

Does Mandating Social Insurance Affect Entrepreneurial Activity?[†]

By YOUSSEF BENZARTI, JARKKO HARJU, AND TUOMAS MATIKKA*

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 percent, which they channel instead into their firms. While young firms use the saved cash to increase their sales by 11 percent and labor costs by 6 percent, 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. (JEL H55, J32, L26)

Dubbed “the engine of growth,” entrepreneurship plays a central role in modern economies. In the United States for example, new businesses account for 20 percent 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. 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

*Benzarti: Department of Economics, University of California and National Bureau of Economics (email: benzarti@ucsb.edu); Harju: VATT Institute for Economic Research and CESifo (email: jarkko.harju@vatt.fi); Matikka: VATT Institute for Economic Research and CESifo (email: tuomas.matikka@vatt.fi). Amy Finkelstein was coeditor for this article. We thank Raj Chetty, Jason DeBacker, Essi Eerola, Seppo Kari, Jaakko Kiander, Tuomas Kosonen, Ryan Oprea, Tuomas Pekkarinen, Emmanuel Saez, Alisa Tazhitdinova, Roope Uusitalo, three anonymous referees, and several conference participants for their helpful comments. We are grateful to Finance Finland, and especially to Päivi Luna, for assisting us with acquiring the data on public pension contributions from Finnish mutual pension insurance companies. Harju and Matikka gratefully acknowledge funding from the Strategic Research Council (SRC) at the Academy of Finland No. 293120, Work, Inequality, and Public Policy.

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¹See, for example, Decker et al. (2014).

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

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 percent currently and 50 percent 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 difference-in-difference strategy and exploit a reform in 2011 that changed the ownership-share rule from 50 to 30 percent to assess how relaxing the social insurance mandate affects entrepreneurial activity. We compare firm owners with 30–50 percent pre-reform ownership shares (treatment) to firm owners with 51–70 percent 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 percent when 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, Peichl, and Sieglöcher (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. Note that because the policy change leads to a relaxed social insurance mandate, allowing the treated entrepreneurs to choose how much to contribute, the insurance contribution variable itself is a choice variable.

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 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. OECD countries address the issue of insuring non-wage earners in three different ways: (1) 73 percent 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 percent either (2) mandate that non-wage earners participate in a special social insurance program specifically designed for them (15 percent) or (3) allow non-wage earners to opt into the regular social insurance program, with no specific mandate (12 percent).³ 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) shows, 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.⁴ Our paper complements the analysis of Chetty et al. (2014) by focusing on a population of active savers, that is, 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, Laeven, and Rajan (2006) show that entry regulations are likely to reduce firm entry. More recently, Aghion et al. (2017); Harju, Matikka, and Rauhanen (2019); and Tazhitdinova (2016) 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.⁵

Third, this paper is related to corporate 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.⁶ For example, Cullen and Gordon (2007) uses time series variation in tax rates to estimate the effect of taxes on risk taking by entrepreneurs, and Gentry and Hubbard (2000) uses 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

³ Source: authors' calculations based on data from the International Social Security Association.

⁴ See also Poterba, Venti, and Wise (1996); Engen, Gale, and Scholz (1996); Benjamin (2003); Engelhardt and Kumar (2007); and Gelber (2011).

⁵ However, we also estimate the effect of the reform on entry and exit.

⁶ See for example Schumpeter (2008) and Baumol, Litan, and Schramm (2007) on the importance of entrepreneurship for growth.

and entrepreneurial activity and found negative correlations between these two variables.⁷

I. Institutional Background and Data

A. *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.

B. *Social Insurance Contributions of Entrepreneurs*

In this paper, we study the impact of mandating social insurance contributions on entrepreneurial activity. In the rest of the paper, 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 IC 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.⁸ 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 18–67 years old, their firm must be at least 4 months old, and the income they derive from the firm has to be at least €7,557 per year (in 2016).⁹

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 percent 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 percent 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.

⁷ See for example Djankov et al. (2010), which finds strong negative relationships between the level of corporate income taxes and entrepreneurship using data from 85 countries.

⁸ YEL stands for “Yrittäjän eläkelaki” in Finnish.

⁹ The 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).

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, 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 percent and 23.7 percent in 2016, respectively.¹⁰

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 contributions are more than actuarially fair.¹¹ 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, that is, 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 percent of the company shares were treated as Y owners, that is, they had more freedom to choose their level of insurance contributions. In 2011, this threshold was decreased to the current level of 30 percent. This meant that from 2011 onward, owners with a 30–50 percent ownership share could now more freely determine their level of social insurance contribution. We use this variation, along with a difference-in-difference strategy discussed in Section II, to investigate the effects of mandating social insurance on the economic activity of entrepreneurs.¹² Note that, in principle, T owners with ownership shares above 30 percent 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.

¹⁰Both 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 was 25.2 percent for persons aged 53 or older, and the YEL contribution rate was 25.1 percent for persons aged 53–62. In addition, the contribution rates were lower for starting businesses of Y owners: 19.6 percent for persons aged 53–62 and 18.4 percent for others.

¹¹In 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.

¹²More 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).

C. Data

We use two datasets: (1) data from the two largest Finnish pension companies managing the mandatory social insurance contributions of entrepreneurs and (2) linked corporate and individual tax return data covering both firm- and owner-level outcomes and characteristics. We use unique identifiers to link these datasets together. There are two points worth noting about our data. First, the panel we are using is unbalanced, which means that our estimates will include the effect of the reform on entry and exit (which we address below). Second, we exclude the owners of multiple firms from the sample. However, our results are robust to including them, as only 7.3 percent of the entrepreneurs in our data own more than 1 firm at a time. The results using all owner-firm pairs are presented in online Appendix Table A.2.

Insurance Contribution Data.—Contribution levels for T owners can be calculated using our dataset 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 that cover approximately 70 percent of all entrepreneurs. These data are available from 2006–2014.

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.

II. Empirical Approach

Estimation.—In order to estimate the effect of mandating social insurance on entrepreneurs and their business activity, we use a difference-in-difference approach where we take advantage of the fact that the ownership-share threshold changed due to the 2011 reform. Prior to 2011, entrepreneurs who owned less than 50 percent 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 percent 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 percent, such that now only entrepreneurs with

ownership shares below 30 percent were considered T owners. In other words, the social insurance mandate was relaxed for entrepreneurs who owned 30–50 percent of their firm. We compare these entrepreneurs to those who owned 51–70 percent of their firm, thus being subject to the Y ownership status both before and after the 2011 reform.¹³

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

$$(1) \quad Y_{i,t} = \alpha_0 + \alpha_1 \text{Treat}_i + \alpha_2 \text{Post}_t + \alpha_3 (\text{Treat}_i \times \text{Post}_t) + \lambda_t + \varepsilon_{i,t},$$

where Y is the outcome variable of interest (in logs) for a given entrepreneur/firm owner i , and t is time. The variable Treat is a dummy equal to one for the treated entrepreneurs and zero 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.¹⁴

The main outcome variables we consider are the following: the amount of annual 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 that consist of annual costs used as intermediate inputs in production, the value of annual gross investments in machines and equipment, and the 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 we use can be found in online Appendix Table A.1.

Identification.—The identifying assumption for the difference-in-difference design is *not* random assignment to the treatment and control groups but that the treatment (30–50 percent ownership share) and control (51–70 percent 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 in Section III. The fact that the outcome variables follow parallel trends prior to the reform and 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. Online Appendix Figure A.1 shows

¹³The results are not sensitive to the choice of the 70 percent upper bound. In online Appendix Table A.3, we use an alternative definition for the control group with ownership shares between 51 to 80 percent prior to the reform. The results are quantitatively and statistically very similar to our baseline results.

¹⁴We also run specification (1) while controlling for firm- and owner-level characteristics. In online Appendix Table A.4, 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.

TABLE 1—DESCRIPTIVE STATISTICS: 2006–2010 BY TREATMENT STATUS AND AGE OF THE FIRM

Variables	Pension contributions	Sales	Labor costs	Investments	Stock holdings	Variable costs	Number of employees
<i>All firms</i>							
Treatment							
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
Observations	51,284	57,282	57,282	57,282	57,282	57,282	57,282
Control							
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
Observations	24,489	32,219	32,219	32,219	32,219	32,219	32,219
<i>Young firms</i>							
Treatment							
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
Observations	11,176	12,358	12,358	12,358	12,358	12,358	12,358
Control							
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
Observations	4,943	6,358	6,358	6,358	6,358	6,358	6,358
<i>Old firms</i>							
Treatment							
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
Observations	40,108	44,924	44,924	44,924	44,924	44,924	44,924
Control							
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
Observations	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 percent ownership) and control (51–70 percent 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 five 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.

the changes in ownership shares for owners with more than 50 percent ownership shares to less than 50 percent (first panel), less than 50 percent ownership shares to more than 50 percent (second panel), and less than 30 percent ownership shares to more than 30 percent (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 difference-in-difference 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 percent and 50 percent for firms with 3 or 2 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

very similar pre-reform characteristics, we believe that the difference-in-difference 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 cut-off. 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 variable that differs across the control and treatment groups is the level of mandatory insurance contributions, which is 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.

III. Results

Social Insurance Contributions.—Figure 1 plots the average annual change in social insurance contributions from 2006–2014 for all entrepreneurs in panel A and the owners of younger firms in panel B and older firms in panel C. 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 choose to reduce their social insurance contributions when 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 percent 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 percent, compared to older firms, 15.1 percent. However, this difference is not statistically significant, as shown in the bottom row of Table 2.¹⁵

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).¹⁶ This decrease in contributions is substantial, approximately five times larger than the average corporate tax rate changes used

¹⁵Furthermore, on average, the observed reduction in social insurance contributions represents 19 percent of the potential maximum reduction, that is, reducing contributions all the way to the minimum allowed.

¹⁶The corporate tax rate is currently 20 percent in Finland, but the rate has been reduced several times in recent years, from 26 percent to 24.5 percent in 2012 and from 24.5 percent to 20 percent in 2014.

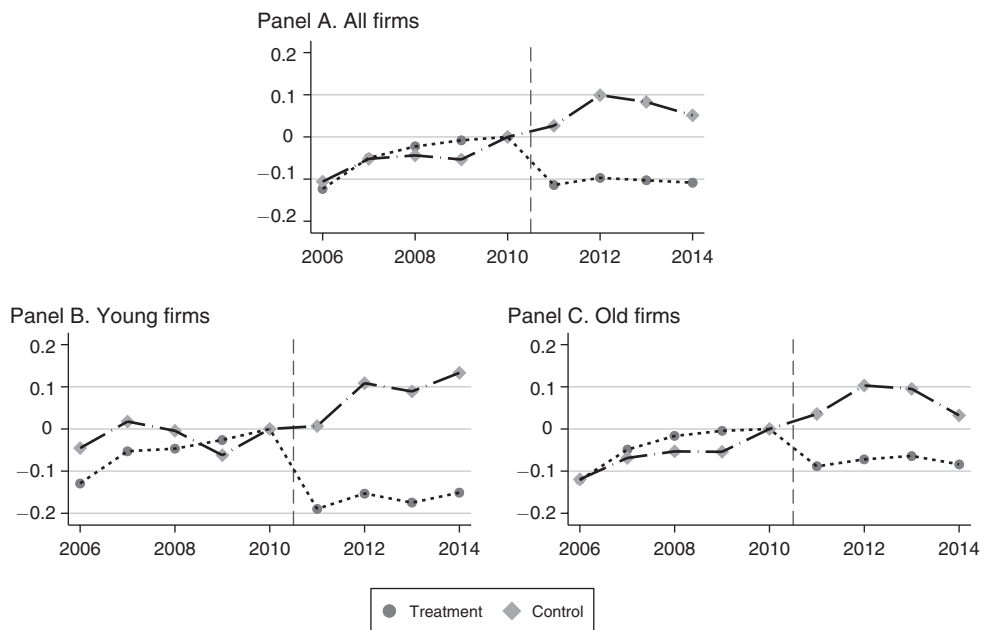


FIGURE 1. SOCIAL INSURANCE CONTRIBUTIONS OVER TIME: TREATMENT AND CONTROL GROUPS

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

by Fuest, Peichl, and Siegloch (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.

Business Activity Outcomes.—Figure 2 shows the effect of the 2011 reform on business activity for the owners of young firms 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 percent increase in sales and 5.9 percent increase in employee labor costs. Column 6 of Table 2 shows an increase in variable costs of 11.7 percent, reflecting increased input usage. In addition, we find a small increase in the number of employees of 4.2 percent (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 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,

TABLE 2—DIFFERENCE-IN-DIFFERENCE RESULTS

Variables	Pension contributions (1)	Sales (2)	Labor costs (3)	Investments (4)	Stock holdings (5)	Variable costs (6)	Number of employees (7)
<i>Young firms</i>							
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)
Observations	31,067	47,063	47,063	47,063	47,063	47,063	47,063
R ²	0.011	0.834	0.926	0.848	0.001	0.817	0.005
<i>Old firms</i>							
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)
Observations	95,384	141,686	141,686	141,686	141,686	141,686	141,686
R ²	0.012	0.823	0.917	0.768	0.001	0.807	0.002
<i>All firms</i>							
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)
Observations	126,451	188,749	188,749	188,749	188,749	188,749	188,749
R ²	0.010	0.824	0.919	0.793	0.000	0.809	0.555
Difference in DD estimates between young and 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 parentheses. Young firms are defined as firms equal to or younger than five years of age, and old firms older than five years of age. The variable “investments” includes investments in machines and equipment.

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 percent as a response to the reform. This implies that the additional cash is reinvested by the owners of mature

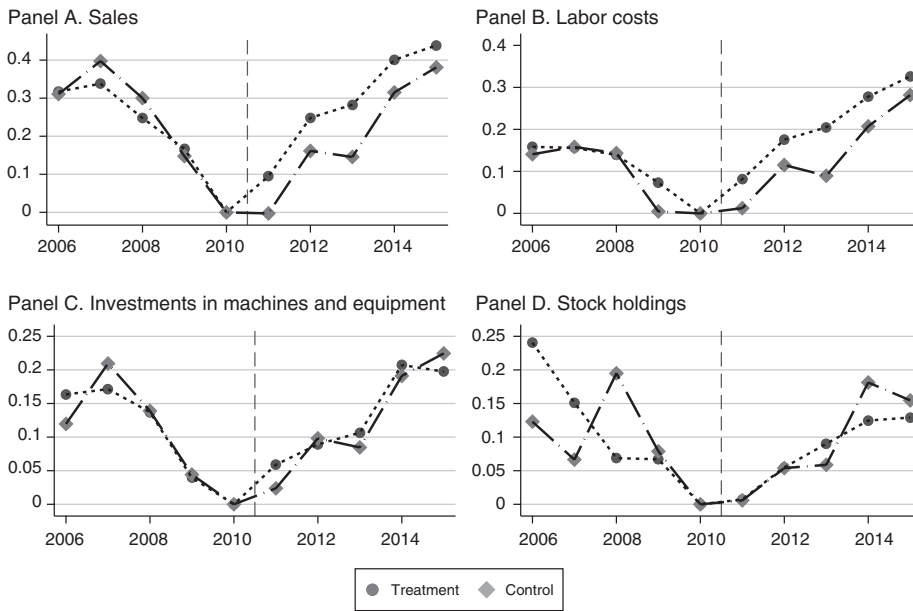


FIGURE 2. EFFECTS ON FIRM-LEVEL OUTCOMES FOR YOUNG FIRMS

Notes: This figure plots the responses of firm-level outcomes to the 2011 reform for the treatment (30–50 percent ownership) and control (51–70 percent ownership) groups for young firms, which we define as firms that are equal to or younger than five 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.

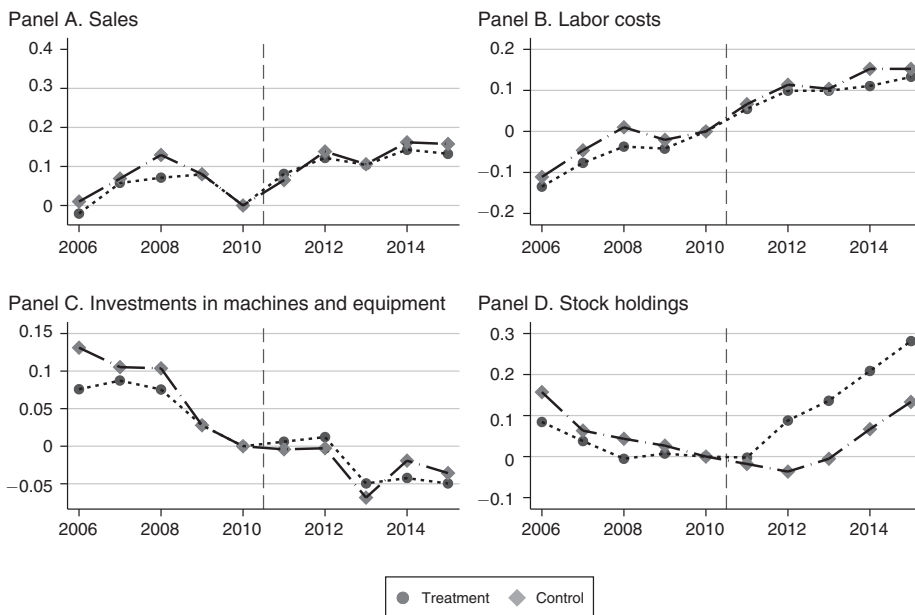


FIGURE 3. EFFECTS ON FIRM-LEVEL OUTCOMES FOR OLDER FIRMS

Notes: This figure plots the responses of firm-level outcomes to the 2011 reform for the treatment (30–50 percent ownership) and control (51–70 percent ownership) groups for old firms, which we define as firms that are older than five 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.

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 difference-in-difference 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.¹⁷

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.¹⁸ 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. Online Appendix Figure A.4 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. Using specification (1) to estimate the effect of the reform on entry and exit rates generates small and insignificant estimates, consistent with the absence of discontinuity around the reform in online Appendix Figure A.4.¹⁹ Note that, as has been also documented by Decker et al. (2016) in the United States, the general trends show that the number of entering firms and the entry rate have decreased while the number of exiting firms and the exit rate have remained stable over the last decade.

IV. Conclusions

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

¹⁷In addition, online Appendix Figure A.3 plots the estimates for separate firm age groups (firms aged zero to two, three to five, six to eight, nine to ten, and older than ten years). These results show that the business activity effects are concentrated on young firms and insignificant for older firms. Similarly, the increase in stock holdings is significant only for the older firms, therefore supporting the results and implications of our baseline difference-in-difference analysis.

¹⁸Online Appendix Figure A.2 plots the main business activity outcomes using the pooled sample, including both young and older firms.

¹⁹The estimate for entry is 0.0045 (0.0105) and for exit is 0.0025 (0.0095), with standard errors in parentheses. The fact that the reform does not affect entry and exit rates is consistent with Benzarti et al. (2018), which finds no effect on firm entry or exit of a 14 percentage point VAT cut in the hairdressing industry in Finland.

example, 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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