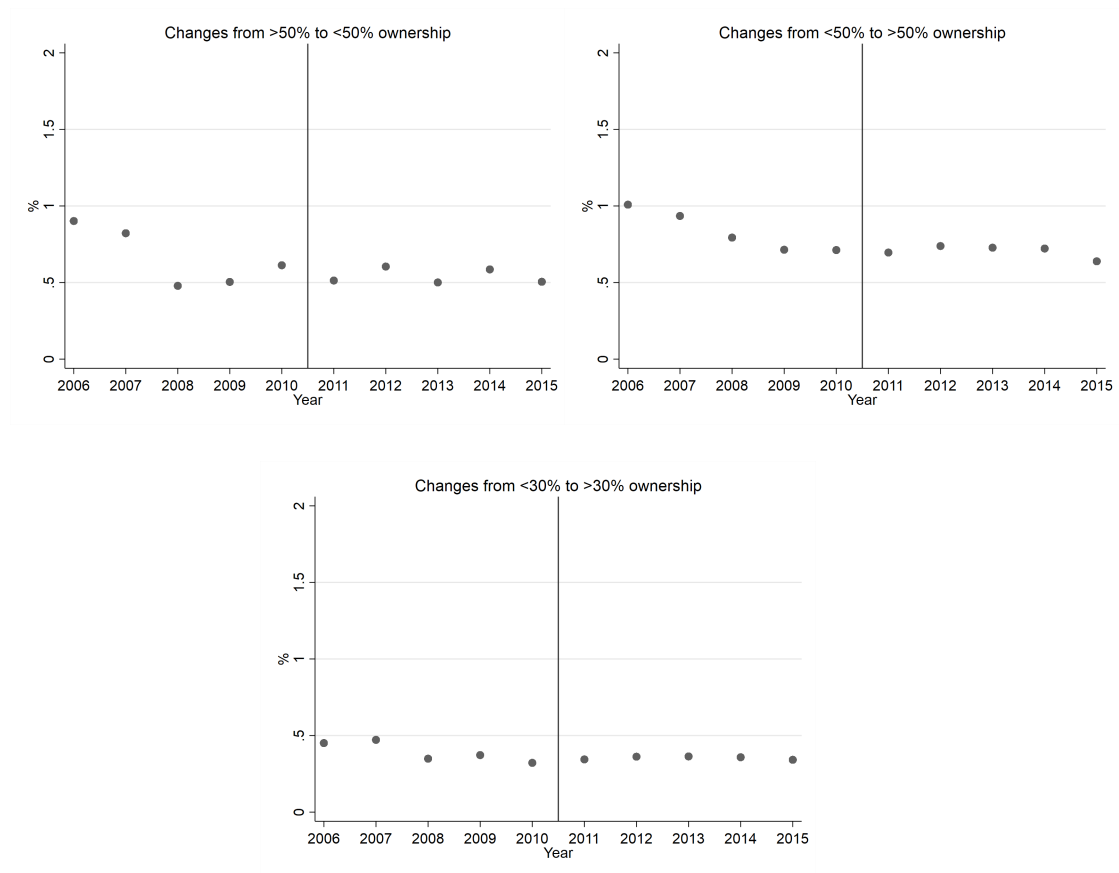
Table 2: Differences-in-differences results

Young firms	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.047 (0.037)	0.172*** (0.044)	0.031 (0.037)	-0.002 (0.045)	0.049 (0.056)	0.058 (0.056)	0.071** (0.032)
Treatment	0.324*** (0.021)	-0.022 (0.028)	0.067*** (0.023)	-0.057** (0.028)	-0.025 (0.034)	-0.011 (0.035)	-0.002 (0.020)
DD estimate	-0.202*** (0.029)	0.111*** (0.034)	0.059** (0.028)	0.007 (0.035)	-0.024 (0.044)	0.117*** (0.044)	0.042* (0.025)
Constant	8.350*** (0.027)	12.15*** (0.026)	11.12*** (0.022)	9.544*** (0.029)	0.418*** (0.036)	10.92*** (0.036)	1.118*** (0.020)
N	31,067	47,063	47,063	47,063	47,063	47,063	47,063
R2	0.011	0.834	0.926	0.848	0.001	0.817	0.005
Old firms							
VARIABLES	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	-0.206*** (0.035)	0.154*** (0.024)	0.253*** (0.020)	-0.144*** (0.027)	-0.046 (0.042)	0.119*** (0.032)	-0.133*** (0.018)
Treatment	0.292*** (0.011)	0.070*** (0.013)	0.113*** (0.011)	-0.025* (0.014)	-0.077*** (0.022)	0.102*** (0.018)	0.050*** (0.010)
DD estimate	-0.151*** (0.017)	0.008 (0.019)	0.000 (0.015)	0.022 (0.021)	0.144*** (0.031)	-0.009 (0.025)	-0.012 (0.014)
Constant	8.403*** (0.013)	12.64*** (0.017)	11.29*** (0.015)	9.921*** (0.018)	0.877*** (0.029)	11.41*** (0.023)	1.465*** (0.013)
N	95,384	141,686	141,686	141,686	141,686	141,686	141,686
R2	0.012	0.823	0.917	0.768	0.001	0.807	0.002
All firms							
VARIABLES	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.105*** (0.017)	0.029 (0.020)	0.149*** (0.017)	-0.112*** (0.023)	0.001 (0.034)	-0.029 (0.027)	-0.061*** (0.010)
Treatment	0.298*** (0.010)	0.045*** (0.012)	0.101*** (0.010)	-0.036*** (0.013)	-0.072*** (0.019)	0.073*** (0.016)	0.011* (0.006)
DD estimate	-0.164*** (0.014)	0.024 (0.016)	0.009 (0.013)	0.015 (0.018)	0.094*** (0.026)	0.007 (0.022)	-0.002 (0.008)
Constant	8.394*** (0.012)	12.67*** (0.015)	11.33*** (0.013)	9.874*** (0.016)	0.754*** (0.024)	11.43*** (0.020)	2.034*** (0.008)
N	126,451	188,749	188,749	188,749	188,749	188,749	188,749
R2	0.010	0.824	0.919	0.793	0.000	0.809	0.555
Difference in DD estimates btw young & old	-0.051 (0.033)	0.102*** (0.038)	0.059* (0.032)	-0.014 (0.041)	-0.168*** (0.054)	0.126** (0.051)	0.052* (0.027)
P-value	0.122	0.008	0.067	0.722	0.002	0.013	0.055

Notes: This table shows the results of estimating equation (1). The time period in these specifications is 2006-2015, except in Column (1), where we have data only until 2014. Heteroskedasticity-consistent standard errors are in parenthesis. Young firms are defined as firms equal to or younger than 5 years of age, and old firms older than 5 years of age. The variable “investments” includes investments in machines and equipment. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

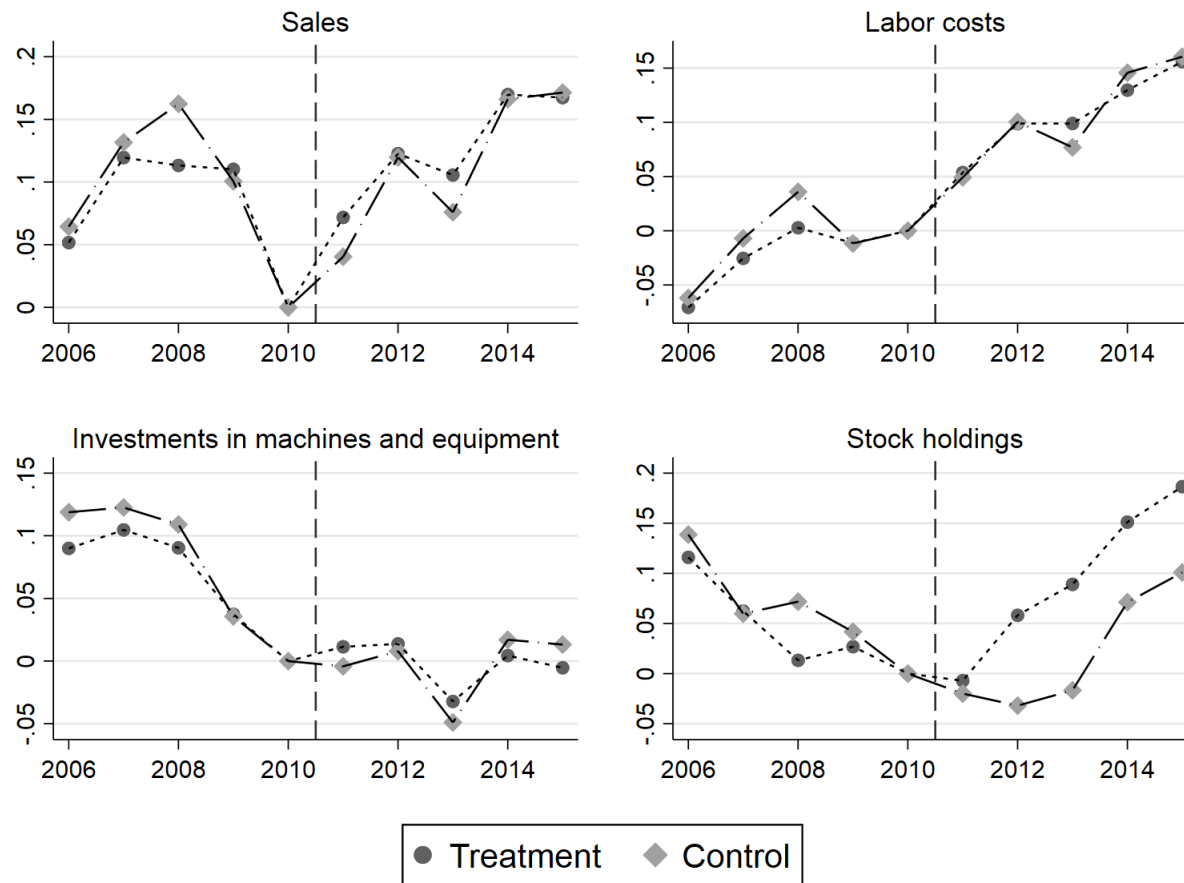
A APPENDIX

Figure A.4: Changes in ownership shares over time



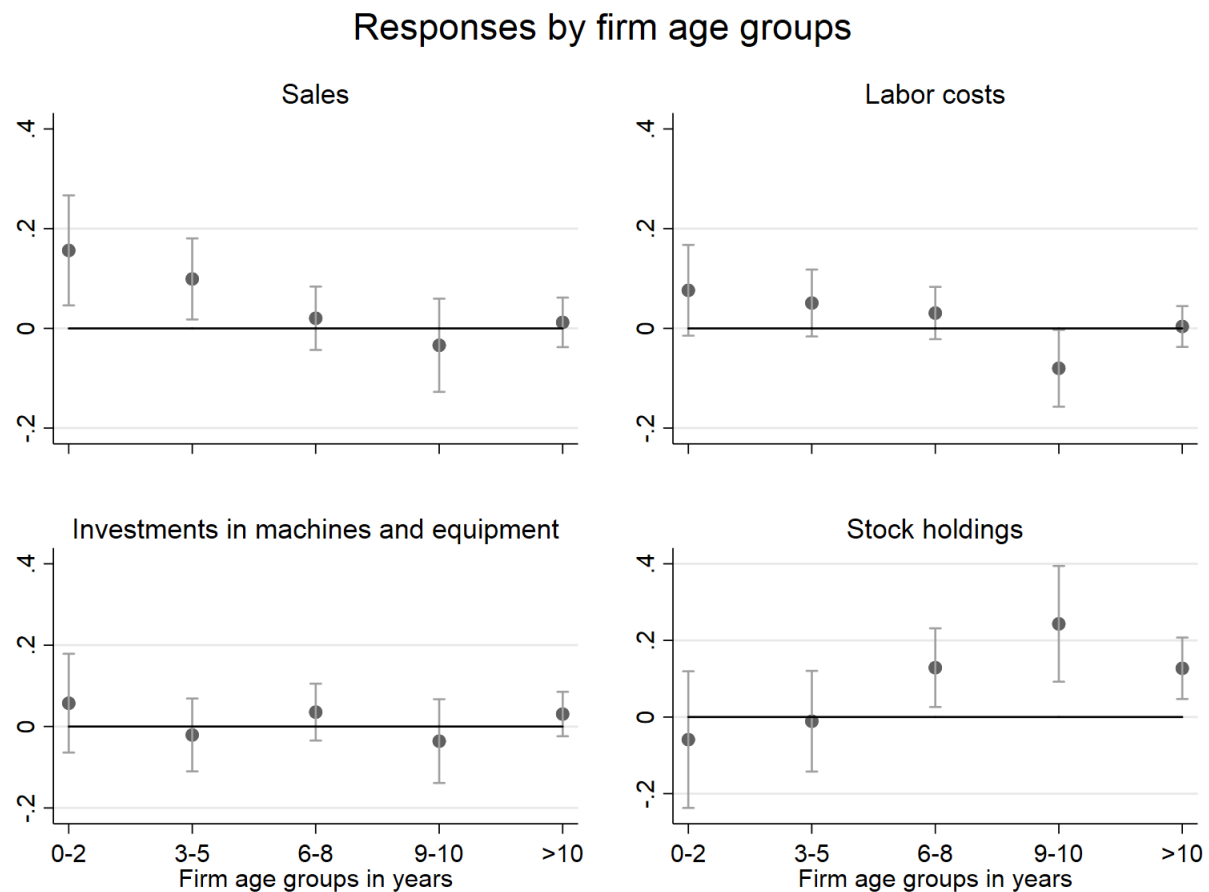
Notes: This figure plots changes in ownership shares over time in 2006-2016. The first panel shows the changes in ownership shares for owners with more than 50% ownership shares to less than 50%. The second panel shows the changes in ownership shares for owners with less than 50% ownership shares to more than 50%. The third panel shows the changes in ownership shares for owners with less than 30% ownership shares to more than 30%. Overall, there are no significant changes across these thresholds over time or around the 2011 reform.

Figure A.5: Effects on firm-level outcomes for all firms



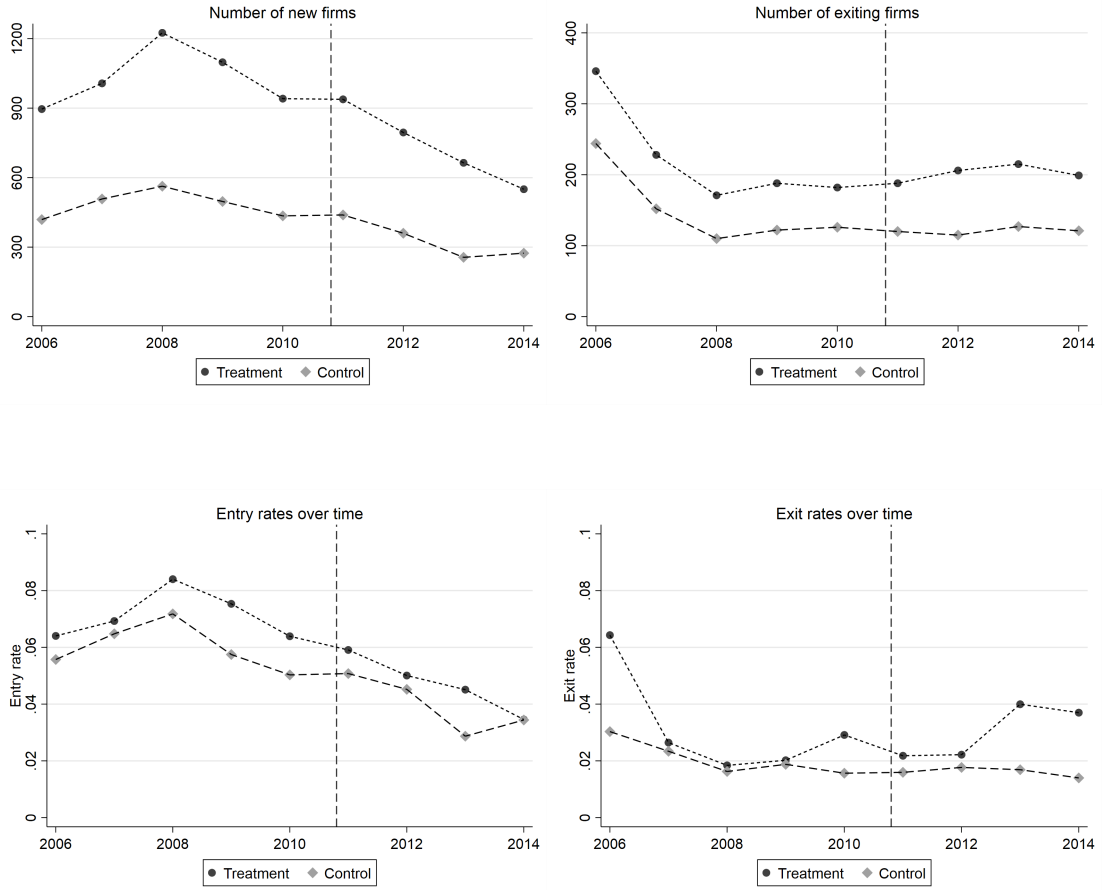
Notes: This figure plots the response of firm-level outcomes to the 2011 reform for the treatment (30-50% ownership) and control (51-70% ownership) groups for all firms. Sales, labor costs, investments in machines and equipment and stock holdings (in logs) relative to 2010 are plotted in the first, second, third and fourth panels, respectively.

Figure A.6: Estimates by firm age groups



Notes: This figure plots the estimates for five firm-age groups. To obtain the estimates, we add five age-group dummies interacted with the $Treat*Post$ term in equation (1). The graphs denote the coefficients for these interaction terms. In addition, the estimable equation includes interaction terms for the age-group dummies with both $Treat$ and $Post$. The graph includes heteroskedasticity-consistent 95% confidence intervals for the estimates.

Figure A.7: Entry and Exit



Notes: This figure plots the number of new firms and the number of exiting firms, and the relative entry and exit rates for the treatment (30-50% ownership) and control (51-70% ownership) groups in 2006-2014. Entry is defined based on the year the firm filed its first tax return. Similarly, exit is defined by the year the firm filed its last tax return in our data.

Table A.3: Definitions of the variables used in the analysis

Variables	Definitions
Social insurance contributions	The annual euro amount of social insurance contributions paid by the entrepreneur. The social insurance regulation in Finland is described in Section 2 in the main text.
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.
Labor costs	Wages and other wage-related compensations paid by the firm to employees excluding all social insurance contributions and taxes. This variable is in euros and at the annual level.
Number of employees	The sum of the number of employees who worked in the firm during the tax year.
Variable costs	Annual euro value of the costs used as intermediate inputs in production.
Investments in machines and equipment	Annual euro value of the gross investments in machines and equipment.
Stock holdings	Annual euro value of stock holdings in listed companies owned by the firm.
Ownership share	The company shares owned by the entrepreneur divided by the total number of shares.
Age of the firm	We define the year in which the firm reported its first tax filing as the year the firm was created, and use this variable to define the age of the firm.
Industry	Industry of the firm using one-digit industry classification.
Municipality	Municipality in which the firm is located. There were 336 municipalities in Finland in 2011.

Table A.4: Differences-in-differences results: Including owners of multiple firms

Young firms							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.047 (0.035)	-0.179*** (0.044)	-0.031 (0.036)	-0.000 (0.045)	-0.042 (0.055)	-0.057 (0.055)	-0.071** (0.032)
Treatment	0.324*** (0.021)	-0.003 (0.027)	0.074*** (0.023)	-0.049* (0.028)	-0.017 (0.033)	0.003 (0.035)	0.001 (0.020)
DD estimate	-0.202*** (0.029)	0.104*** (0.033)	0.052* (0.028)	0.001 (0.035)	-0.035 (0.044)	0.105** (0.044)	0.036 (0.025)
Constant	8.351*** (0.025)	12.34*** (0.035)	11.16*** (0.030)	9.542*** (0.035)	0.462*** (0.042)	10.99*** (0.044)	1.188*** (0.025)
N	31,646	47,834	47,834	47,834	47,834	47,834	47,834
R2	0.011	0.832	0.927	0.848	0.001	0.817	0.005
Old firms							
VARIABLES	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.175*** (0.020)	0.139*** (0.023)	0.247*** (0.019)	-0.134*** (0.026)	-0.049 (0.040)	0.104*** (0.031)	-0.138*** (0.017)
Treatment	0.275*** (0.010)	0.108*** (0.013)	0.104*** (0.011)	-0.030** (0.014)	-0.067*** (0.021)	0.092*** (0.017)	0.032*** (0.009)
DD estimate	-0.136*** (0.016)	0.008 (0.018)	-0.013 (0.015)	0.021 (0.020)	0.145*** (0.030)	-0.015 (0.024)	-0.016 (0.013)
Constant	8.339*** (0.013)	12.68*** (0.016)	11.30*** (0.014)	9.913*** (0.018)	0.874*** (0.028)	11.43*** (0.022)	1.458*** (0.012)
N	104,434	155,576	155,576	155,576	155,576	155,576	155,576
R2	0.011	0.818	0.921	0.778	0.001	0.813	0.002
All firms							
VARIABLES	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.172*** (0.017)	0.095*** (0.020)	0.217*** (0.017)	-0.100*** (0.022)	-0.019 (0.034)	-0.000 (0.027)	-0.057*** (0.010)
Treatment	0.284*** (0.009)	0.082*** (0.011)	0.096*** (0.010)	-0.036*** (0.012)	-0.061*** (0.018)	0.071*** (0.015)	0.013** (0.006)
DD estimate	-0.152*** (0.014)	0.022 (0.016)	-0.000 (0.013)	0.014 (0.017)	0.096*** (0.026)	0.005 (0.021)	-0.001 (0.008)
Constant	8.327*** (0.012)	12.64*** (0.015)	11.29*** (0.013)	9.859*** (0.016)	0.815*** (0.024)	11.40*** (0.020)	2.039*** (0.008)
N	136,080	203,410	203,410	203,410	203,410	203,410	203,410
R2	0.009	0.820	0.922	0.798	0.000	0.814	0.563

Notes: This table shows the results of estimating equation (1) when including owners of multiple firms in the sample. The time period in these specifications is 2006-2015, except in Column (1), where we have data until 2014. Heteroskedasticity-consistent standard errors in parentheses. Young firms are defined as firms equal to or younger than 5 years of age, and old firms older than 5 years of age. The variable “investments” includes investments in machines and equipment. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.5: Differences-in-differences results: Alternative control group using owners with 51–80% ownership shares

Young firms							
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.258*** (0.048)	-0.108*** (0.039)	-0.001 (0.033)	-0.053 (0.040)	0.003 (0.052)	-0.167*** (0.052)	-0.139*** (0.029)
Treatment	0.328*** (0.019)	0.036 (0.025)	0.116*** (0.021)	-0.011 (0.026)	-0.043 (0.031)	0.052 (0.032)	0.037** (0.018)
DD estimate	-0.219*** (0.026)	0.099*** (0.031)	0.040 (0.026)	0.011 (0.032)	-0.058 (0.041)	0.106*** (0.041)	0.053** (0.023)
Constant	8.335*** (0.025)	12.37*** (0.032)	11.19*** (0.028)	9.590*** (0.033)	0.405*** (0.040)	11.09*** (0.042)	1.269*** (0.023)
N	33,784	51,587	51,587	51,587	51,587	51,587	51,587
R2	0.011	0.830	0.925	0.846	0.009	0.815	0.006
Old firms							
VARIABLES	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	-0.163*** (0.033)	0.141*** (0.022)	0.243*** (0.018)	-0.133*** (0.024)	-0.027 (0.038)	0.113*** (0.030)	-0.131*** (0.016)
Treatment	0.286*** (0.010)	0.108*** (0.012)	0.152*** (0.010)	-0.003 (0.013)	-0.070*** (0.020)	0.166*** (0.016)	0.086*** (0.009)
DD estimate	-0.146*** (0.015)	0.020 (0.017)	0.005 (0.014)	0.015 (0.019)	0.106*** (0.029)	-0.010 (0.023)	-0.013 (0.013)
Constant	8.343*** (0.012)	12.60*** (0.015)	11.25*** (0.013)	9.897*** (0.017)	0.784*** (0.026)	11.34*** (0.021)	1.429*** (0.011)
N	105,852	159,073	159,073	159,073	159,073	159,073	159,073
R2	0.013	0.820	0.915	0.767	0.005	0.804	0.003
All firms							
VARIABLES	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.174*** (0.016)	0.090*** (0.019)	0.221*** (0.016)	-0.108*** (0.021)	-0.001 (0.032)	0.020 (0.025)	-0.049*** (0.009)
Treatment	0.293*** (0.009)	0.085*** (0.011)	0.141*** (0.009)	-0.010 (0.012)	-0.071*** (0.017)	0.137*** (0.014)	0.029*** (0.005)
DD estimate	-0.165*** (0.013)	0.029* (0.015)	0.006 (0.012)	0.013 (0.016)	0.055** (0.024)	0.001 (0.020)	-0.008 (0.007)
Constant	8.332*** (0.011)	12.56*** (0.014)	11.24*** (0.012)	9.836*** (0.015)	0.724*** (0.022)	11.32*** (0.019)	2.009*** (0.007)
N	139,636	210,660	210,660	210,660	210,660	210,660	210,660
R2	0.011	0.821	0.918	0.791	0.005	0.806	0.559

Notes: This table shows the results of estimating equation (1) when using an alternative control group including owners with 51–80% ownership shares. The time period in these specifications is 2006–2015, except in Column (1), where we have data until 2014. Heteroskedasticity-consistent standard errors in parentheses. Young firms are defined as firms equal to or younger than 5 years of age, and old firms older than 5 years of age. The variable “investments” includes investments in machines and equipment. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.6: Differences-in-differences results with controls included

Young firms		(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.	
Post-2010	0.338*** (0.045)	-0.154*** (0.042)	-0.020 (0.036)	-0.006 (0.042)	-0.032 (0.056)	-0.013 (0.052)	-0.087*** (0.030)	
Treatment	0.220*** (0.023)	-0.322*** (0.030)	-0.197*** (0.026)	-0.259*** (0.030)	-0.049 (0.039)	-0.323*** (0.038)	-0.238*** (0.022)	
DD estimate	-0.238*** (0.027)	0.095*** (0.032)	0.054* (0.028)	0.019 (0.033)	-0.015 (0.045)	0.123*** (0.042)	0.034 (0.024)	
Constant	4.592*** (0.179)	10.92*** (0.429)	10.77*** (0.261)	9.361*** (0.349)	-0.183 (0.187)	10.97*** (0.284)	0.848*** (0.181)	
N	30,988	46,926	46,926	46,926	46,926	46,926	46,926	
R2	0.169	0.855	0.931	0.868	0.030	0.843	0.133	
Old firms		Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.244*** (0.029)	0.139*** (0.019)	0.235*** (0.015)	-0.085*** (0.024)	-0.017 (0.031)	0.096*** (0.023)	-0.019 (0.017)	
Treatment	0.149*** (0.037)	-0.239* (0.135)	-0.159 (0.104)	-0.270*** (0.102)	-0.107 (0.073)	-0.236 (0.162)	-0.150* (0.078)	
DD estimate	-0.175*** (0.021)	-0.002 (0.020)	-0.007 (0.015)	0.027 (0.026)	0.138*** (0.030)	-0.012 (0.030)	-0.006 (0.016)	
Constant	3.581*** (0.213)	12.01*** (0.364)	10.86*** (0.257)	10.86*** (0.315)	0.789* (0.406)	12.28*** (0.284)	1.746*** (0.192)	
N	95,363	141,646	141,646	141,646	141,646	141,646	141,646	
R2	0.192	0.848	0.924	0.803	0.022	0.840	0.269	
All firms		Pension contrib.	Sales	Labor costs	Investments	Stock holdings	Variable costs	No. of empl.
Post-2010	0.209*** (0.016)	0.068*** (0.019)	0.181*** (0.017)	-0.089*** (0.021)	-0.023 (0.033)	-0.000 (0.025)	-0.052*** (0.010)	
Treatment	0.163*** (0.011)	-0.262*** (0.013)	-0.169*** (0.012)	-0.269*** (0.014)	-0.088*** (0.022)	-0.258*** (0.018)	-0.159*** (0.007)	
DD estimate	-0.192*** (0.013)	0.017 (0.015)	0.005 (0.013)	0.022 (0.017)	0.095*** (0.026)	0.012 (0.020)	-0.001 (0.008)	
Constant	3.665*** (0.100)	11.61*** (0.126)	10.65*** (0.105)	10.53*** (0.122)	0.521*** (0.171)	11.78*** (0.122)	2.519*** (0.051)	
N	126,351	188,572	188,572	188,572	188,572	188,572	188,572	
R2	0.177	0.847	0.925	0.822	0.017	0.839	0.578	

Notes: This table shows the results of estimating equation (1) with control variables included. The time period in these specifications is 2006-2015, except in Column (1), where we have data only until 2014. The owner-level controls are age, age squared, gender and ownership share of the firm. The firm-level controls include municipality dummies for the location of the firm and one-digit industry dummies. Heteroskedasticity-consistent standard errors in parentheses. Young firms are defined as firms equal to or younger than 5 years of age, and old firms older than 5 years of age. The variable “investments” includes investments in machines and equipment. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.