# Higher Dividend Taxes, No Problem!
# Evidence from Taxing Entrepreneurs in France

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# Higher Dividend Taxes, No Problem! Evidence from Taxing Entrepreneurs in France *

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**Abstract**

This paper investigates how the 2013 three-fold increase in the dividend tax rate in France affected firms' investment and performance. Using administrative data covering the universe of firms over 2008–2017 and a quasi-experimental setting, we find that firms swiftly cut dividend payments. Firms use this tax-induced increase in liquidity to invest more, particularly when facing high demand and return on capital. For every euro of undistributed dividends, firms increase their investment by 0.3 euro, leading to higher sales growth. Heterogeneity analyses show that no group of firms cut their investment, thereby rejecting models in which higher dividend taxes increase the cost of capital. Overall, our results show that the tax-induced increase in liquidity relaxes credit constraints and can reduce capital misallocation.

**Keywords**: Financing Policy; Business Taxes; Capital and Ownership Structure
**JEL Code**: G11, G32, H25, O16

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# 1 Introduction

Proposals to encourage firms to invest by limiting corporate payouts are regularly floated in the political debate. In 2019, U.S. Senators Schumer and Sanders argued that: "*when corporations direct resources [to payouts], they restrain their capacity to reinvest profits more meaningfully in the company in terms of R&D, equipment, higher wages.*" Following a similar logic, in 2013, after its electoral victory, the French center-left party decided to raise the dividend tax rate by a factor of three for French entrepreneurs, explaining that: "*it is fair and legitimate to reward patient and productive investment (...). We want to incentivize investment rather than dividend payouts.*"[1] By contrast, supporters of limited taxes on dividends argue that increasing the dividend tax rate would actually depress investment by increasing companies' cost of capital. When President G. W. Bush adopted the Jobs and Growth Tax Relief Reconciliation Act of 2003 that reduced the top federal tax rate on individual dividend income in the U.S., he claimed that the tax cut would provide "*near-term support to investment*" and "*capital to build factories, to buy equipment, hire more people.*"

At the heart of this debate is the question of the impact of dividend taxes on corporate investment decisions and its effect on overall output. Dividend taxes can affect overall output via two channels. First, for the *average* firm, a change in the dividend tax rate may lead to either more or less investment.[2] Second, the dividend tax rate could change the *distribution* of investment across firms, which in the presence of heterogeneous firms will affect the degree of capital misallocation in the economy.[3]

In this paper, we provide a novel empirical answer to both dimensions of this question by exploiting the 2013 reform in France that led to an increase in the dividend tax rate from 15.5% to 46%, one of the largest in developed countries over the past forty years. We also exploit rich, administrative panel data that cover the universe of French corporations from tax filings and which provide detailed

1. Francois Rebsamen, French senator and one of the most prominent figures of the "Parti Socialiste" (the left-wing party in power), 2012.

2. The effect for the average firm is a priori unclear. Higher dividend taxes can have either no effect, a positive effect or a negative effect on investment. We discuss the different theories in the literature review.

3. This would happen for instance if an increase in the dividend tax rate leads firms with low return to capital to increase their investment more, while firms with high return to capital become more constrained. Note that in this example, if the number of firms with low return to capital is much larger in the economy, we could simultaneously have an increase in the average investment rate, usually perceived as a positive outcome, *and* an increase in capital misallocation, which would reduce aggregate output in the long-run.

balance sheets and income statements over the period 2008–2017.

The French reform affected firms with a particular legal status, which account for three-quarters of the population of firms, while the rest remained unaffected. This feature, combined with the universe of tax-files, provides us with several appealing institutional features to understand how an increase in the dividend tax rate affects both the level and the distribution of investment across firms. First, the reform affected most firms in the economy, including small and new firms which are particularly likely to be equity dependent and to see their cost of capital increase after the dividend tax hike. Second, we observe all firms in the economy, with sizeable treated and control groups to provide in-depth analyses of potential investment reallocation. And third, the detailed data on firm cash-flow statements and balance sheets allow us to provide a complete picture of the different margins of adjustments to the tax hike and to explore possible changes in income-shifting behaviors from treated entrepreneurs, which is crucial to estimate whether firms change their amount of wasteful or productive investment.

Our identification relies on ex-ante differences in firm legal status, but requires neither firms choosing a legal status randomly nor a common support in the *level* of covariates across firms. It only requires that treated and control firms would have evolved similarly to each other absent the reform. To ensure that our estimates are well-identified, we use two methods. First, we provide visual evidence of the evolution of key firm outcomes such as dividends and investment around the year of the reform by estimating difference-in-differences event studies. The graphs confirm that control and treated firms evolve in parallel in the years leading to the reform and only start to diverge after 2013. Second, we saturate our difference-in-differences estimator with high-dimensional fixed effects to remove as much time-varying unobserved heterogeneity as possible. In our preferred specification, we compare treated and control firms in the same industry, located in the same city and in the same quintile of pre-reform capital growth.

Our first set of results confirms that the 2013 tax hike was a large and salient shock for the treated entrepreneurs. We find that entrepreneurs affected by the reform adjust their behavior along three dimensions. First, firms swiftly reduce their dividends the year of the reform and maintain lower dividends thereafter. Treated firms cut their dividends by 3 p.p. of the firm's capital, which represents a 15% drop relative to the pre-reform sample mean and implies an elasticity of the dividend to the tax rate of 0.43.[4] Second, the reform introduced a steep kink in the

4. Interestingly, this is very close to the elasticity for the 2003 Bush tax cut as estimated in Chetty and Saez (2005) and Yagan (2015).

tax-code, as the new tax rate of 46% only applies to dividends exceeding 10% of the firm equity. Following the reform, a large and increasing bunching in dividend distributions appears at this threshold for treated firms. Third, while firms existing before the reform do not change their legal status, new entrepreneurs display important behavioral changes consistent with regulatory arbitrage by increasingly opting for the legal status that is not subject to the tax increase. These different reactions help to validate our design and to confirm that entrepreneurs were highly aware of the reform at the time it was implemented and quickly responded to it.

Next, we estimate the real effects of this tax increase on investment, employment and firm performance, the key outcomes proponents of an increase in dividend taxation hope to influence. We find that on average, while the tax increase has a precisely estimated null effect on employment, it leads to a sizeable increase in investment for treated firms by about 0.9 p.p. of capital, a 15% increase relative to the pre-reform sample mean. This implies an elasticity of investment with respect to the dividend tax rate of around 0.38, with a 95% confidence interval between 0.28 and 0.48. This finding is robust to alternative specifications, investment measures (total or tangible, gross or net of depreciation) and subsamples.

Given that treated firms increase their undistributed earnings (i.e. cut their paid dividends) by 3 p.p. of capital and increase investment by 0.9 p.p. of capital, our estimate implies that they reinvested *one third* of their tax-induced additional retained earnings, an elasticity in line with the literature estimating pass-through of cash-flow shocks on investment. This increase in investment translates into higher sales and value-added, without lowering firm productivity, and reduces the probability of firm exit. These results imply that, *on average*, a higher dividend tax rate does not increase the cost of capital for existing firms in our sample and in fact, leads to higher investment.

While the average treated firm increases its investment, the reform might still lead to a reduction in overall output in the long-run if capital misallocation increases. This would happen for instance if a minority of firms, important for long-term dynamics, face heightened financial constraints, or if the increase in investment is concentrated in firms with low return on capital or in firms with only wasteful investment opportunities. We therefore offer three pieces of evidence suggesting that this is not the case and that if anything, the higher dividend tax rate reduces the misallocation of capital.

First, we show that the tax-induced increase in investment is concentrated among firms facing new investment opportunities. We proxy investment opportunities by computing the leave-one-out mean of sales growth in the firm industry-

by-local labor market post reform. We then sort this measure of investment opportunities into terciles and find that treated firms increase investment more only when they face large investment opportunities. By contrast, treated firms with limited investment opportunities do not invest more than control firms. Because the amount of dividend distributed varies significantly across firms pre-reform, it is also possible to compare firms *within* the treated category, to control for any other unobserved shocks that might affect the treatment differentially. We split treated firms into high and low dividend payers before the reform and include a treated-by-year fixed effect in our specification. Even within the group of treated firms, we find that the investment gap increases only for high-paying dividend firms facing high investment opportunities.

Second, we conduct a similar exercise by sorting firms according to their marginal return on capital pre-reform to estimate how capital misallocation evolves after the reform.[5] We find that the tax increase leads to an increase in investment rate that is three times as large for firms in the highest tercile of ex-ante marginal return on capital relative to firms in the lowest tercile. We also find that within treated firms, higher dividend payers pre-reform increase investment more if they are in an industry with high levels of capital misallocation pre-reform.

We conclude our analysis of the possible reallocation effects of the tax increase by focusing on the empirical predictions of the "old view" theory of dividend taxation, which argues that a higher dividend tax rate increases the cost of capital when firms finance their additional investment by issuing equity (e.g. Poterba and Summers, 1983). Since equity dependent firms are likely to be young and fast-growing and these two categories represent a small fraction of the total population of firms, the positive average effect of higher dividend taxation on investment can mask heightened financing constraints for the minority of equity-dependent firms. We compute multiple proxies for the degree of equity dependence and reestimate our investment regressions for the sub-sample of firms most likely to be equity dependent. Irrespective of the proxy chosen, we fail to find any significant negative effects. Therefore, even among those firms most likely to face an increase in their cost of capital after the dividend tax hike, the reform has no negative impact on their investment.

In the last part of the paper, we track how the remaining two-thirds of unpaid dividends that are not invested are allocated as this also has implications for the reallocation of capital triggered by the reform. We first test if treated

5. See Bau and Matray (2020) for a detailed description of the methodology and complete set of references to the literature on capital misallocation.

entrepreneurs engage in more income shifting and have found other ways to take money out of their firm. We rule out an increase in tax avoidance behaviors by showing that following the reform, treated entrepreneurs are not more likely to transfer some of their personal consumption to their company, measured using intermediary good consumption or intermediary service consumption.

Next we consider balance sheet adjustments on both the liability side (e.g. debt) and asset side (e.g. cash holding). Treated entrepreneurs increase their gross working capital by an amount almost equal to the remaining tax-induced undistributed dividends. The increase in gross working capital is essentially split between cash holding and customer credits. Higher credit extension to treated firms' customers could partially explain faster sales growth for treated firms. Current liabilities, by contrast, remain unchanged and in particular, treated firms do not use the higher retention to repay their suppliers faster.

We conclude by discussing the consequences of our results for theories of dividend taxation and by formulating different caveats about the implications of our study for understanding the link between dividend tax rates and capital misallocation. Since we find no evidence that the tax-induced increase in investment is wasteful, our results imply that in equilibrium, entrepreneurs pay dividends despite being financially constrained. This might seem surprising, as paying dividends is often used in the corporate finance literature as a proxy for lack of credit constraints. However, previous papers have found that firms often pay dividends despite being credit constrained (e.g. Kaplan and Zingales, 1997). We therefore also discuss different models that could explain these outcomes, both rational (agency frictions) and behavioral (e.g. hyperbolic discount factor or systematic forecasting errors).

**Related Literature.** Our work relates to four strands of the literature. First, we contribute to the empirical literature on capital gains taxation. Despite a large theoretical literature on this topic, empirical analyses have been lagged behind, due to the challenge of finding plausible control groups, as most reforms of capital gains affect all firms in the economy. The most studied reform is the U.S. 2003 Dividend Tax Cut of the Bush Administration. It has been shown to have a positive effect on payout policy for listed firms on average (Chetty and Saez, 2005, Brown, Liang, and Weisbenner, 2007, Chetty and Saez, 2010, Blouin, Raedy, and Shackelford, 2011), to lead to lower debt financing (Lin and Flannery, 2013), higher quality of merger and acquisitions (Ohrn and Seegert, 2019) and to raise stock prices (Auerbach and Hassett, 2007). The effect on firm investment is more nuanced. While Desai and Goolsbee (2004) and Yagan (2015) find no effect on physical

investment of private firms in a difference-in-differences setting, Gourio and Miao (2010) using a calibrated model of firms with idiosyncratic productivity shocks finds that the tax cut increased aggregate investment and welfare by reallocating capital away from mature firms and toward financially constrained firms.

In an international setting, the taxation of dividends at the personal income level is negatively correlated with dividend payments (e.g. Chetty and Saez, 2005; Bach et al., 2019), while for investment, dividend tax cuts have been found to have weakly positive effects (Becker, Jacob, and Jacob, 2013; Alstadsæter, Jacob, and Michaely, 2017; Moon, 2018) and a positive effect on payouts (Jacob and Michaely, 2017). Our paper is the first to study the effect of a very large tax *increase* on the universe of small and medium firms (in addition to large listed firms) and their investment decisions. We also provide novel and in-depth analysis of the reallocation pattern across firms and industries to show that the additional investment decreased capital misallocation.

Second, we relate to the literature on capital gains taxation, in particular Sinn (1991) for the neoclassical model of dividend taxation that embeds the "old" and "new" view; Chetty and Saez (2010) for the "agency view" and Korinek and Stiglitz (2009) for the "intertemporal arbitrage" view. While we can confidently reject the neoclassical model, disentangling the agency and intertemporal arbitrage views is more challenging and we discuss their respective merits in the last part of the paper.

Third, we relate more broadly to the literature studying the effect of corporate taxes on firm policies that has found substantial real effects. Several aspects have been studied: investment (Zwick and Mahon, 2017; Giroud and Rauh, 2019), financial policies (Heider and Ljungqvist, 2015; Ohrn, 2018; Ivanov, Pettit, and Whited, 2020), wages and profit (e.g. Suárez Serrato and Zidar, 2016; Garrett, Ohrn, and Suárez Serrato, 2020), spatial misallocation (Fajgelbaum, Morales, Serrato, Suárez, and Zidar, 2019), inequality (Nallareddy, Rouen, and Suurez Serrato, 2018 ), as well as innovation (e.g. Moretti and Wilson, 2017; Hombert and Matray, 2018; Akcigit, Grigsby, Nicholas, and Stantcheva, 2018).

Finally, we relate to the literature studying the effect of financial constraints on various types of misallocation (all the references are detailed in Bau and Matray (2020): misallocation of entrepreneurs across sectors (Buera, Kaboski, and Shin, 2011; Midrigan and Xu, 2014), misallocation of labor (e.g. Hombert and Matray, 2016; Fonseca and Doornik, 2019; Hombert and Matray, 2019; Acabbi, Panetti, and Sforza, 2020) misallocation of capital within sectors across firms (Gopinath, Kalemli-Özcan, Karabarbounis, and Villegas-Sanchez, 2017, Bau and

Matray, 2020), misallocation of capital within multi-plants firms (Kehrig and Vincent, 2019), misallocation of capital over the business cycle (Kehrig, 2015), misallocation of bank lending (e.g. Delatte, Matray, and Pinardon Touati, 2019) or misallocation of international trade (e.g. Xu, 2020).

# 2 Institutional background and the 2013 reform

## 2.1 Differences in legal status

This section explains the differences in legal statuses that determine the split between control and treated firms after the reform.

**Firm legal status.** French corporations are mainly divided into three legal statuses: "*Société à Responsabilié Limitée*" (SARL), "*Société Anonyme Simplifiée*" (SAS) and "*Société Anonyme*" (SA).[6] In 2012, 77% of new firms were incorporated as SARL, 20% as SAS and 3% as SA.[7]

SARL and SAS are similar along the following dimensions: they have no minimum number of shareholders, face no restrictions on the amount of nominal equity they issue when created and guarantee limited liability for their partners up to the amount of the partner's contributions.

There are two main differences between SARL and SAS.[8] First, SAS offers more flexibility in the design of the company by-laws and easier access to external capital markets. Second, SAS managing directors are required by law to be employees of the firm, while SARL managing directors do not face this requirement. This has two implications: (i) SARL managing directors have a different social security scheme when they are compensated through wages and (ii) SARL managing directors can be paid solely with capital income (dividends) without any labor income (wages), which will be of primary importance for the reform we consider. To ease exposition, in the rest of the text we refer to SARL as "treated firms" and to SAS as "control firms" and summarize the main differences regarding the legal status of treated and control firms in Table A1 in the Appendix.

**Comparison with U.S. firms.** All firms in our sample pay an entity-level tax and as such are similar to U.S. "C-corps." There is a French equivalent of "S-corps"

6. We omit discussion of two additional corporate forms: EURL and SASU. These corporate forms are simply a SARL or SAS with only one shareholder.

7. The SA status is the mandatory status for listed firms and very rarely applies to private firms. To increase comparability between treated and control we remove these firms from the analysis even though including them leaves the results virtually unchanged.

8. We detail the finer details in Appendix A.1

but, unlike in the U.S., this status is highly restrictive. Firms can only classify as pass-through entities during the first five years of a firm's existence, and they are required to have fewer than 50 employees and sales below 10 million. Therefore, unlike in the U.S., pass-through entities are only found among the youngest and smallest firms and mostly limited to self-employed individuals. Such firms are excluded from our sample as they report only limited items in their balance sheet and because we focus on firms with at least one employee.

**Taxation around liquidation.** Shareholders can decide to liquidate their firms and share the remaining assets once all the obligations have been paid. Before any distribution, they have to pay a special tax ("*droit de partage*") of 2.5% of the net value of assets. The distribution of the remaining money is then taxable at the appropriate dividend tax rate.[9]

**Take away.** Except with respect to the employment status of the owner manager and some differences in ease of access to external finance, treated and control firms are very similar, in particular regarding the taxes and regulation they are subjected to, and are close to U.S. C-corps.

## 2.2 Taxing dividends in France and the 2013 reform

In this subsection, we detail the French tax system (dividend and payroll taxation on labor and capital income) and explain why the dividend tax rate jumped from 15.5% to 46% for treated firms in 2013.

**French dividend taxation.** After paying corporate taxes, firms are left with a net income that can be either held in cash and equivalents (short-term investment) or distributed to shareholders in the form of dividends. The allocation of the net income is decided on a yearly basis by the firm's assembly of shareholders during their Annual Ordinary General Meeting.

Dividend taxation in France consists of two components. The first component is a payroll tax with a rate around 15% that applies to the gross dividend amount decided during the General Meeting and withheld at source.[10] The second component is a standard progressive personal income tax, that applies to the "net"

9. This means in particular that following the change in the dividend tax rate for treated firms, the new tax rate will apply, implying that shareholders of treated firms cannot reduce their taxes by liquidating their firm.

10. It may seem strange for dividends to be subject to a payroll tax. It should be noted however that the payroll tax paid by shareholders is of different nature than the payroll tax on wages, as it does not open rights to future benefits. In this sense, it is more a "pure" tax rather than a "contribution."

dividend after payroll taxes have been paid. In 2012, the year before the reform, the payroll tax rate on dividends was 15.5% for all types of legal entities, treated and control.

Taxes on labor income have the same structure. The gross amount is subject to payroll taxes withheld at source and the net wage is then subject to a personal income tax. The noticeable difference between labor and capital income is that the payroll tax rate on labor income is much higher, around 46%. Since owner-managers of treated (SARL) firms do not have to be an employee of their own firm, this large distortion between labor and capital income taxation creates an incentive for owner-managers to receive their compensation in the form of dividends rather than wages.

Owner-managers may still prefer to receive wage compensation for two reasons. First, it can allow their family to access social insurance benefits. Indeed, the payroll tax on dividends is a "pure tax" and does not grant any right to social benefits, while the payroll tax on wages is a social security contribution, which the OECD defines as "compulsory payments paid to general government that confer *entitlement* to receive a future social benefit."[11] Second, dividend payments are regulated along two dimensions: (i) dividends can never exceed the net income from previous accounting exercise, net of all past losses (if any) and amortization of various expenses, and (ii) dividends have to be split among shareholders in proportion to their equity holding, implying that large dividend payments to the owner-manager will trigger large dividend payments to the other shareholders.

Finally, regarding share buybacks, until 2015 they are typically taxed as dividends rather than capital gains (unless they can be explained by past losses that are forcing the firm to shrink), such that the dividend tax rate applies to the overall payout (share repurchases + dividends).

**The reform.** In 2013, Francois Hollande and the center-left party reduced the distortion between capital and labor income for entrepreneurs by abolishing the arbitrary distinction between dividends and wages for owner-managers of SARLs.[12] Following the reform, all dividends paid to SARL owner-managers were considered wages, and as such, became subject to the same 46% wage payroll tax rate. This change tripled the tax rate SARL owner-managers paid on dividends.

11. For instance, most French websites for entrepreneurs discussing this arbitrage advocate a mix for the entrepreneur's compensation.

12. *Loi de Finance pour le Financement de la Sécurité Sociale 2013.* The distinction was considered arbitrary since the entrepreneur can decide to have the compensation of her risk, capital invested and labor effort either labelled as "dividends" or "wages," given that she is the majority owner.

This new tax rate only applies to dividends accounting for more than 10% of the firm nominal share capital owned by the manager and her family.[13] Below this threshold, the payroll tax rate remains at 15.5%. To give a simplified example, consider an owner-manager of a treated firm with a share capital worth €100,000 who owns 100% of her company. In 2013, she receives a dividend of €50,000. She will have to pay the following payroll taxes:

$$15.5\% \times \overbrace{10,000}^{\text{10\% of €100,000 share capital}} + \overbrace{46\%}^{\text{post reform dividend tax rate}} \times 40,000 = 19,950$$

Her net dividend is then 50,000-19,950= €30,050, on which she has to pay a personal income tax. Before the reform, the payroll tax would have been: 15.5%×50,000 = €7,500 instead of €19,950.[14]

While this can create an incentive for owner-managers to increase the amount of nominal share capital in the company, it is important to note that the value of share capital determines the shareholders' financial liability in case of a default of the firm. As such, if shareholders want to benefit from limited liability protection, they have an incentive to keep the value of the share capital to its minimum.

Control firms (SAS) were left out of the reform. Their payroll tax on dividends remained at 15.5%, providing us with a natural control group that could have been subject to the reform, but never was.[15]

How the reform affected the choice of an entrepreneur to be incorporated as SAS (control) or SARL (treated) and the optimal mix between dividends and wages for her compensation is complicated. The main point to stress is that the optimal decision depends on the specificities of the entrepreneur (family, numbers and age of kids, total compensation, etc.) and it is not obvious that "on average," one solution dominates.

13. The inclusion of the shares owned by the family to determine whether the CEO owns a majority of the firm's shares prevents owner-managers from simply transferring the shares to their partner and as such escaping the reform.

14. Dividends paid to the other minority shareholders remains taxed at 15.5%. While creating a difference in the effective tax rate of dividends among shareholders, note that it is illegal to pay different amount of dividends to different shareholders. Therefore, it seems reasonable to assume that the tax rate of the majority shareholder is the most important in setting the level of dividend policies.

15. While in theory managing directors of control firms could pay themselves mostly in dividends and with the lowest wage possible, in practise we observe in the data that wages are two and half time larger than dividends (assuming *all* dividends are paid to the managing director). Such higher wage relative to dividends could partially be explained by the fact that the minimum wage for skilled workers in France is regulated by the the collective agreement of their industry and go as far as €65,000 yearly.

**Reactions to the reform and expectations of reversal.** The decision to raise the payroll tax rate of dividends paid to the owner-manager of treated firms was part of a broader agenda to harmonize the taxation of capital and labor, pushed by the newly-elected President. Control firms managed to stay out of the reform, thanks to more effective lobbying coming from a better representation among employers' unions and the fact that their managers are legally obliged to be employees and not independent workers. We give a detailed discussion of the reform and the reasons why control firms were left out of it in Appendix A.

When introduced, the reform was marketed as "permanent" since it was implemented to correct a tax distortion.[16] However, the election of Francois Hollande to the French Presidency came as a surprise and many expected him not to be reelected after the first two years of his mandate. In addition, the reform was highly debated during the first two years after its implementation. Both elements probably created hope (if not anticipation) among entrepreneurs that the reform would be abolished in the future. While it is unfortunately impossible to observed the entrepreneurs' expectations at that time, it is worth stressing that President Emmanuel Macron who replaced President Francois Hollande, despite being more pro-market and pro-business and having introduced a reform of other aspect of the taxation of dividends, decided to uphold the alignment of the tax rate between capital and labor income for owner-managers of treated (SARL) firms.

# 3 Data and empirical strategy

## 3.1 Firm data

**Financial statements and firm legal statuses.** We retrieve firm accounting information from tax files (FICUS for the period pre-2008 and FARE for 2008-onwards). The data contain income statements and balance sheets collected by the Treasury for the entire universe of French firms, for firms subject to the regular corporate tax regime (*Bénéfice Réel Normal*), or the simplified corporate tax regime (*Régime Simplifié d'Imposition*) also called "non commercial" firms such as accounting firms or law firms (*Bénefice Non Commercial*). Firms with annual sales below €32,600 (€81,500 in retail and wholesale trade) can opt out and choose a special micro-business tax regime (*Micro-Entreprise*), in which case they do not

16. Unlike the the initial setting of the 2003 Bush tax cut, the French experiment had no default expiration date. The U.S. tax cut was originally legislated to expire in 2009, then extended to 2013 and finally made permanent.

appear in the tax files.

**Ownership structure.** We identify firms belonging to a business group using a yearly survey of business groups by INSEE called "Enquête Liaisons Financieres (LIFI)." It covers all economic activities. Since 1998, the survey has been cross-checked with information from Bureau Van Dijk. LIFI provides information about both direct and indirect stakes and cross-ownerships, which makes it possible to reconstruct the group structure even in the presence of pyramids (Boutin et al., 2013, Hombert and Matray, 2019). We remove subsidiaries from our sample as they may exhibit significantly different behavior from stand alone firms, particularly regarding their payout policies.[17]

## 3.2 Empirical strategy

**Analysis sample.** We focus on firms present during the period 2008–2017 and impose that we observe them in 2011 (two years before the reform). Because we are interested in the real effects of the tax reform on investment, we exclude financial firms (naf code 6000–6999) and utilities (naf code 3500–3999) from the analysis. We also drop observations reporting zero or negative assets, total sales, PPE (property, plants and equipments and wage-bill. All firms in our sample have at least one employee.

Unconditionally, control firms tend to be larger than treated firms. Therefore, we increase the common support by removing all firms with assets below the fifth percentile and above the ninety fifth percentile of the treated firms' asset distribution in 2012. Finally, we only retain firms for which we observe at least four years in the data and with no gap in their filing year.[18] This leaves us with a total of 11,129 distinct firms in the control group (98,797 observations) and 96,138 firms in the treated group (861,362 observations).

Table 1 reports the descriptive statistics for our sample of treated and control firms before the reform. We scale most variables by firm capital in 2011. Treated firms are slightly smaller and employ fewer workers than control firms, but are more profitable. Treated and control firms have similar investment rate, capital structures (cash-holding and leverage), pay dividends with similar probabilities (37% vs 40%), and pay out similar proportions of their capital as dividends (23% vs 25%).

17. However, including them does not change the results.
18. Results are virtually unchanged without these different restrictions.

Table 1: Summary Statistics

| | *Panel A: Pre-Reform 2009–2012* | | | | | |
|---|---|---|---|---|---|---|
| | **Treated** | | | **Control** | | |
| | Mean | s.d. | p50 | Mean | s.d. | p50 |
| *Dividend Variables* | | | | | | |
| Dividends (in K€) | 19 | 53 | 0 | 40 | 110 | 0 |
| Dividend $\geq 0$ | .37 | .48 | 0 | .4 | .49 | 0 |
| Dividend / Total Capital | .23 | .74 | 0 | .25 | .8 | 0 |
| *Other Firm Characteristics* | | | | | | |
| Asset (in K€) | 871 | 716 | 641 | 1,592 | 944 | 1413 |
| PPE (in K€) | 206 | 267 | 115 | 395 | 420 | 248 |
| Equity (in K€) | 45 | 92 | 15 | 140 | 341 | 70 |
| Employment | 7.9 | 9.8 | 6 | 13 | 16 | 10 |
| Net Income / Total Capital | .52 | 1.9 | .14 | .48 | 2 | .11 |
| Liquidity / Total Capital | 1.9 | 5.2 | .45 | 2.2 | 5.7 | .47 |
| Debt / Total Capital | 1.5 | 4.5 | .41 | 1.3 | 4.3 | .28 |
| Total Investment / Total Capital | .078 | .31 | .021 | .072 | .32 | .018 |
| Tangible Investment /Total Capital | .058 | .21 | .019 | .042 | .19 | .015 |
| Distinct firms | 96,138 | | | 11,129 | | |

This table reports summary statistics for the universe of firms pre-reform. Total capital is defined as tangible capital (property, plant and equipment) plus intangible capital (R&D, software, etc.). PPE is "property, plants and equipments."

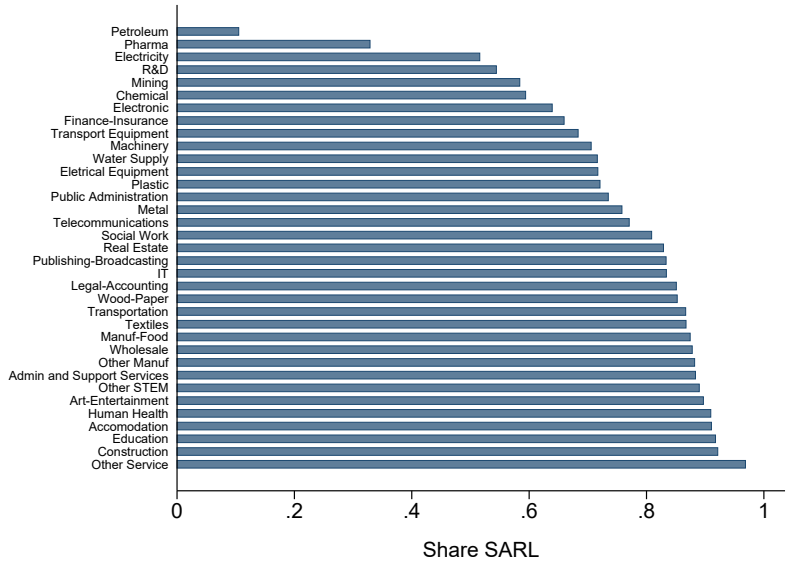
Regarding the distribution of treated firms across industries before the reform, treated firms span the entire spectrum of all industries and usually accounted for the majority of firms, as shown in Figure 1.

**Econometric specification.** In order to test the effect of a change in the dividend tax rate on firm outcomes, we estimate a series of difference-in-differences specifications of the form:

$$Y_{i,j,c,t} = \beta \; Treated_i \times Post_t + X_{i,t} + \theta_i + \; \delta_{j,t} + \; \gamma_{c,t} + \; \varepsilon_{i,j,c,t} \tag{1}$$

where $Y_{i,j,c,t}$ are various firm outcomes for firm $i$ in industry $j$, located in area $c$ at year $t$ normalized in most cases by total capital in 2011 (to prevent changes in the denominator from driving our regression coefficients). $\theta_i$ are firm fixed effects and ensure that we remove time-invariant heterogeneity across firms. $\delta_{j,t}$ are (four-digit) industry×year fixed effects and control for time-*varying* unobserved heterogeneity across industries, such as differences in industry-level business cycles that may be correlated with firm outcomes. The use of industry×year fixed effects

Figure 1: Distribution of Treated Firms Across Industries




This figure plots the share of firms whose legal status of organization is SARL (treated) over the period 2008–2012 across all 38 main industries in France.

forces the parameter of interest $\beta$ to be identified solely by comparing firms within the *same* industry.[19] In robustness tests, we also include $\gamma_{c,t}$ that are commuting zone×year fixed effects to remove time-varying heterogeneity across local labor markets.[20] $X_{i,t}$ can be either a collection of time-varying firm-level controls, or ex-ante firm characteristics that we interact with year. Given that the reform may have a direct impact on any firm characteristics, using time-varying controls would bias the coefficient and in our preferred specification, we only use ex-ante characteristics.[21]

In the most conservative specification, we include industry×year, and commuting zone×year fixed effects and as the main ex-ante firm characteristics pre-reform capital growth quintile×year fixed effects. Pre-reform capital growth is computed by taking the annualized growth rate of capital between the first appearance of the firm in the dataset and 2012. The coefficient of interest $\beta$ in this case is estimated by comparing firms operating in the same industry, located in the same city and having experienced the same capital growth prior to the reform, and it measures

19. We use the 2 digit Naf rev2 code which includes 66 distinct industries.

20. The definition of "commuting zone" is the French "Bassin d'Emploi" 1990 definition, which corresponds to local labor markets and partitions France into 357 geographic areas in France Metropolitan, plus two sub-regions for Corsica.

21. This is commonly referred to as the problem of "bad controls" (e.g. Angrist and Pischke, 2008). This is why our preferred specification uses quintile of capital growth in the pre-period and age before the shock, both interacted with year.

the relative change in firm outcomes for firms facing a dividend tax rate increase relative to firms not facing this tax increase. Standard errors are clustered at the firm level to account for possible autocorrelation in the error term.

# 4 Effect on payout and regulatory arbitrage

## 4.1 Regulatory arbitrage

While the reform did not lead to important changes in organizational form for existing firms, it did have a very large impact on the legal status chosen by new entrepreneurs.

Figure 2 shows the evolution of the fraction of firms registered as treated (SARL) for new firms and firms existing before 2012. While the fraction of treated firms stays flat for firms existing before 2013, new entrepreneurs display important behavioral changes consistent with regulatory arbitrage. Over 80% of new firms were created as SARL prior to 2013, but this number declines to 40% by 2018, with a sharp drop in 2014–2015. The important lack of behavioral response from existing entrepreneurs may be surprising, but is in line with results from Gordon and MacKie-Mason (1994), Goolsbee (2004) or Giroud and Rauh (2019) that find for the U.S. little shifting of organizational form between C and S-corps in responses to differential tax rates.

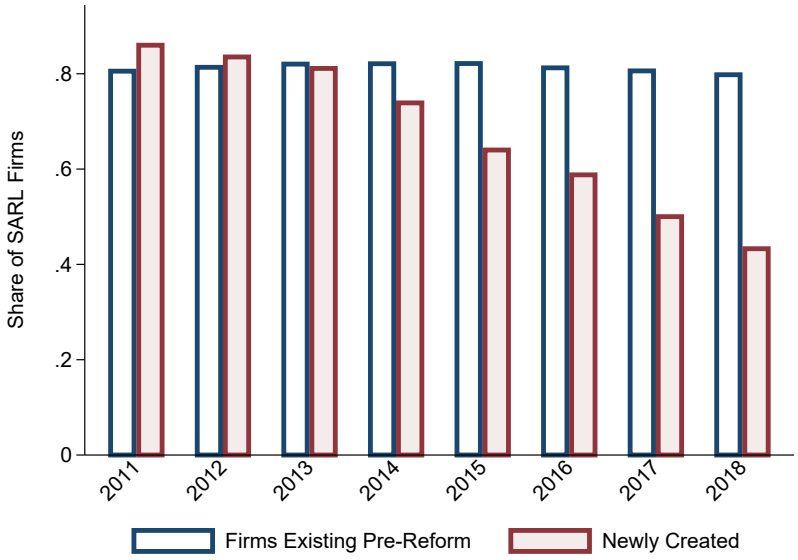
The lack of changes in organizational form for existing firms combined with the large reaction for new firms also suggest important adjustment costs in France. The monetary cost, while non-trivial, does not appear prohibitive (in the order of €5,000 to €10,000, representing around 10% to 25% of the firm net income). Moreover, legal restrictions likely also detered entrepreneurs of treated firms, as the law prohibits a legal status change if the change is "purely motivated by the motive to escape or reduce social security contributions" (article L243-7-2).[22]

## 4.2 Effect on payouts

**Baseline effect on dividends.** We start by displaying the yearly coefficients of the regression when we include industry, commuting zone and pre-reform growth

22. It is in practice hard to assess to what extend this regulation is truly binding. Indeed, this regulation is almost never mentioned in professional medias as a barrier and it seems possible to always justify the change for a "economic motive" such as the plan to attract future investors, and not purely for a "fiscal motive."

Figure 2: Effect of 2013 Tax Reform on Organisational Form




Evolution of legal status of firms over time. This figure plots the share of firms whose legal status of organization is SARL (treated) for firms existing prior to the reform or younger than two year ("newly created").

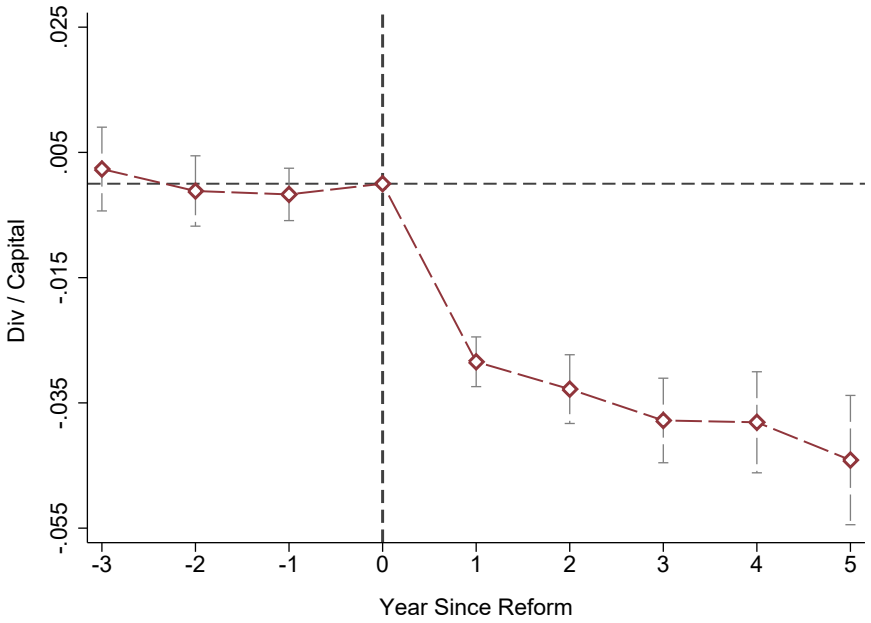
quartile fixed effects to provide a visual analysis of the effect of the reform on paid dividends in proportion to the firm capital in Figure 3.

Three facts are noteworthy. First, prior to the reform, treated and control firms behave similarly, confirming that the "parallel trend" assumption needed for differences-in-differences estimators is satisfied. Second, treated firms adjust almost immediately to the increase in tax rate by abruptly cutting dividends the year of the reform. Third, following the swift drop, treated firms keep paying lower dividends throughout the period and never revert their decision.

We next estimate the margin of adjustment and the robustness of the dividend reduction in Table 2. Table 2 Panel A reports the effect of the dividend tax reform on dividends when we only include firm and industry×year fixed effects. In all cases, we find a negative effect, highly statistically significant with p-values well below 0.001. In column 1, we find that treated firms reduce their dividends by € 0.03 for every euro of capital, implying a 16% drop relative to the pre-reform sample mean.

This estimation mixes both the intensive margin (firms paying less in dividends) and the extensive margin (firms stopping dividend payout). We decompose the two effects in columns 2 and 3. In column 2, we use dividends in (log) euros, which is thus defined only when dividends are positive and can be directly

Figure 3: Effect of 2013 Tax Reform on Dividend Payments




This figure plots the yearly coefficient and its 95% confidence interval of the event study difference-in-differences estimator in equation (1) of the 2013 dividend tax increase, when the dependent variable is dividends over total capital. The specification includes industry-by-year and pre-reform asset growth quintile-by-year fixed effects.

interpreted as semi-elasticities. We find a drop of 12%. In column 3, we estimate a linear regression on the probability of paying any dividend and find a drop of 3.5 percentage points, representing a 9% decrease relative to the pre-treatment mean. The fact that treated firms entirely stop paying dividends may seem surprising given the existence of the tax kink at 10% of the firm share capital. However, when we replace the dependent variable with a dummy equal to one if the total amount of dividends paid is above the 10% share capital threshold, we find that the tax increase leads to a drop by 4.7 percentage point (column 4), a magnitude 25% larger, which is consistent with owner-managers optimizing their tax rate.

Table 2 Panel B shows that the negative effect of dividend taxation is robust to an array of different fixed effects that removes pre-2013 time-varying unobserved heterogeneity. Column 1 shows the result with only firm and year fixed effects, column 2 adds industry×year fixed effects, column 3 adds quintile of pre-treatment capital growth×year fixed effects and column 4 adds commuting zone×year fixed effects. In this final specification, the effect of the tax increase is estimated by comparing firms in the same industry, located in the same local labor market,

Table 2: Effect of 2013 Tax Reform on Dividend Payments

Panel A: multiple dividend adjustment margins

| *Dependent Variable* | Div / Capital | Log(Div) | Div≥0 | Div ≥ 10% [Div/Share Capital] |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Treated×Post | -.03*** | -.12*** | -.035*** | -.047*** |
| | (.0023) | (.0081) | (.0024) | (.0024) |
| *Fixed Effects* | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ |
| Observations | 959,332 | 310,126 | 960,159 | 960,159 |
| Mean LHS | .19 | 3.2 | .33 | .31 |

Panel B: saturating the regression in fixed effects

| *Dependent Variable* | Div / Capital | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Treated×Post | -.032*** | -.03*** | -.029*** | -.029*** |
| | (.0023) | (.0023) | (.0023) | (.0024) |
| *Fixed Effects* | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ |
| Year | ✓ | — | — | — |
| Industry × Year | — | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | — | — | ✓ | ✓ |
| Commuting Zone × Year | — | — | — | ✓ |
| Observations | 959,332 | 959,332 | 959,332 | 959,332 |

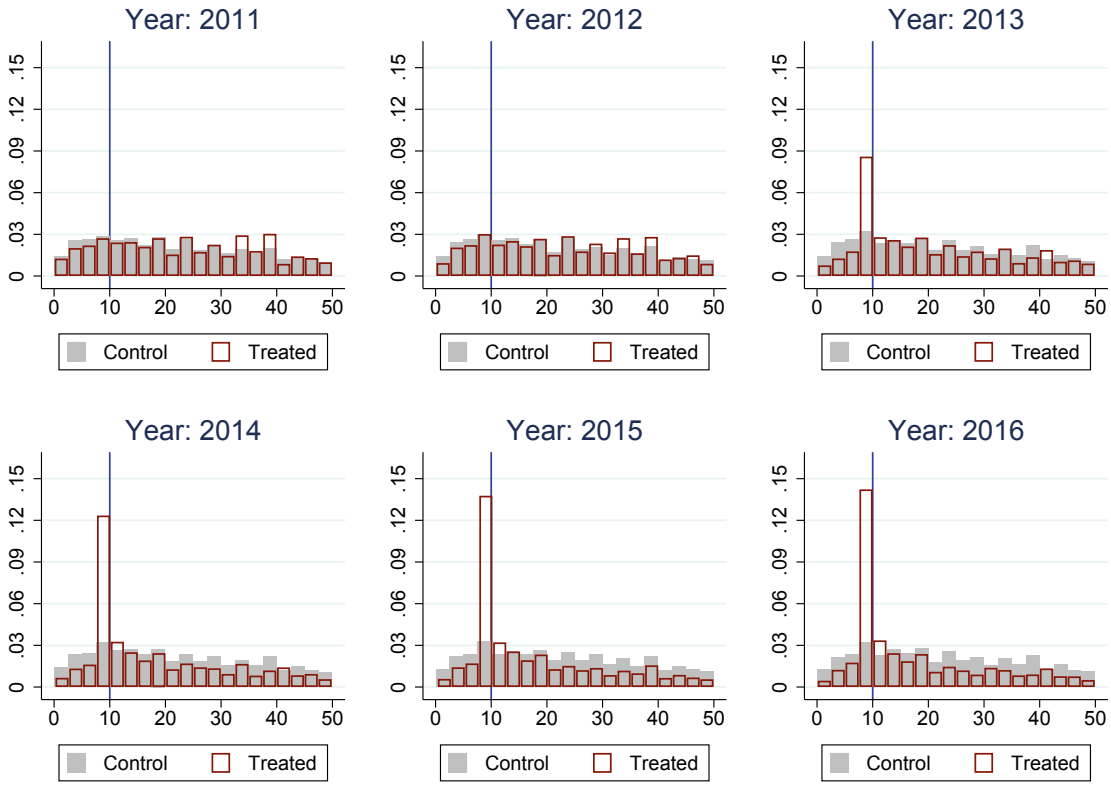
This table shows the effect of the 2013 dividend tax increase on dividend payment. In Panel A, we decompose the effect for various measures of dividends. In Panel B the dependent variable is dividends scaled by total capital in 2011. In Column 4, "Commuting Zone" corresponds to local labor markets defined by the statistical office ("Bassin d'Emploi"). Standard errors are clustered at the firm level. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

that are in the same quintile of annualized capital growth over 2008–2012. In this case, the dividend tax increase leads to a decrease in dividend payment of €0.029 for each euro of capital, which is almost identical to the baseline effect.

**Kink optimization.** Figure 4 provides visual evidence that the reform created strong incentives for treated firms to restrict their dividends at the 10% threshold of the firm share capital, consistent with the notion that entrepreneurs became

progressively aware of the reform and optimized more over time. The figure plots the distribution of dividends scaled by share capital for the sample of firms paying dividends. This distribution is similar among treated and control firms and the ratio is evenly distributed across the different values until 2012. After 2012, we observe bunching right below the 10% threshold for the firms affected by the tax reform, while the distribution of firms not affected remains stable. Consistent with the idea that agents do not immediately understand the subtleties of the new tax regime (e.g. Aghion, Akcigit, Lequien, and Stantcheva, 2017), the fraction of treated entrepreneurs who bunch at the threshold increases slowly over time and peaks after three years.[23]

Figure 4: Dividend Payment Around the 10% Threshold of Share Capital




The figure plots the distribution of the ratio of dividends over share capital for the years 2011–2016 for firms paying dividends. The x-axis is the ratio dividends dividend/share capital (in percentage). The y-axis is the fraction of firms in a specific bin of dividend/equity. "Treated" firms are firms affected by the 2013 tax reform on all dividends paid for a value above 10% of the firm's share capital (SARL) and "Control" firms are firms not affected (SAS)

23. Treated entrepreneurs may have an incentive to also increase the value of their firm share capital, but we find essentially no change in the data post reform.

## 4.3 Elasticity Discussion

**Estimation of the value of the post-reform tax rate.** To estimate the elasticities of different outcome variables with respect to one-minus-the-tax-rate, we can apply the standard elasticity formula:

$$elasticity^{Y_i}_{\tau_{div}} = \Delta\ Y_i / \left[ (\tau^{new}_{div} - \tau^{old}_{div}) / (1 - \tau^{old}_{div}) \right]$$

While we know that the old tax rate $\tau^{old}_{div}$ equals 0.155 and we can estimate $\Delta\ Y_i$ from reduced form regressions, a challenge arises when defining the value of the new tax rate. Indeed, as discussed in Section 2.2, after the reform, dividends are treated as "wages," which changes the very nature of the payroll tax. Before the reform, the payroll tax was a "pure tax," but after the reform the payroll tax became a social security contribution, opening rights to social benefits.

This new link between taxes and social benefits introduces a gap between the nominal tax rate of 46% on the taxed income and the effective tax rate, which should be adjusted by the value of the benefits attached to the social security contribution (SCC). Intuitively, if the government increases the tax rate on entrepreneurs by one euro but returns this euro later as pensions for instance, the taxes have almost not increased. We detail the literature associated with how wage earners incorporate expected social benefits in their labor supply decision in Appendix A.3.

According to Bozio, Breda, and Grenet (2018), a large fraction of French SSC (if not the majority) are actually not true "contributions," in the sense that the amount of benefit received does not equate one-for-one the amount of money paid.[24] Other contributions have a much stronger linkage with future benefits (e.g. main pension scheme, unemployment insurance, complementary pension schemes). Based on the work done by the French Institut des Politiques Publiques (IPP), the value of retirement contribution for treated entrepreneurs in our sample is around 20% of the taxed income.[25] This gives us a lower bound for the effective increase in the dividend tax rate. If entrepreneurs fully value the benefits associated with retirement contribution, their payroll tax rate following the 2013 reform would see an increase from 15.5% to 26% (= 46% − 20%). If they fully discount the benefits, their effective tax rate should increase to 46%. Treated entrepreneurs would not value the benefits promised by the government if, for instance, they

24. This is the case for instance for health care, child care benefits, etc.

25. We are deeply indebted to Antoine Bozio for his detail explanation of the arcania of the French contribution system and for producing all the statistics from the IPP.

think the government will default on the pension it promised in the future. If they value retirement benefits at half their true value, as in Finkelstein, Hendren, and Luttmer (2019), their effective tax rate would increase to 36%. Therefore, even in the case of a perfect valuation of their future benefits, the new tax rate of treated firms reduces their total return to dividends (the net-of-tax dividends plus the benefits associated with the contribution) by 26%, a 10 percentage point increase relative to prior to the reform.

**Elasticity of dividends.** Note that while the complication associated with estimating the effective new tax rate can change the magnitude of the elasticity, it does not bias our reduced form estimates in any way.

If we assume that treated entrepreneurs do not value the benefits associated with their social security contribution (SCC), the effective new tax rate is 46%, implying an elasticity of dividend reaction to one-minus-the-tax-rate of 0.43,[26] which is close to the elasticity estimated for the U.S. following the 2003 dividend tax-cut by Chetty and Saez (2005) and Yagan (2015) of 0.47.

On the other hand, if we assume that entrepreneurs affected by the tax hike fully value the benefits associated to their SCC, the elasticity is well over 1.5. This implies in economic terms that for every 1% increase in the dividend tax rate, entrepreneurs cut their dividends by 1.5%, which is a much higher magnitude than those estimated so far. Therefore, in the rest of the paper, we report elasticities assuming that the new effective tax rate is 46%, which will provide a lower bound for the estimated elasticities.

# 5 Real effects: investment and firm performance

There are two opposing channels through which a higher dividend tax rate can affect investment and employment. First, as we found in Section 2, higher dividend taxes make dividend payments today less desirable and leave treated firms with higher earnings retention, which they can use to finance larger investments, or to pay their employees more.[27]

Second, higher dividend taxes can increase the user cost of capital, which will negatively affect investment for firms that finance their marginal investment with new equity and use the return to investment to pay dividends (the "old view" of

26. $(0.16)/(\tau_{div}^{new}\text{-}0.155/0.845) = 0.43$

27. This is usually the argument made by politicians to justify why a tax rate increase can promote investment and the underlying justification of French politicians for the tax hike in 2013, as well as the argument behind the Sanders-Schumer proposal in 2019.

dividend taxation). This is particularly likely for young firms and cash-constrained firms with limited access to bank credit (e.g. Sinn, 1991).

## 5.1 Average effect on investment and employment

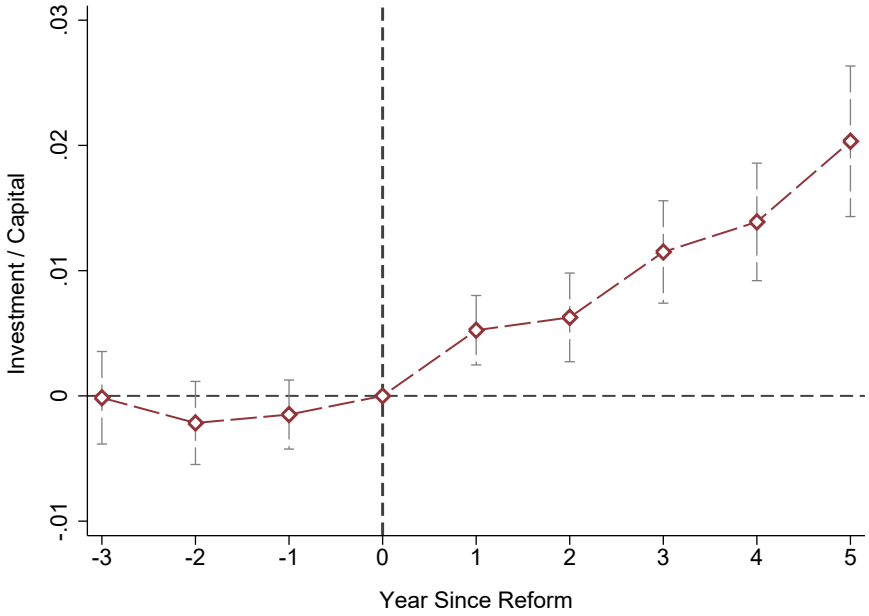
Total capital is defined as tangible and intangible capital. Tangible capital includes the book value of all property, plant and equipment at the end of tax year and intangible capital includes capitalized R&D spending, software, patent licences, goodwill, copyrights and franchises. Investment is defined as the change in the stock of capital (total or just tangible). For both variables, we compute the gross and net change, with net defined as book value minus depreciation and scale everything by firm's total capital (tangible plus intangible) in 2011.

Figure 5 plots the yearly coefficients, and the 95% confidence intervals of the event-studies differences-in-differences estimation of equation 1 of the tax's impact on investment. While point estimates oscillate around zero before the reform, investment by treated firms sizeably increases relative to control firms two years after the tax hike, which could either be due to the fact that treated firms needed time to accumulate larger cash balances before investing or because they were initially anticipating a reversal of the policy that did not come.

Table 3 shows that our results are robust across different specifications and for the different measures of investment. Panel A shows the result when we use gross investment and Panel B the results for net investment. In all cases, we find a positive, precisely estimated effect of the dividend tax increase on investment. The dividend tax hike leads firms to increase their total investment by €0.0091 (column 2) to €0.0095 (column 1) for every euro of capital, which represents an increase of around 15% relative to the pre-reform sample mean of €0.068 per euro of capital. We find a similar result for tangible investment, which increases by €0.006 (column 3) for every euro of capital, a 11% increase relative to its pre-reform sample mean of €0.055 per euro of capital. In Panel B, we report the estimates after accounting for book depreciation and again find similar, albeit bigger, point estimates across all different specifications, both for tangible and total investment.

Assuming a new dividend tax rate of 46% and focusing on total investment, the dividend tax increase had an effect of +€0.0091 per euro of capital, with a standard error of €0.0013, relative to the pre-reform sample mean of €0.068 per euro of capital. These estimates imply an elasticity of total investment relative to one-minus-the-tax rate of 38%, with a 95% confidence interval between 27% to

Figure 5: Effect of 2013 Tax Reform on Investment




This figure plots the yearly coefficient and its 95% confidence interval of the difference-in-differences estimator in equation (1) of the 2013 dividend tax increase, when the dependent variable is total investment scaled by the firm total capital in 2011.

48%.[28]

While we find economically meaningful effects on investment, we estimate a precise positive but economically small effect on employment that we report in Appendix Table A2. We report the results when we look at employment in full-time equivalent terms, average wages and the labor shares (defined as the sum of wages and salaries, payments for employee benefit programs and contributions to pension, divided by the firm value added). We take employment and average compensation in logs, so that the point estimate can be directly interpreted as a semi-elasticity. Regressions are estimated with our preferred baseline set of fixed effects: industry×year and pre-reform capital growth quintile×year fixed effects. In odd columns, we also include commuting zone×year fixed effects given that heterogeneity across local labor markets are important to explain employment. We find that employment increases by 1.1% (column 1) to 1.2% (column 2) when we control for differences across local labor market. Average compensation did not change, while the labor share slightly increases relative to the pre-reform sample

28. The elasticity is estimated as follows: (0.0079/0.078)/(0.3/0.845). The confidence interval is obtained by replacing 0.0079 by 0.0011 +/- 1.9 times the standard error of 0.0013.

Table 3: Effect on Investment

| *Dependent Variable* | Total Investment | | Tangible Investment | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | **Panel A: Gross Investment** | | | |
| Treated×Post | .0095*** | .0091*** | .006*** | .0058*** |
| | (.0013) | (.0013) | (.001) | (.001) |
| | **Panel B: Net Investment** | | | |
| Treated×Post | .01*** | .0096*** | .0068*** | .0064*** |
| | (.0012) | (.0012) | (.00088) | (.00089) |
| *Fixed Effects* | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ |
| Commuting Zone × Year | — | ✓ | — | ✓ |
| Observations | 956,170 | 956,170 | 956,195 | 956,195 |

This table shows the effect of the 2013 dividend tax increase on investment. Total investment includes tangible (machine, property, plant and equipment) and intangible (software, patents, licences) investment. Net investment is total investment minus depreciation. Capital growth quintile is computed using the annualized capital growth pre-reform. Pre-reform sample means for the dependent variables are 0.068 (total gross investment), 0.055 (tangible gross investment), 0.007 (total net investment) and -0.0003 (tangible net investment). All variables are scaled by total capital in 2011. Standard errors are clustered at the firm level. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

mean by 2.6%.

## 5.2 Discussion of the magnitude

In terms of economic magnitude, the elasticity of investment with respect to the change in taxes is meaningful. We estimate that a 1% change in the tax rate causes treated entrepreneurs to increase their investment by 0.38%. We also rule out a zero elasticity at the 95% confidence interval, as oppose to the confidently estimated null elasticity of investment obtained in Yagan (2015).

Another way to interpret the economic magnitude of this tax-induced change in investment rate is to compare it with the drop in corporate earnings triggered by the tax hike. On average, firms reduced their payout by €0.03 euro per euro of capital, while increasing their investment by roughly €0.01 per euro of capital,

implying a pass-through of this "retained earnings shock" of 0.3.[29]

To gauge the magnitude of this pass-through of 0.3, we can compare it with the existing literature estimating the pass-through of cash-flow shocks to investment. Of course, previous estimates exploit different sources of variation and estimate pass-through on a different sets of firms, but subject to these caveats, the comparison suggests that our estimate is large but not implausible. Lamont (1997) finds that for every $1 dollar in oil cash-flow, non-oil investment rises $0.12. Gan (2007) and Chaney, Sraer, and Thesmar (2012) find an increase in investment of $0.12 and $0.06 for every $1 increase in firm collateral value respectively and the literature overall finds an investment–cash flow coefficients of around $0.10.[30]

Therefore, the elasticity of €0.30 appears in the upper tail of the cash-flow shock to investment sensitivity estimated by the literature. Of course, it does not tell us whether these new investments are economically profitable or essentially "wasteful," which is a classic caveat of the literature studying firm investment.

It is unfortunately impossible to have data on the return to specific investment. However, we explore three dimensions suggesting that treated firms use the increased tax-induced unpaid dividends to seize profitable new investment opportunities rather than engaging in wasteful investment. First, we look at the consequence of this tax reform on the performance of the average treated firm in Section 5.3. Second we explore the heterogeneity in investment response as a function of new investment opportunities in Section 6.1 and third, we explore heterogeneity with respect to differences in average marginal return on capital in Section 6.2.

## 5.3 Effect on firm performance

We investigate how the increase in dividend taxes and investment affects firm performance in Table 4. Following the tax hike, sales (column 1) and value-added (column 2) of treated firms increase by 2% and 1.7% respectively, while productivity is unaffected (column 3). Profit margin decreases slightly (column 4) but the magnitude is so small that it is essentially a precise zero. In addition, the small drop in profits could be completely mechanical rather than implying a slow-down in economic performance. Indeed, because after the reform the payroll

29. This means that around two third of the tax-induced undistributed earnings is not used to increase investment and we trace out the remaining two-thirds in Section 7.

30. More precisely, Gan (2007) and Chaney, Sraer, and Thesmar (2012) use shocks to borrowing capacity rather than pure cash-flow shocks, but they still provide orders of magnitude that can be useful to think about the size of the effect.

taxes on dividends are paid when social security contributions are paid (i.e. when the firm pays wages), this mechanically reduces firm profitability, which is equal to value added minus net wages and social security contributions. For this reason, looking at sales and value-added is more informative.

Finally, we look at the probability the firm disappears from the sample in year t+1 in column (5) and find a higher dividend tax rate reduces the probability of exit. While this last result might be surprising, we show in Section 7.2 that the remaining undistributed dividends not reinvested are essentially stored as cash, implying a drop in firm risk. Overall, these results suggest that the tax-induced higher investment allows firms to expand their size, without reducing their efficiency.

Table 4: Effect on Firm Performance

| *Dependent Variable* | Log(Sales) | Log(VA) | Productivity | Profit margin | Prob(exit) |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Treated×Post | .02*** | .017*** | -.0027 | -.0019** | -.0073*** |
| | (.0019) | (.0025) | (.002) | (.0009) | (.0011) |
| *Fixed Effects* | | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Observations | 960,159 | 960,159 | 958,259 | 960,159 | 960,159 |
| Mean LHS | 6.6 | 5.6 | .01 | .057 | .0029 |

This table shows the effect of the 2013 dividend tax increase on firm performance. In column 3, *Productivity* is defined as the residual of the regression log(valued added) over capital and labor (in logs). In column (5) *Exit* is a dummy equal to one if the firm exited the sample in year t+1. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

# 6 Reallocation of investment across firms

In this section we explore heterogeneity in investment response to shed light on the potential reallocation happening across firms. Indeed, even if an increase in the dividend tax rate pushes the average treated firm to invest more, the reform could have negative consequences in the long run for total output if this positive increase in average investment masks large reallocation of investment across firms, in particular in favor of inefficient firms with limited investment opportunities or firms with investments generating low returns to capital.

Such wasteful investment would happen for instance if entrepreneurs facing a tax hike prefer to invest in "pet projects" for which they derive some private benefits but which deliver negative average profits, rather than paying more taxes (e.g. Chetty and Saez, 2010).[31]

The average positive effect could also mask heightened financial constraints for the subset of equity-dependent firms, for which theory predicts that a higher dividend tax rate might lead to a higher cost of capital and a reduction in their investment.

Teasing out whether higher average investment is made in profitable projects or mostly in wasteful projects, as well as assessing if some firms end up facing higher financial constraints, is important as it leads to radically different conclusions about the consequences of increasing the dividend tax rate on overall output.

## 6.1 Investment opportunities

To test if investment opportunities affect the way treated entrepreneurs react to the reform, we use a classic leave-one-out approach and compute the sales growth rate post-reform at the industry and city level. We then sort firms into terciles of investment opportunities and reestimate equation 1 over each sub-sample.

Table 5 reports the results and shows a linear increase in the sensitivity of investment to the tax shock across the three bins. While a change in the dividend tax rate has no effect for firms facing the lowest investment opportunities (column 1), firms with the highest investment opportunities increase their investment two times more after the tax hike than firms in the second tercile of investment opportunities (column 3 relative to column 2).

We explore heterogeneity *within* treated firms in columns 4 to 6. Firms facing a higher dividend tax rate should increase their investment because they decide to cut their dividend payments today, freeing up resources to invest in the future. Because dividend payments are skewed in the data, it is possible to isolate within the group of treated firms, a sub-group of firms that are cutting their dividend payments by a lot and so benefit from a substantial increase in the amount of cash available for their investment. We rank firms based on their average dividend payment before the reform and split them into quintiles. We then consider firms

31. The decision to invest in wasteful projects might a priori seem unlikely in our setting given that treated firms are closely held and therefore face very low agency costs. However, some specific forms of wasteful investment are possible in our context, for instance if entrepreneurs have a preference for running a bigger firm, independently of the marginal return on investment or if they engage in some form of income-shifting such as paying some personal spending (e.g. personal car, personal home) using the firm's money.

in the first quintile being in the "low dividend payment" group (this is the majority of firms not paying a dividend) and firms in the last quintile being in the "high dividend payment" group. We create a dummy variable *High Dividends* that equals one if the firm is in the last quintile of the pre-reform dividend distribution and zero if it is in the first one and interact it with the variable *Treated*×*Post* in equation 1.

We then run the following investment regression on each tercile of investment opportunity:

$$Y_{i,j,c,t} = \beta\ Treated_i \times Post \times High\ Dividends_i + X_{i,t} + \theta_i + \ \delta_{j,t} + \ \gamma_{c,t} + \ Treated_i \times \lambda_t + \ \varepsilon_{i,j,c,t}$$

This specification offers another advantage. Since we now also have within treated group variation (between ex-ante high and low dividend payers), we can also include a set of fixed effects treated×year to account for time-varying unobserved heterogeneity between treatment and control and ensure that the parameter of interest $\beta$ is estimated solely by comparing firms within the treated group, and in particular ensures that the effect cannot be explained by other shocks affecting treated firms differentially post reform. In this case, $\beta$ gives the marginal difference between treated firms paying high dividends pre-reform relative to treated firms paying low dividends pre-reform.[32]

We find that there is no difference between these two groups in their investment response in the first two terciles of investment opportunity (columns 4 and 5). However, when we focus on the group facing the highest investment opportunities (column 6), we find a highly significant and economically meaningful difference between the two groups of entrepreneurs exposed to the tax hike. Relative to pre-reform low dividend payers, high dividend payers increase their investment by an extra 2.3% of their capital (column 6), which represents an increase of 20% relative to the pre-reform sample mean investment of these firms.[33] While it might seem strange that the coefficients in columns (4) and (5) are no longer significant and of smaller magnitude than columns (1) and (2), recall that columns (1) to (3) reports the *average* effect of the reform, which is absorbed by the fixed effects treated×year in columns (4) to (6). The coefficients in columns (4) to (6) show

32. Note that in this case, we can no longer estimate *Treated*×*Post* as it is colinear with the fixed effects treated×year.

33. In unreported regressions, we first verify that firms that used to pay more dividends before the reform reduce their dividend payments relatively more. This is indeed the case. On average firms in the "high dividends" group before the reform cut their dividend payment by 11.5% of capital.

the additional *marginal* effect of being a high dividend payer before the reform in the treated group relative to low dividend payers in the same treated group.

Table 5: Sensitivity by Investment Opportunities

| *Dependent Variable* | Total Investment | | | | | |
|---|---|---|---|---|---|---|
| Investment Opportunity Bin | $1^{st}$ | $2^{nd}$ | $3^{rd}$ | $1^{st}$ | $2^{nd}$ | $3^{rd}$ |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treated×Post | .00093 | .003** | .012*** | | | |
| | (.0013) | (.0013) | (.0035) | | | |
| Treated ×Post ×High Dividends | | | | .0046 | -.0013 | .023** |
| | | | | (.0048) | (.0048) | (.011) |
| *Fixed Effects* | | | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Treated × Year | — | — | — | ✓ | ✓ | ✓ |
| Observations | 316,827 | 316,827 | 316,827 | 182,683 | 182,683 | 182,683 |

This table shows the effect of the 2013 dividend tax increase when firms are sorted by their investment opportunity. We compute investment opportunity by using a leave-one out mean at the industry-commuting zone level of investment over the post period and sort firms into tercile, such that the first tercile is made of firms with the lowest investment opportunities and the last tercile is made of firms with the highest investment opportunities. In columns 4 to 6, *High Dividends* is a dummy equal to one if the firm belong to the last quintile of the dividends over capital distribution during the pre-period and to zero if it belongs to the first quintile. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

## 6.2 Marginal return on capital

Another approach to study if the reform led to overinvestment or wasteful investment is to study how the misallocation of capital evolves after the reform. To do so, we follow the framework introduced by Bau and Matray (2020) and sort firms prior to the reform according to their level of marginal return on capital. Then we test if the reform has differential effects for firms with a high level of MRKP, namely firms that are likely to be capital constrained.

Under the assumption that firms' production functions are Cobb-Douglas, the firm marginal return on capital (MRPK) is equal to $MRPK = \frac{\partial Revenue_{it}}{\partial K_{it}} = \alpha_j^k \frac{Revenue_{it}}{K_{it}}$. Provided that all firms in an industry share the same $\alpha_j^k$, $\frac{Revenue_{it}}{K_{it}}$ provides a within-industry measure of MRPK. To determine whether firms had a high or low MRPK prior to the reform, we average each firm's values of MRPK over

2008–2012 (the last year prior to the tax change). We then sort firms into tercile within each 4-digit industry and reestimate equation 1 over each sub-sample.

Columns (1) to (3) of Table 6 report the results. We find that the tax increase has a positive effect on investment for treated firms throughout the distribution of MRPK, but more importantly, this effect increases linearly with the level of ex-ante MRPK. In particular, the difference in investment response between firms with a very high level of MRPK (column 3) relative to a low level of MRPK is economically large, with firms in the last tercile increasing their investment by 1.4% of capital, three times more than firms in the first tercile.

We also use the same approach as in Section 6.1 and augment equation 1 by interacting *Treated*×*Post* with a dummy variable *High Dividends* that equals one if the firm is in the last quintile of the pre-reform dividend distribution and zero if it is in the first one. Columns (4) to (6) report the results. Similar to the results when looking at investment opportunities, we find that the difference between high and low dividend payers within treated firms increase, but only for firms in the highest tercile of the MRPK distribution.

Table 6: Sensitivity by Ex-ante Marginal Returns on Capital

| *Dependent Variable* | Total Investment | | | | | |
|---|---|---|---|---|---|---|
| Ex-ante MRPK Bin | $1^{st}$ | $2^{nd}$ | $3^{rd}$ | $1^{st}$ | $2^{nd}$ | $3^{rd}$ |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treated×Post | .0055*** | .0098*** | .014*** | | | |
| | (.0014) | (.002) | (.0032) | | | |
| Treated ×Post ×High Dividends | | | | .0085 | -.0073 | .019** |
| | | | | (.0069) | (.0063) | (.0081) |
| *Fixed Effects* | | | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Treated × Year | — | — | — | ✓ | ✓ | ✓ |
| Observations | 317,557 | 317,557 | 317,557 | 182,683 | 182,683 | 182,683 |

This table shows the effect of the 2013 dividend tax increase when firms are sorted by their MRPK (construction explained in Section 6.2). In columns 4 to 6, *High Dividends* is a dummy equal to one if the firm belong to the last quintile of the dividends over capital distribution during the pre-period and to zero if it belongs to the first quintile. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Interpretation.** Taken together, these results yield two conclusions. First, they

confirm the predictions in Korinek and Stiglitz (2009) that firms can in equilibrium be credit constrained despite paying dividends, which implies that a tax-induced decrease in paid dividends (or similarly a tax-induced increase in available liquidity) can result in higher investment in the economy. While it might seem surprising as the corporate finance literature often uses dividend payments as a proxy for the existence of credit constraints, our results echo the findings in Kaplan and Zingales (1997) that shows that dividend payment is a poor predictor of the existence of credit constraints and that many firms paying dividends report facing credit constraints.

Second, our results strongly suggest that the average tax-induced increase in investment is not coming from entrepreneurs engaging in income shifting or wasteful investment. If that were the case, we should find a similar increase irrespective of the local investment opportunities or the ex-ante level of MRPK. By contrast, we show that entrepreneurs who decrease their paid dividends a lot after the reform do not expand their investment more relative to low dividend payers when investment opportunities are low, or when the expected returns to investment are low (low MRPK). These two results imply that entrepreneurs are not willing to waste their undistributed earnings.

Of course, as we discuss in more detailed below in Section 8, this does not imply that the reform is increasing *welfare*. After all, the increase in the dividend tax rate reduces the choice set of treated entrepreneurs by making the payment of dividends to themselves more expensive. However, what our results show is that in partial equilibrium, the reform leads to an increase in the amount of wealth created by treated entrepreneurs as these new investment are likely to have been profitable.

While so far the reallocation of investment across firms point toward a positive effect of the reform on economic efficiency, one group of firms could still face heightened financial constraints: equity dependent firms, which might decrease efficiency in the long-run (e.g. Gourio and Miao, 2010, Alstadsæter, Jacob, and Michaely, 2017). We explore this question in the section below.

## 6.3 Looking for the old view

Recall that according to the old view of dividend taxation, a higher tax rate on dividends should increase the user cost of capital and thereby reduce investment for equity-dependent firms. Therefore, despite the positive average effect on investment, the tax increase may have been binding for this specific sub-group of

firms.

The combination of an average positive effect and negative effect for the group of equity-dependent firms is possible, as long as mature firms that finance their investment via retained earnings dominate the population of firms. Heightened financial constraints for equity-dependent firms could be problematic in the long-run however, to the extent that these firms tend to be younger, more dynamic firms.

Note that Table 6 already shows that the reallocation happening immediately after the reform is likely *positive* for the efficiency of the economy, as treated firms with high marginal return to capital invest more after the reform relative to treated firms with lower marginal return. We now explore a dimension of reallocation that might be more damaging for the economy in the long-run: heightened constraints for equity-dependent firms.

**Equity dependence.** In the standard model of dividend taxation and investment, a higher dividend tax rate would lower investment only if the marginal source of funding is equity. In order to identify such firms, we use five different proxies. In the interest of space, we report the empirical results on equity-dependence in the Appendix of the paper.

First, we split firms along bins of age. Indeed, in firm life cycle models (Sinn, 1991), young firms start cash-constrained and finance investment via equity issuance, then become mature and generate enough cash-flows to finance their investment internally. We therefore estimate equation 1 separately for each decile of age and report the point estimate and 95 percent confidence intervals for each coefficient regression in Figure B1. For each within-decile estimate, the reform always has a precise, small effect and the figure displays no upward or downward trends in point estimates cross-decile, implying no differential effects on the younger, more equity-dependent firms.

We use as a second proxy the probability that a firm issues equity, following Auerbach and Hassett (2003). We create a dummy *New Equity Issuance* that equal one if we observe a positive change in equity between $t$ and $t+1$ over the pre-reform period. We then predict the probability of the firm issuing new equity by estimating a linear probability model, where we regress the variable *New Equity Issuance* on industry-by-year, commuting zone-by-year, age quartile dummies, profitability and lagged profitability, debt and lagged debt investment and lagged investment all scaled by asset and (log) assets. We then split the sample in quintiles and again failed to find any drop in investment, even for the firms most likely to be more equity-dependent (cf. Table A3).

Third, we compute the fraction of capital that has been financed by equity prior to the reform by summing up all equity issuance (including the amount of equity at creation) and dividing it by the value of total capital (tangible and intangible) in 2012. This proxy reveals that a large fraction of firms relied substantially on equity to finance their previous investment, with the last quintile of the distribution having a ratio of equity issued over capital equal to 1.15, implying that for every euro of productive capital, the firm issued €1.15 equity. By contrast, the firms in the first quintile of the distribution have a ratio of equity over capital of 0.036, meaning that every euro of capital has been financed with only 2.3 cents of equity. Table A4 shows that across the different bins, the effect of the tax increase on investment is always positive and in most cases statistically significant.

Fourth, we look at the number of times a firm issued equity during the sample period. Because instances of equity issuance are rare, we split the sample in only two categories: firms that never issued equity (column 1) and firms that issued at least once (column 2). We also compute the number of equity issuances over a longer time period (2004–2017), which allows us to split the sample into three categories: no issuance (column 3), one issuance (column 4) and two or more than two issuances (column 5). As with other proxies of equity-dependence, we do not find that a higher dividend tax rate reduces investment for (some) treated firms.

Finally, we look at firm size and estimate the effect separately for each decile of size, measured by firm assets the year before the reform. Figure B2 displays the effects on total investment by firm size decile. Each regression is estimated using equation 1 and we report the point estimate and 95 percent confidence intervals for each coefficient regression. As for age, the reform has always a precise small effect with no upward or downward trend, at the exception of the first three decile which displays slightly higher positive reaction.

Taken together, these results strongly reject the "old view" theory of dividend taxation which predicts that young, equity-dependent firms should reduce their investment following an increase in the dividend tax rate.[34]

Overall, the distributive effects of the reform point toward a reallocation of investment toward firms with higher investment opportunities and higher marginal return to capital, with no negative effects for equity-dependent firms. All these

34. There is one final group of equity-dependent firms that might have been negatively affected by the reform: new firms discouraged from being created after the reform. I do not explore this "extensive margin" in this paper because it would require a completely different estimation strategy and leave this question for future research. There are reasons to believe however that the reform had limited effect on the entry of new entrepreneurs, as new entrepreneurs could always incorporate under the SAS legal status. The fact that the fraction of new firms incorporated under this status increases steadily after 2013 (Figure 1) also supports this hypothesis.

results indicate that the increase in the dividend tax rate had both a positive effect for the investment of the average firm, but also for the reallocation of investment across treated firms.

# 7 Additional margins of adjustments

Since treated firms after the tax hike reduce their amount of dividends paid by around €0.03 per euro of capital but reinvest a third of it, two-thirds remain "missing." In this section, we leverage the detailed data from the tax files to track where the additional undistributed money flows. We explore two main possibilities. First, treated entrepreneurs could engage in more aggressive income shifting and find creative ways to take money out from their firm (e.g. Gordon and Slemrod, 1998). Second, treated entrepreneurs could adjust other elements of their balance sheet and in particular their current assets (customer credit and cash and short-term investment holding) and their current liabilities.

## 7.1 Tax avoidance

Because the tax reform only affected entrepreneurs owning at least 50% of the capital of treated firms, treated entrepreneurs have substantial control over the way firm spending is allocated and therefore have a larger ability to engage in income shifting between corporate and personal income (e.g. Gordon and Slemrod (1998), Piketty, Saez, and Stantcheva (2014)). In particular, owner-managers of closely-held firms can reduce their tax base by purchasing private consumption goods and services through their firm rather than first paying themselves a dividend and then buying the good or service.[35]

**Regulatory barriers.** It is important to stress here that even though the majority owner has some leeway to engage in income shifting, this practise is extremely regulated. In particular, even if the CEO owns one hundred percent of the company, there is still a clear legal distinction between the company's best interest and the CEO's personal and private interests. In particular, by using the company as her personal bank account, the owner-manager is exposed to the risk of "misappropriation of corporate asset" (*abus de biens sociaux*), as she would no longer act in the "Company's best interests under all circumstances." Such behavior is liable to a term of imprisonment of five years in jail and a fine of €375,000. Should the

35. Classic examples of such behaviors include declaring the personal housing rent as a "work office" or personal dinners as "work dinner."

company be on the verge of bankruptcy, the CEO also becomes personally liable for the losses of the company and no longer benefits from the protection of limited liability (article L.241-3 4).

This regulation also applies in the case where the entrepreneur would try to use her firm assets as collateral to secure a *personal* loan, implying that it is not possible for treated entrepreneurs to extract money out of their firm using this behavior, as no bank in France would take the legal risk.[36]

**Evidence from cash-flow statements.** While constrained by law, entrepreneurs may still engage in some income shifting, which can be detected from the cash-flow statement of the firm. The French tax-files do not report detailed itemized spending, but they do provide the amount spent for "raw materials," "intermediary consumption of goods" and "intermediary consumption of services" (which includes e.g. office rent, cars renting, external consultants, etc.). The data also provides firm valued added, defined as total revenues minus all the costs related to production.

We express each variable as a percentage of the business revenue since the income-shifting hypothesis would predict an "abnormal" increase in intermediary consumption relative to what the business used to need to produce one euro of revenue. This increase in intermediary consumption should lead to a decrease in the fraction of euros of revenues transformed in euros of value-added.

For each variable, we estimate equation (1) and report the results in Table 7. Whether it is intermediate goods (column 1), intermediate services (column 2), raw materials (column 3) or value-added over revenues (column 4), we do not find any meaningful change. Most coefficients are statistically insignificant and their magnitudes are essentially zero, with changes around 0.2%–0.4% of revenues. If anything, the share of intermediate goods in the firm revenue decreases by 0.4% in relative terms (column 1).

Therefore, the hypothesis of "income shifting," according to which treated owner-managers decide to relabel some expenses and increase the firm's "discretionary expenses" for their personal benefit is not verified. The results, if anything, even suggest opposite effects to this hypothesis. Notice that the absence of results does not imply that French entrepreneurs are particularly virtuous. It simply means that following the tax hike, they do not engage in *more* income shifting. Given that what entrepreneurs can do is regulated, it is well possible that even before the reform they were optimizing as much as possible and have simply no

36. Note that the reverse is not true and it is possible for managing directors to engage their personal liability to secure a loan for their firm.

more leeway when the tax increased.

Table 7: No Evidence of Tunneling

| *Dependent variable / Sales* | Intermediate Goods | Intermediate Services | Raw Material | Value Added |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Treated×Post | -.00014 | .00061** | .0014*** | -.0015*** |
| | (.00038) | (.00031) | (.00038) | (.0004) |
| *Fixed Effects* | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ |
| Observations | 960,159 | 960,159 | 960,159 | 960,159 |
| Mean LHS | .2 | .13 | .24 | .43 |

This table shows the effect of the 2013 dividend tax increase on different types of intermediate consumption of the firm. Intermediate services include rents, consulting, vehicle renting etc. Each variable is scaled by contemporaneous sales. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

## 7.2 Balance sheet adjustment

Owner-managers of treated firms are reinvesting only a fraction of their undistributed dividends and do not seem to shift part of their consumption to take money out from their firm without paying taxes. Therefore, the remainder of the undistributed dividends should accumulate in the firm balance sheet as gross working capital, either in the form of liquidity (defined as cash and short-term investment) or in the form of credit to their customers.[37] They could also use this extra cash to repay their suppliers faster, reducing their net working capital (gross working capital minus short-term liabilities).

To trace out the change in net working capital, we estimate a series of models similar to equation (1), where the dependent variables are different items of the firm balance sheet scaled by 2011 assets. We also decompose and report the *Post* dummy into four dummies for each year after the reform.

Table 8 reports the results. Column (1) reports the effect for net working capital. If all these undistributed dividends were used to expand the firm's working capital or to reduce its short-term liabilities, we should observe a constant increase of this item over time, which is precisely what we see. This expansion in net working capital is driven for the largest part by the accumulation of liquidity

37. To be precise, owner-managers could also decide to produce more and store the extra products as inventories, but this accounts for a small fraction of a firm working capital.

(column 2). Over time, treated firms continuously increase their liquidity to the point that by 2017, it reaches 18% of their capital.

In order to see if firms actively change the management of their customers and suppliers' credit, in columns (5) and (6) we scale supplier debt and customer debt by the firm's lagged sales. We find that while treated firms appear to obtain slightly more credit from their suppliers, the point estimate is very small. At the same time, treated firms extend even more credit to their customers, such that in net, treated firms increase their credit to the economy.

Table 8: Balance Sheet Adjustments

| *Dependent variable* | Net Working Capital/ Capital | Liquidity/ Capital | Supplier Debt/ Capital | Customer Debt/ Capital | Supplier Debt/ Sales | Customer Debt/ Sales |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treated×Reform(t+0) | .025*** | .023*** | .043*** | .017*** | .0006** | .0018*** |
| | (.0098) | (.0085) | (.0077) | (.0051) | (.00026) | (.00036) |
| Treated×Reform(t+1) | .068*** | .049*** | .065*** | .035*** | .0013*** | .002*** |
| | (.015) | (.013) | (.011) | (.0074) | (.00038) | (.00053) |
| Treated×Reform(t+2) | .12*** | .066*** | .079*** | .031*** | .00015 | .002*** |
| | (.019) | (.017) | (.014) | (.0092) | (.00048) | (.00065) |
| Treated×Reform(t+3) | .19*** | .11*** | .1*** | .061*** | .0021*** | .0024*** |
| | (.024) | (.021) | (.018) | (.011) | (.00057) | (.00078) |
| Treated×Reform(t+4) | .27*** | .18*** | .13*** | .1*** | .0044*** | .0036*** |
| | (.032) | (.027) | (.023) | (.015) | (.00073) | (.001) |
| *Fixed Effects* | | | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Observations | 955,775 | 956,042 | 956,188 | 955,792 | 960,159 | 960,159 |

This table shows the effect of the 2013 dividend tax increase on the firm balance sheet. Net working capital is defined as gross working capital (liquidity plus account receivables plus inventory) minus short-term liabilities. Liquidity is the sum of cash and cash-equivalents (marketable securities, commercial paper, Treasury bills). In columns 1 to 4, each variable is scaled by total capital in 2011. In columns 5 and 6 the denominator is lagged sales. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

# 8 Discussion with theory

**Theories of dividend taxation.** The prominent theories regarding the effects of dividend taxation on investment highlight the importance of three parameters: (i) the marginal source of investment finance and the magnitude of liquidity-constraints[38] (e.g. Sinn, 1991); (ii) the value of wasteful investment for the man-

38. The difference between cash-rich and cash-poor firms maps the distinction between the "old view" and "new view" of dividend taxation. In the "old view" investment will decrease

ager[39] (Chetty and Saez, 2010); and (iii) the firms' ability to carry resources over time by holding cash rather than investing it, creating a possible "intertemporal tax arbitrage" (Korinek and Stiglitz, 2009).

Our results clearly reject both the "old view" and "new view" of dividend taxation. In the "old view," tax changes do not affect dividend payments directly, but instead affects equity issuance and investment, which eventually affects dividends when the additional investment pays off. The timing of dividend adjustments together with the positive increase in investment is inconsistent with these predictions. The new view is also clearly rejected as it predicts no change in investment and dividend payout policy.

We are therefore mostly left with the possibility that firms engage in intertemporal tax arbitrage as in Korinek and Stiglitz (2009). In their model, if managers view the tax increase as only temporary, they have an incentive to reduce dividends, build up a liquidity buffer and wait for the tax reversal to distribute payouts to shareholders. Because in equilibrium, investment opportunities arise randomly and future dividend payments are discounted at a higher rate than the market rate, these tax-induced higher liquidity reserves also reduce firm financial constraints. As such, when investment opportunities arise in the economy, firms can use these additional liquidity reserves to invest more.[40] We do find that consistent with their model, treated firms invest relatively more when they have higher investment opportunities, particularly so when, before the reform, they distributed a lot of dividends.

Our results show that in equilibrium, many firms pay dividends despite being financially constrained, i.e. do not leave enough liquidity in their firm bal-

because it is financed with new equity issuance and higher taxes raises the cost of equity (e.g. Harberger, 1962, Feldstein, 1970, Poterba and Summers, 1983). By contrast, in the "new view" higher taxes reduces the marginal return on investment but also reduces the ex-post marginal incentive to distribute payouts by a similar amount, leaving investment and payout unchanged (e.g. King, 1977, Auerbach, 1979, Bradford, 1981).

39. Note that in Chetty and Saez (2010), the problem is modelled as an agency cost whereby managers have a private benefit for investing in their "pet projects" that reduces the profitability of the firm. While this theory is not immediately appropriate for our setting, since by design, treated firms are always firms run by a managing director who is also the majority shareholder and therefore faces very limited agency costs, it is possible to slightly reformulate the model in Chetty and Saez (2010) by assuming that entrepreneurs derive non-pecuniary benefits from being their own boss. For instance, they may want to run a firm that is bigger than the size that would maximize profits (e.g. Hamilton, 2000)

40. Cash holdings within firms can be discounted at a higher rate than cash holdings outside for multiple reasons: agency concerns (e.g. the "Jensen free cash-flow problem"), managerial myopia, imperfections in risk markets, which may result in households being even more credit rationed than firm, or simply the accumulated retained earnings tax, which punishes firms for holdings excessive cash balances.

ance sheet to overcome financial frictions when profitable investment opportunities arise. This implies that the value of one euro outside the firm is perceived higher than one euro inside the firm. Two very different classes of models can rationalize this fact: rational and behavioral.

The rational explanation can come in two forms. First, it could simply be that entrepreneurs value consumption today more than tomorrow or are facing personal liquidity shocks, which make them prefer consuming the wealth produced by their firm rather than reinvesting it. Second, leaving too much money inside the firm might be costly due to agency costs. This is the classic "free cash-flow" hypothesis developed by Jensen. While at face value it seems unlikely to be an important determinant in our setting, as the CEO of the firm is also the majority owner, a more subtle (but similar) mechanism could be at play based on intra-household bargaining. If for instance the capital is owned by the family but only one member works in the firm, this potentially reintroduces a form of separation between ownership and management, and the family members not working at the firm but owning it might prefer not to leave too much cash in it.

Two more behavioral explanations can also rationalize our results. First, entrepreneurs may make systematic errors when anticipating future investment opportunities and in this case could underestimate their future needs for liquidity. Second, entrepreneurs may display "hyperbolic discount factor" (e.g. Laibson, 1997) implying they will overvalue consumption today (paying dividends) over investment for the future. In this case, a higher dividend tax rate will be a solution to restore the proper arbitrage between consumption and savings.

Disentangling these different hypotheses would require additional data that unfortunately are often not available and more than one paper. We leave these questions open for future research. In practise, it is well possible that a combination of all these explanations might be at play in the data.

**Evolution of investment misallocation.** The question of how the misallocation of capital evolves is to a large degree a general equilibrium question. It is therefore important to stress that our research design cannot, by construction, answer this question because it relies on a partial equilibrium difference-in-differences approach.

The payment of dividends can have positive reallocation effects if the money distributed by the firm to its shareholders is then reinvested by them in firms with higher returns to capital (Gourio and Miao, 2010; De la O, 2020). In this respect, dividend payments can be seen as an efficient way to reallocate resources away from firms with no profitable investment projects (which explains why they are

distributing dividends) toward firms with profitable investment projects. Liquidity can transit across firms through two channels: shareholders directly reinvesting their dividends in a new firm, or depositing them on their saving account, which will then increase banks' credit supply.

Therefore, dividend payments can improve the allocation of capital under three main conditions. First, the dividends paid must be reinvested and not consumed. Second, firms that are paying dividends must have lower marginal return on capital than firms not paying dividends. And third, the investors who receive the dividends (whether it is the individual shareholder or the bank that benefit from an expansion of its deposits) must be able to identify firms with a high marginal return on capital.

If all these conditions are met, constraining dividend payments by increasing the dividend tax rate will necessarily lead to an increase in capital misallocation. There are reasons to believe that this is unlikely to be the case in our settings.

First, households largely consume cash payouts (Baker, Nagel, and Wurgler, 2007), probably even more so in our case given that the dividends are an important part of the entrepreneurs' compensation.

Second, treated firms with no investment opportunities do not increase their investment but instead, accumulate cash in their balance sheet, which is saved on a deposit account. This implies that from the perspective of a bank, the *level* of deposits it can use to extend credit has not changed, only the *composition* (from individual deposits to firm deposits). In this respect, liquidity is still flowing from firms with no investment opportunities to firms with investment opportunities, via the channel of firm deposits.

Given that at the same time, the reform leads treated firms with high returns to capital to invest more, which in partial equilibrium implies a reduction in misallocation, it seems plausible that the reform overall increases output both by leading not only the average firm to invest more, but also by improving the allocation of investment across firms.

# 9 Conclusion

The capital share of income for individuals at the top of the income distribution has increased continuously over time (Eisfeldt, Falato, and Xiaolan, 2019). At the same time, it is becoming harder to clearly distinguished between labor income and capital income, in particular for business owners (e.g. Smith, Yagan, Zidar, and Zwick, 2019).

The effects of the distortions introduced by a tax wedge between capital and labor income is therefore more pressing than ever. France decided to align taxation on one form of capital income (dividends) in 2013. We show that, far from producing the "economic Armageddon" that opponents to the reform predicted, this tax hike led to higher investment and higher sales growth.

Tax-induced liquidity retention led the average treated firm to increase its investment. For every €1 of dividend not distributed, treated firms reinvested €0.3. This increase for the average was also accompanied by a positive reallocation of investment across firms, in favor of firms with high investment opportunities and firms with high expected returns to capital , and it did not increase financial constraints for equity-dependent firms.

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# Appendix

## A.1 Detailed differences across SAS and SARL

**Differences for the firm.** The differences and similitude between SAS and SARL can be summarized by the table below.

Table A1: Main Legal Differences Between Treated and Control Firms

| | **SARL** (Treated) | **SAS** (Control) |
|---|---|---|
| **owner-managers** | **Majority-owner not employed** | **Employee** |
| Spouse status | Spouse collaborator | Employee |
| By-laws | Pre-defined | Completely flexible |
| Types of Shares | Ordinary | Different share classes possible |
| # of Shareholders | Limited to 100 | No max |
| Bonds Issuance | Audit necessary + $\geq$ 3 year | No condition |

As we explained in Section 2.2, the main difference regarding the owner-managers is that SAS managing directors are required by law to be employees of the firm, while SARL managing directors do not face this requirement. The status of the spouse also differs. While the spouse of a SARL owner-managers can benefit from the status of "spouse collaborator", which makes him/her eligible for social security benefits without having to be an employee (i.e. no need for a wage or a work contract), this is not the case for the spouse of a SAS managing director.

Because there is a lot of family firms in France, in particular among SMEs, this notion of "spouse collaborator" makes the SARL legal status attractive.

Regarding the design of the by-laws and access to outside finance, the differences are the following:

- By-laws are "pre-defined" for SARL firms. This makes it particularly appealing for instance for entrepreneurs with potential shareholders / associates they do not necessarily trust or for unsophisticated entrepreneurs. SARL by-laws are almost "plug and play" and do not require to use a lawyer to design them.

- As a consequence, while SARLs are constrained to only issuing ordinary shares, SAS firms can issue all type of share classes (e.g. preferred, ordinary)
- SAS have also an easier access to the bond market. They can issue warrants and convertible bonds, which SARL cannot and face no restrictions on bond issuance, while SARL must have existed for at least 3 years and have an auditor to issue bonds.
- Finally, SAS firms face no restriction about the number of shareholders while SARL are capped at one hundred

## A.2 Discussion of the reform

### A.2.1 Why did the reform only impacted SARL firms?

The 2013 reform only impacted SARL owner-managers. However the arbitrage opportunity also existed to some degree for SAS firms and SAS owner-managers. There are two main reasons that explain that the reform only affected SARLs:

**Reform of independent workers' status.** The first one is related to the status of the owner-manager and the social regime to which she contributes. As explained previously, SARL owner-managers are legally treated as independent workers, whereas SAS and SA managers are employees. As a consequence, they do not share the same social regime. Independent workers contribute to the "RSI"[41], whereas employees contribute to the french standard regime[42]. Furthermore, in 2009 another category of independent french workers, the "liberal professions"[43] was imposed the same change in taxation on their own dividends than the 2012 reform for SARL owner-managers. One year after the 2012 reform, it was finally extended to another category of independent workers: the agricultural workers. The relationship between those three reforms is that they both concerned independent workers paying social contributions to the same RSI regime. Hence the 2012 reform impacting SARL owner-managers was part of a global reform of the RSI regime and not the one of the *"Regime Generale de la Securite Sociale"*.

**Lobbying power.** The second explanation lies in the bargaining power of SARL owner-managers versus SA and SAS ones. As described in the paper, SA and SAS

41. *Regime Social des Independants*
42. *"Regime General de la Securite Sociale"*
43. French "Liberal professions" include notably lawyers, doctors, notary.

firms are, on average, bigger than *SARLs*. In turn SA and SAS firms are more likely to have a higher lobbying power. This is further discussed below as in 2015, a parliamentary amendment to extend the tax reform to SA and SARL was rejected following intense lobbying by french two main employers' organisations.

### A.2.2 Subsequent reactions to the reform

**A strong opposition.** The exclusion of SA and SAS firms of the scope of the reform, as well as the sharp increase in taxation, created a strong opposition to it. An opposition group of SARL owner-managers, calling themselves *"the sheeps,"* [44] lobbyied hard against it but ultimately failed, after having gained the support of the french Senate. However, the opposition remained strong afterwards. Parliamentary amendments to cancel the reform were proposed in the 2015, 2016 and 2018 *Loi de Finance pour le Financement de la Sécurité Sociale*.[45] To this date, they never have been accepted.

**Attempt to extend it to SAS and SA firms.** I 2014, a french deputy proposed an amendment to the social security funding law to enlarge the reform to SA and SAS firms which was ultimately rejected. The amendment[46] specifically stipulates that its aim is to reduce fiscal optimization of SA and SAS owner-managers while ensuring equity between them and SARL owner-managers.

In an article in the french leading newspaper Le Monde, [47] we know that its rejection was the output of an intense lobbying campaign of the two french employers' organizations. The article reports that they lobby to Emmanuel Macron, then Secretary of Treasury (Minister of Economics and Finance), that finally managed to convince President Francois Hollande to ask the parliament to withdraw the amendment. The underlying explanation is that SA and SAS firms are better represented among those two organizations that were SARL.

## A.3 Discussion tax incidence

How wage earners should incorporate expected social benefits in the their labor supply decision? Early empirical studies have found that social security contri-

44. https://www.lemonde.fr/economie/article/2012/10/18/apres-les-pigeons-les-chefs-d-entreprises-moutons-du-rs_1776814_3234.html

45. In 2015, 2016 and 2018 the amendment was proposed by Senator Cadic.

46. Amendment 876 to the 2015 *Loi de Finance pour le Financement de la Sécurité Sociale*

47. https://www.lemonde.fr/politique/article/2014/10/30/comment-le-gouvernement-a-cede-au-patronat-sur-la-taxation-des-dividendes_4515630_823448.html

butions (SSC) are fully shifted to employees (e.g. Gruber, 1997), implying in our setting a full valuation of the benefit. This idea has recently been challenged by Saez, Matsaganis, and Tsakloglou (2012) and Saez, Schoefer, and Seim (2019) which find in Greece and Sweden a full incidence on capital rather than labor.

Bozio, Breda, and Grenet (2018) uses French data and social security contribution reforms to show that the incidence of a SSC marginal rate change depends on the degree of tax-benefit linkage. In many countries such as France, a large fraction of the SSC (if not the majority) is actually not a true "contribution," in the sense that the amount of benefit received does not equate one-for-one the amount of money paid. This is the case for instance for health care, child care benefits, etc. Other contributions have imperfect relationships with future benefits (e.g., main pension scheme, unemployment insurance), while some specific SSCs have very strong linkage (e.g., complementary pension schemes). For contributions with little tax–benefit linkage, Bozio, Breda, and Grenet (2018) estimate a precise zero incidence on labor, while they found a precise full incidence when the linkage is strong.

**Value of benefits in the French system.** The retirement contribution for treated entrepreneurs is around 20% (17.7% for the main contribution, with complementary pension schemes that can go up to 7%). While 7% is the maximum complementary possible, only a minority reach this maximum, hence the average being around 20%.

**Subjective valuation of social benefits.** The literature on the extent to which individuals value the benefits guarantee by the government is very limited. The best estimate we have come from Finkelstein, Hendren, and Luttmer (2019) who, using the Oregon Medicaid Experiment estimate the recipients value of Medicaid benefits at around 50%. Of course, because this estimation of the benefits valuation by recipients is made in a very specific context: Medicaid in the U.S. and therefore might not be representative for French entrepreneurs.

# Appendix Tables

Table A2: Effect on Wages and Employment

| *Dependent Variable* | Employment | | Mean Wage | | Wages / Value Added | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treated×Post | 0.011*** | 0.012*** | 0.0018 | 0.0014 | 0.0043*** | 0.0048*** |
| | (0.0015) | (0.0015) | (0.0011) | (0L0012) | (0.0012) | (0.0012) |
| *Fixed Effects* | | | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Commuting Zone × Year | — | ✓ | | ✓ | — | ✓ |
| Observations | 959,332 | 959,332 | 959,332 | 959,332 | 959,332 | 959,332 |

This table shows the effect of the 2013 dividend tax increase on employment. Employment is the total full-time equivalent. Mean wage is total compensation divided by number of employees. Both variables are in log. Asset growth is the annualized growth of firm capital between 2008 and 2012. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A3: Equity Dependence: Probability to Issue Equity

| *Bin probability equity issuance* | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | | | **Total Investment** | | |
| Treated×Post | .0067* | .0079** | .0031 | .0063** | .0063*** |
| | (.004) | (.0034) | (.0029) | (.0026) | (.0026) |
| | | | **Tangible Investment** | | |
| Treated×Post | .006* | .0068** | .00076 | .0067*** | .0084*** |
| | (.0036) | (.003) | (.0025) | (.0022) | (.0022) |
| *Fixed Effects* | | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Observations | 190,748 | 191,478 | 191,594 | 191,501 | 190,546 |

This table shows the effect of the 2013 dividend tax increase when firms are sorted by their probability to issue equity. This probability is estimated following Auerbach and Hassett (2005) where we regress a dummy *New Equity Issuance* that equal one if we observe a positive change in equity between $t$ and $t+1$ over the pre-reform period onto profitability and lagged profitability, leverage and lagged leverage, investment and lagged investemnt, size log asset), industry, age bin, local labor market fixed effects. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A4: Equity Dependence-Fraction of Capital Financed Through Equity

| *Equity Issued / Capital*$_{2012}$ | .023 | .065 | .14 | .31 | 1.5 |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| | | | **Total Investment** | | |
| Treated×Post | .006** | .0074*** | .0096*** | .011*** | .011*** |
| | (.0031) | (.0027) | (.0026) | (.0028) | (.0036) |
| | | | **Tangible Investment** | | |
| Treated×Post | .0061** | .008*** | .011*** | .012*** | .0093*** |
| | (.0029) | (.0024) | (.0022) | (.0024) | (.0031) |
| *Fixed Effects* | | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Commuting Zone × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Observations | 174,050 | 193,492 | 197,388 | 197,774 | 193,466 |

This table shows the effect of the 2013 dividend tax increase when firms are sorted by the fraction of capital in 2012 financed by equity since the firm entered in the dataset starting in 1994. The first line indicates the average of equity issued / capital within each bin. We estimate equation 1 for each group separately for total investment and tangible investment both scaled by total capital in 2011. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

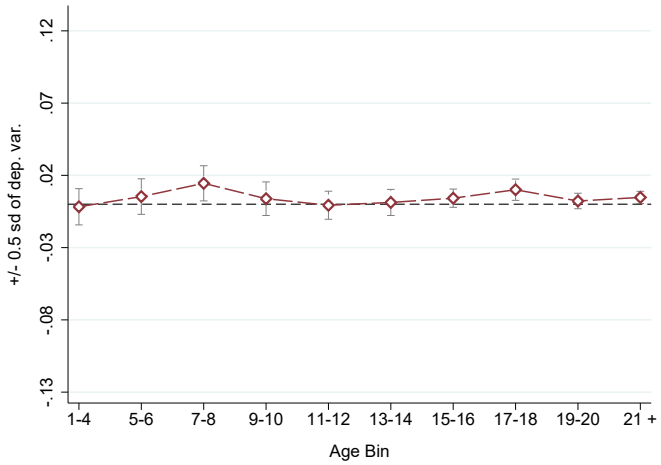
Table A5: Equity Dependence: Number of Equity Issuance

| | 2009–2016 | | 2003–2016 | | |
|---|---|---|---|---|---|
| *# equity issued* | 0 | 1 | 0 | 1 | 2 |
| Treated×Post | .011*** | .0076*** | .011*** | .0075*** | .011*** |
| | (.0019) | (.0018) | (.0022) | (.0018) | (.0041) |
| | | | **Tangible Investment** | | |
| Treated×Post | .0078*** | .0043*** | .008*** | .0048*** | .0052* |
| | (.0015) | (.0014) | (.0017) | (.0014) | (.003) |
| *Fixed Effects* | | | | | |
| Firm | ✓ | ✓ | ✓ | ✓ | ✓ |
| Industry × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Capital Growth Quintile × Year | ✓ | ✓ | ✓ | ✓ | ✓ |
| Observations | 446,994 | 510,351 | 385,567 | 467,482 | 104,296 |

This table shows the effect of the 2013 dividend tax increase when firms are sorted by the number of instances of equity issued over the period 2009–2016 (columns 1–2) or the period 2003–2016 (columns 3–5). In columns 1 and 2, we split the sample between firms that never issued equity (column 1) or issued once or more than once (column 2). In columns 3–5, we split into no issue (column 3), one issue (column 4) or two or more issue (column 5). We estimate equation 1 for each group separately for total investment and tangible investment both scaled by total capital in 2011. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

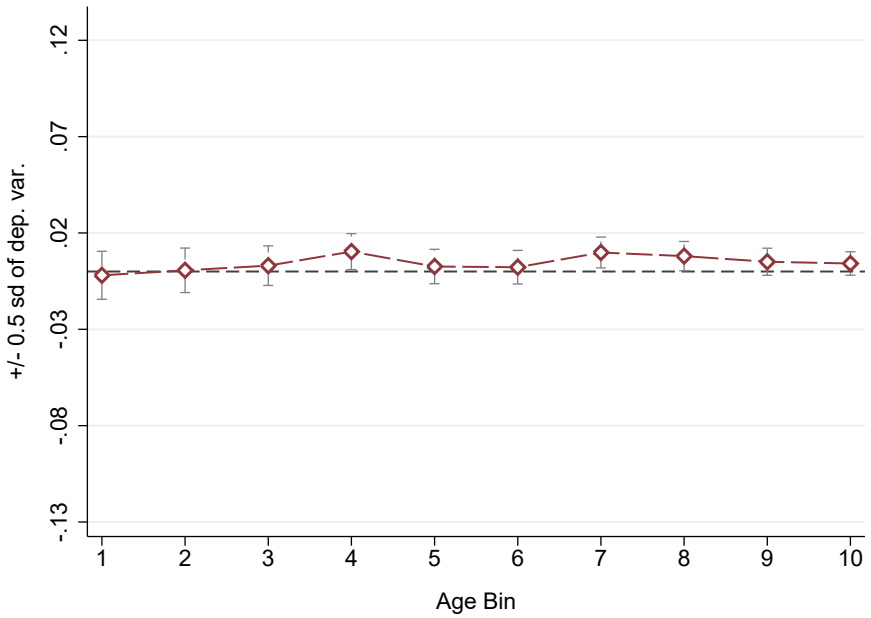
# Appendix Figures

Figure B1: Total Investment: Heterogeneity by Age




This figures plot the post coefficients and its 95% confidence interval of the difference-in-difference estimator in equation (1) when the dependent variable is total gross investment scaled by total capital in 2011. Each coefficients is estimated for a given bin of firms sorted by decile of 2012 assets' value. The height of the Y-axis is fixed at 0.5 s.d. of the pre-reform sample mean of the dependent variable to ease the economic interpretation.

Figure B2: Total Investment: Heterogeneity by Size




This figures plot the post coefficients and its 90% confidence interval of the difference-in-difference estimator in equation (1) when the dependent variable is total gross investment scaled by total capital in 2011. Each coefficients is estimated for a given bin of firms sorted by decile of 2012 assets' value. The height of the Y-axis is fixed at 0.5 s.d. of the pre-reform sample mean of the dependent variable to ease the economic interpretation.