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

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Abstract

This paper investigates the 2013 three-fold increase in the French dividend tax rate. Using administrative data covering the universe of firms over 2008–2017 and a quasi-experimental setting, we find that firms swiftly cut dividend payments and used this tax-induced increase in liquidity to invest more. Heterogeneity analyses show that firms with high demand and returns on capital responded most while no group of firms cut their investment. Our results reject models in which higher dividend taxes increase the cost of capital and show that the tax-induced increase in liquidity relaxes credit constraints which can reduce capital misallocation.

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

1 Introduction

Proposals to limit corporate payouts so that firms invest more 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.*" For similar reasons, the French center-left party raised the dividend tax rate by a factor of three for French firms in 2013 after its electoral victory, 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 firms' 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, 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 can 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 elements 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 in the last forty years. We also exploit rich administrative panel data that cover the universe of French corporations from tax-filings and that provide detailed balance sheets and income statements over the period 2008–2017.

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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 if, for instance, an increase in the dividend tax rate leads firms with low returns to capital to increase their investment more while firms with high returns 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 actually reduce aggregate output in the long-run.

The French reform affected firms with a particular legal status that account for three-quarters of the population of firms, while the rest remained unaffected. This clean policy, 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 many types of firms, including small and new firms that are particularly likely to be equity-dependent and to see their cost of capital increase after the dividend tax hike. Second, because we observe all firms in the economy and have sizeable treated and control groups, it is possible to provide in-depth analyses of potential investment reallocation. Third, the detailed data on firm cash-flow statements and balance sheets allow us to provide a complete picture of the different margins of firm-level adjustments to the tax hike and to explore possible changes in income-shifting behaviors from treated firms, which is crucial for estimating whether firms increase their amount of wasteful or productive investment.

Our identification relies on ex-ante differences in firm legal status, but it does *not* require either firms to choose a legal status randomly or 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 unobserved time-varying heterogeneity as possible. This is possible because control and treated firms share significant overlap in size and are both present in all industries of the French economy. In our preferred specification, we compare treated and control firms in the same industry, located in the same city and in the same decile of pre-reform firm size.

Our first set of results confirms that the 2013 tax hike was a large and salient shock for the treated firms. We find that firms 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 3.2 p.p. of the firm's capital, which represents a 16% drop relative to the pre-reform sample mean and implies an elasticity of the dividend to the tax

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rate of 0.43.[4] Second, an increasing bunching in dividend distributions appears at the kink introduced in the tax code.[5] Third, while firms existing before the reform do not change their legal status, new firms 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 firms were highly aware of the reform and quickly responded to it.

Next, we estimate the real effects of this tax increase on employment, investment, and firm performance, the key outcomes proponents of an increase in dividend taxation hope to influence. We find that on average, the tax increase has a precisely measured small positive effect on employment and that 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, which implies an elasticity of investment with respect to the dividend tax rate of around 0.38. 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 it furthermore reduces the probability of firm exit. The large increase in investment implies that, *on average*, a higher dividend tax rate does not increase the cost of capital for existing firms in our sample.

Even if treated and control firms exhibit no differential pre-trends before the tax-hike and are compared within the same industry and size bin, it is still possible that other concomitant shocks to the tax change specifically affected treated firms. We address this problem by exploiting the large variation in dividend payments pre-shock and split the treated and control groups into high and low-dividend payers before the reform. This allows us to compare firms with the *same* legal status and to include a treated-by-year fixed effect in our specification and thereby address the possibility that our results are driven by unobserved shocks across legal status. Doing so produces similar point estimates. This implies that almost all of

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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).

5. The new tax rate of 46% only applies to dividends exceeding 10% of the firm equity.

the baseline effect is driven by firms more exposed to the reform that were paying more dividends prior to the tax hike.

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 if for instance 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 show 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. When comparing high and low dividend payers with the same legal status, 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 within industry according to their marginal return on capital pre-reform to estimate how capital misallocation evolves after the reform.[6] 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. The absence of difference between high and low dividend payers for firms with low investment opportunities and low ex-ante returns to capital shows that firms are not willing to waste their undistributed earnings when facing limited prospective returns. This provides further evidence that the average tax-induced increase in investment is not coming from firms engaging in income-shifting or wasteful investment.

We end our analysis of the possible reallocation effects of the tax increase by focusing on the empirical predictions of the "old view" theory of dividend

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

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 subsample 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. We first test if treated firms engage in more income-shifting and use other ways to take money out of their firms. We rule out an increase in tax avoidance behaviors by showing that following the reform, treated firms are not more likely to transfer some of their personal consumption to their company, measured using intermediary goods consumption or intermediary services consumption.

Next we consider balance sheet adjustments on both the liability (e.g. debt) and asset (e.g. cash holding) side. Treated firms 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, firms 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 dividend taxation. Despite a large theoretical literature on this topic, empirical analyses have lagged behind due to the challenge of finding plausible control groups since most reforms of capital gains affect all firms in the economy. The most studied reform is the U.S. 2003 Dividend Tax Cut by 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), and higher quality of mergers 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) uses a calibrated model of firms with idiosyncratic productivity shocks to find 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 firms and their investment decisions, which is important as responses to tax rate changes are not always symmetric (e.g. Benzarti, Carloni, Harju, and Kosonen, 2020). We also provide novel and in-depth analysis of the reallocation pattern across firms and industries to show that the additional investment likely decreased capital misallocation.

Second, we relate to the literature on dividend taxation, in particular Sinn (1991) for the neoclassical model of dividend taxation that embeds the "old" and "new" views; 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 corpo-

rate 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 firms across sectors (Buera, Kaboski, and Shin, 2011; Midrigan and Xu, 2014), of labor (e.g. Hombert and Matray, 2016; Fonseca and Doornik, 2019; Hombert and Matray, 2019; Fonseca and Matray, 2021) of capital within sectors across firms (Gopinath, Kalemli-Özcan, Karabarbounis, and Villegas-Sanchez, 2017, Bau and Matray, 2020), of capital within multi-plants firms (Kehrig and Vincent, 2019), of capital over the business cycle (Kehrig, 2015), of bank lending (e.g. Delatte, Matray, and Pinardon Touati, 2019) or of international trade (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. Private corporations in France are divided into two legal statuses: "*Société à Responsabilié Limitée*" (SARL) and "*Société Anonyme Simplifiée*" (SAS).[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 partners' contributions.

There are two main differences between SARL and SAS status. First, SAS offers more flexibility in the design of the company by-laws and easier access to

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7. We omit from the discussion the mandatory legal status for listed firms "*Société Anonyme*" (SA), which accounted for roughly a quarter of the economy in 2012. As explained below, we remove listed firms from the main analysis.

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 about the legal status of treated and control firms in Table A1 and describe the finer details about their legal obligations and rights in Appendix A.1.

We provide a detailed discussion of SARL and SAS economic characteristics and their shareholding composition and discuss the representativeness of this sample for the French economy in Section 3.2.

Comparison with legal status in the U.S. 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" but unlike in the U.S., this status is highly restrictive so this type of pass-through entity is 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 we focus on firms with at least one employee.

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.

As shown in Section 3.2, treated and control firms are very similar in terms of profitability, investment intensity, and leverage, even after controlling for revenue and industry, and both present in all industries of the French economy. They also have substantial size overlap, even though control firms tend to be more assets-intensive. The large similarities between treated and control firms imply that even if they differ in the level of some outcomes, they can share similar *common trends* because they share time-varying industry, geographical and size-specific shocks. Similar *trends* before the reform between the two types of firms is the only condition required for identification, which we demonstrate graphically later in Figures 4 and 5.

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 how the policy change in 2013 raised the dividend tax rate from 15.5% to 46% for treated firms.

French dividend taxation. After paying corporate taxes, firms are left with a net income that can either be 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 its 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.[8] The second component is a standard progressive personal income tax, that applies to the "net" 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: SARL (treated) and SAS (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 in 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 families 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."[9]

Second, dividend payments are regulated along two dimensions: (i) dividends can never exceed the net income from previous accounting exercises, net of all past

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8. 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 from the payroll tax on wages, as it does not open rights to future benefits. In this sense, it is more of a "pure" tax rather than a "contribution."

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

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, share buybacks were typically taxed as dividends rather than capital gains until 2015 (unless they can be explained by past losses that are forcing the firm to shrink), so 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 SARL firms.

Firm have an *owner*-manager if the entrepreneur, alone or jointly with her family, holds at least 50% of the firm equity. The inclusion of "family ownership" ensures that managing directors of SARL firms could not escape the reform simply by transferring their equity to their spouse, children or relatives. The focus on *owner*-managers (i.e. managers holding at least 50% of the equity) is explained by the fact that the distinction between dividends and wages is arbitrary when the managing director can decide how to label her compensation by herself, given that she is the majority owner. In this respect, the distinction between dividends and wages before the reform did not reflect relative compensation for the risk of the capital invested and for labor effort, but rather was just a legal fiction that allowed the owner-manager to optimize the tax rate of her total compensation.

The fact that the reform applies specifically to owner-managers of SARL implies that not *all* SARL are exposed to the reform. However, it is important to stress that the vast majority of them are. According to the French statistical office (INSEE), over 90% of SARL firms are run by an owner-manager. We find an even higher number for the subset of the sample that we can match to Amadeus-Bureau Van Dick (BvD) where we can observe information on shareholder composition and managerial team (Appendix A.5). Therefore, using solely the legal status "SARL" to identify treated will at worst introduce some attenuation bias to our coefficients.

Following the reform, all dividends paid to SARL owner-managers are considered wages, and as such, become subject to the same 46% wage payroll tax rate. This change effectively tripled the tax rate SARL owner-managers paid on dividends. We discussed the details of the reform and some additional policies adopted around this period in Appendix A.2.2.

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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.

While the reform might have affected firms' incentives to re-incorporate as SAS (control) or SARL (treated), we abstract from this problem in our analysis by freezing the legal status before the tax reform. We discuss how the reform affected the firm's incentive to incorporate as SAS (control) or SARL (treated) and the optimal mix between dividends and wages for managers' compensation in Appendix A.1 for the interested reader.

Reactions to the reform and expectations of reversal. The decision to raise the payroll tax rate of dividends 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 due to more effective lobbying from better representation among employers' unions and the fact that their managers were 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.2.1.

When introduced, the reform was marketed as "permanent" since it was implemented to correct a tax distortion.[10] However, the election of Francois Hollande to the French Presidency came as a surprise and many expected him not to be re-elected, which might have created hope that the reform would be abolished in the future. While it is unfortunately impossible to observe managers' expectations at that time, it is worth stressing that President Emmanuel Macron, President Francois Hollande's successor, 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-onward). The data contain income statements and balance sheets collected by the Treasury for the entire universe of firms in the economy. These data are used

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10. 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.

to determine tax liability and are audited by the tax authority with significant penalties applied in case of misreporting, which guarantees the high quality and accuracy of the data used.

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, or PPE (property, plants and equipment). All firms in our sample have at least one employee in addition to the owner-manager.[11]

3.2 Representativeness and external validity

Sample representativeness of the French economy. Like most economies, the size distribution of firms in France is extremely right-skewed as shown by Figure 1a, which plots the cumulative density function of firms by size. This creates a trade-off between providing an analysis that is not purely driven by the idiosyncratic shocks of the largest firms (and therefore is less likely to be representative of the modal firm) and an analysis that captures the largest fraction of the economy.

We deal with this issue in two ways. First, we cut the sample at the ninety-fifth percentile of the size distribution because of the right-skewness (Figure 1a). We also cut firms at the fifth percentile to remove the smallest firms to restrict attention to corporations operating at substantial scale. Second, we include pre-reform size decile-by-year fixed effects in all our specifications to ensure a comparison across treated and control firms of similar size.

This leaves us with a sample that accounts for a substantial fraction of the economy, capturing around two-thirds of the employment in private firms, which is the vast majority of the economy in France.[12] In this sample, treated firms represent around half of the economic activity as shown in Figure 1b and span all the industries of the economy as shown in Figure 2.

In Section 5.2, we report robustness of all our estimates when we include the whole universe of firms, including the largest ones and the listed ones and show that our point estimates are barely affected, indicating that our results do not

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11. Results are virtually unchanged without these different restrictions.

12. This is of comparable orders of magnitude to Yagan (2015) that analyses the Bush tax cut in the U.S. and uses a sample accounting for half of the private employment in the U.S.

only apply to small and medium size firms.[13]

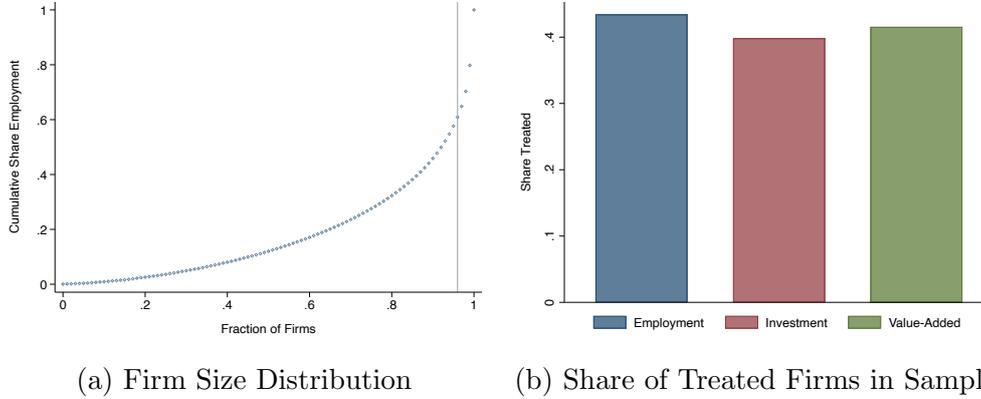Figure 1: Sample Representativeness

(a) Firm Size Distribution   (b) Share of Treated Firms in Sample

Figure (a) plots the cumulative distribution of firm size for all private firms in the French economy in 2011. The grey line indicates the 95th percentile. Figure (b) plots the shares of employment, investment and value-added of by treated firms in the sample.

Modal firm characteristics. 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. As noted before, treated and control firms have similar investment rates and capital structures (cash-holding and leverage), and they pay out similar proportions of their capital as dividends (20% versus 21%). The similarities in leverage, liquidity, and dividend ratios also suggest that there are no systematic differences in how financially constrained they are. Control firms are more asset-intensive, but they have enough overlap in their size distribution with treated firms to allow us to sort the sample into size deciles pre-shock and estimate all regressions with size decile-by-year fixed effects. The inclusion of these fixed effects ensures that the effect of the tax increase is identified by comparing firms that may be exposed to similar size-specific time-varying shocks.

All firms are closely held in the sample and therefore have limited agency frictions. We discuss how this could affect our interpretations of the results and how it can be linked with theories of dividend taxation in Section 8. Since firms in the sample are private, it is complicated to know their exact shareholder composition. For a subset of firms (around 40%), it is nonetheless possible to obtain this information by using historical data from Amadeus (BvD). We explain exactly how we clean these data in Appendix A.5. We find that treated and control firms have the

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13. A caveat is that due to the design of the reform, listed firms are always part of the control group and do not have equivalent firms that are treated, which is also true of the largest firms. Therefore, further research would be necessary to extrapolate results where we have tight groups of control and treated firms to out-of-sample conclusions.

Table 1: Summary Statistics

	Treated			Control		
Pre-Reform 2009–2012						
	Mean	s.d.	p50	Mean	s.d.	p50
Dividend / Capital	0.20	0.70	0	0.21	0.73	0
Dividend / Net Income	0.32	0.59	0	0.41	0.64	0
Other Firm Characteristics						
Assets	977,557	1,290,237	598,000	3,791,357	3,717,410	2,391,000
Tangible capital	284,491	542,068	132,425	1,131,118	1,642,627	507,181
Employee compensations	280,725	364,205	190,587	838,619	1,089,383	526,134
Net Income / Capital	0.48	1.46	0.14	0.51	1.63	0.12
Liquidity / Capital	1.58	3.96	0.41	1.61	4.21	0.34
Debt / Capital	1.24	3.05	0.39	1.04	2.95	0.28
Total Investment / Capital	1.07	0.28	1.02	1.07	0.28	1.02
Tangible Investment / Capital	0.05	0.19	0.02	0.04	0.18	0.02

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

same shareholder composition and that for this subsample, 95% of SARL (treated) firms are run by an owner-manager (i.e. a CEO owning over 50% of the shares), which is very close to the number estimated by the French statistical office for the whole population of SARL firms.

Treated firms span the entire spectrum of all industries before the reform and usually accounts for the majority of firms, as shown in Figure 2.

External validity. How much do our results apply to other contexts? Countries are different on multiple dimensions and applying results from one country to another is always a heroic exercise. Nonetheless, while the modal firm in this study might seem small relative to previous studies looking at (mostly listed) firms in the U.S., our final sample is representative of the French economy and the French economy is representative of most other developed countries.[14]

We provide two set of analyses to support this point that we summarize here and provide detail in Appendix A.4.1.

First, using data from Eurostat, we show France has a similar distribution of small firms (fewer than 50 employees) and medium firms (between 50 and 250 employees) as other European countries (Figure A2). We find the same similarity when looking at the sectoral composition (Figure A3).

Second, we show that the French economy, like other advanced economies, has

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14. The U.S. is an exception in the OECD given the size of its economy relative to other countries. Using GDP in dollars, in 2019 the U.S. was 7 times larger than France and the U.K., 5 times larger than Germany, 10 times larger than Italy, and 16 times larger than Spain.

Figure 2: Distribution of Treated Firms Across Industries
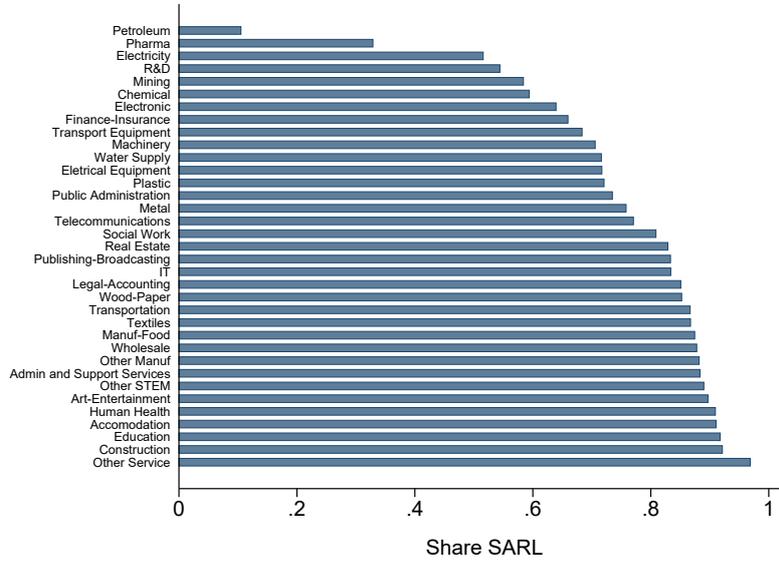
This figure plots the share of firms whose legal status of organization is SARL (treated) over the period 2008–2012 across all 38 main industries in France.

a very similar firm size distribution as the U.S. economy that follows Zipf's law.[15] This empirical regularity implies that there is a mechanical link between the size of the country and the average firm size (e.g. Gabaix, 2016). Since the U.S. is an outlier in the overall size of the its economy, it is also actually an outlier in its average firm size. However, once "adjusted" for the size of the overall economy, the U.S. and French economies are very similar. We provide a more detailed discussion in Appendix A.4.2.

3.3 Empirical strategy

Econometric specification. In order to analyze 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:

$$Y_{i,j,c,t} = \beta\, Treated_i \times Post_t + X_{i,t} + \theta_i + Size\ Bin_{i,t} + \delta_{j,t} + \gamma_{c,t} + \varepsilon_{i,j,c,t} \quad (1)$$

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). θ_i are firm fixed ef-

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15. See Axtell (2001) for the U.S.; Fujiwara et al. (2004) for Europe; appendix B of Giovanni and Levchenko (2013) for various OECD countries and Figure A4 for a replication of the distribution in our sample.

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fects and ensure that we remove time-invariant heterogeneity across firms. $\delta_{j,t}$ are (five-digit) industry by 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-by-year fixed effects forces the parameter of interest β to be identified solely by comparing firms within the *same* industry.[16]

Because we are studying most of the economy, firm size varies substantially in the sample. We include in the baseline specification $Size\ Bin_{i,t}$ which is a vector of pre-reform average size decile-by-year fixed effects. This set of fixed effects ensures that we are estimating the effect of the reform by comparing firms in the same size bin and therefore filter out correlated shocks that might exist between size and the reform. Finally, we include county-by-year fixed effects $\gamma_{c,t}$ to remove time-varying heterogeneity across local labor markets.[17]

In robustness tests, we include a collection of additional firm-level controls $X_{i,t}$: liquidity (cash over lagged assets), leverage (total debt over lagged assets) and profitability (operating income over lagged assets). Given that the reform may have a direct impact on many firm characteristics, using time-varying controls would bias the coefficient.[18] We address this problem by using the pre-reform value of these controls interacted with year fixed effects.

In our preferred specification with pre-reform characteristics fixed effects, the coefficient of interest β is estimated by comparing firms operating in the same industry, located in the same county, controlling for differential size trends, and it measures 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 Effects on regulatory arbitrage and payouts

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 newly created firms.

Figure 3 shows the evolution of the fraction of firms registered as treated

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16. We use the 5 digit Naf rev2 code that includes 574 distinct industries.

17. Specifically, we use French "département," which partitions France into one hundred distinct entities.

18. Commonly referred to as the problem of "bad controls" (e.g. Angrist and Pischke, 2008).

(SARL) for new firms versus those existing before 2013. While the fraction of treated firms stays flat for firms existing before 2013, new firms display important changes consistent with regulatory arbitrage. Over 80% of new firms were created as SARL prior to 2013, but there is a sharp drop in 2014–2015 and this number declines to 40% by 2018. The important lack of response from existing firms may be surprising but is in line with results from Gordon and MacKie-Mason (1994), Goolsbee (2004), and Giroud and Rauh (2019) that find little shifting of organizational form between C and S-corps in the U.S. in response to differential tax rates.[19]

Figure 3: Effect of 2013 Tax Reform on Organisational Form
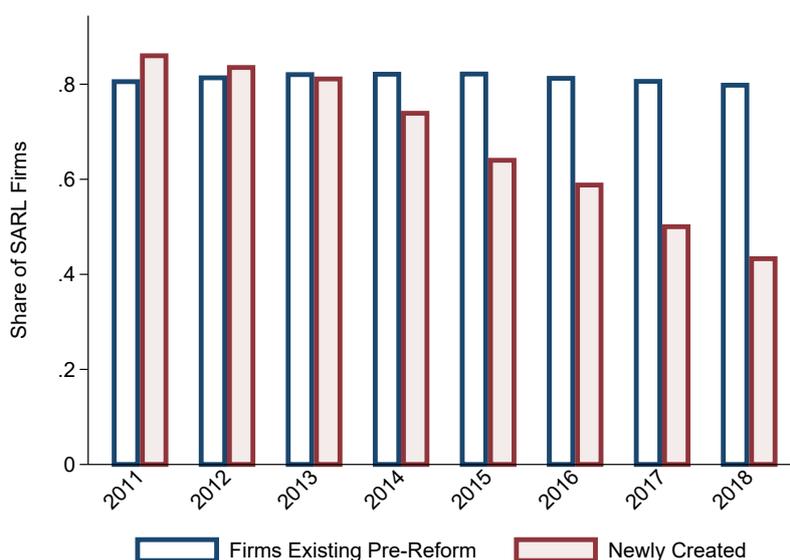
Evolution of legal status of firms over time. This figure plots the share of firms whose legal status of organization is SARL (treated) for firms existing prior to the reform and newly created firms after the reform.

4.2 Effect on payouts

We start by displaying the yearly coefficients of the regression when we include the different sets of fixed effects to provide a visual analysis of the effect of the reform on the ratio of paid dividends in Figure 4.

Three facts are noteworthy. First, prior to the reform, treated and control firms

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19. The lack of changes in organizational form for existing firms combined with the large reaction for new firms can be rationalized by important adjustment costs in France that takes two forms: a monetary cost between €5,000 to €10,000, representing around 10% to 25% of the firm net income, and a legal restriction since 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).

behave similarly, confirming that there is no violation of the "parallel trend" assumption needed for differences-in-differences estimators in the pre-period.[20] Second, treated firms adjust immediately to the increase in the tax rate by abruptly cutting dividends the year of the reform. Third, following the swift drop, treated firms keep paying lower dividends throughout the post period and do not revert.

Figure 4: Effect of 2013 Tax Reform on Dividend Payments
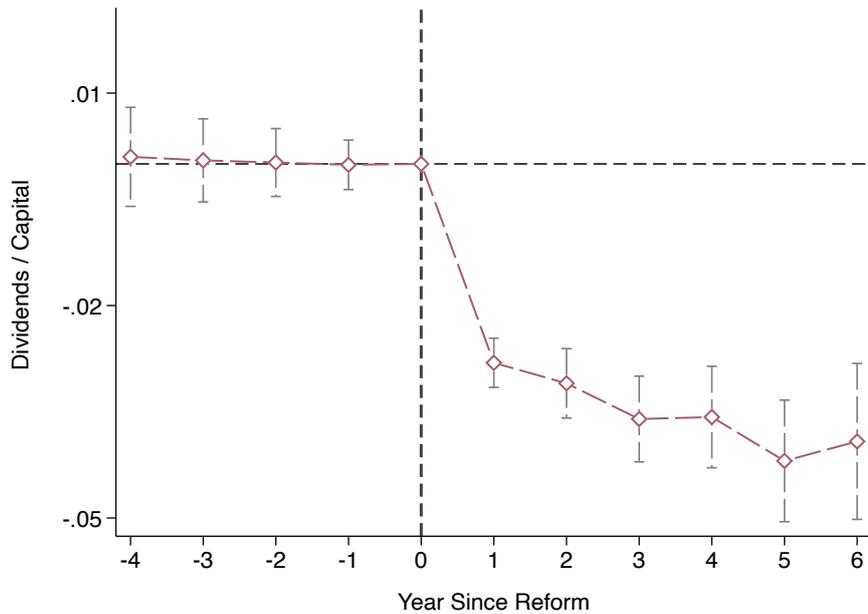
This figure plots the yearly coefficient and their 95% confidence intervals of the event study difference-in-differences estimator in equation (1) of the 2013 dividend tax increase. The dependent variable is scaled by total capital in 2011.

We next estimate the average effect and the robustness of the dividend reduction in Table 2. Table 2 shows that the negative effect of dividend taxation is robust to an array of different fixed effects that removes different potential sort of time-varying unobserved heterogeneity. Column 1 shows the result with firm and size bin-by-year fixed effects, column 2 adds industry-by-year fixed effects, column 3 adds county-by-year fixed effects and column 4 adds time-varying controls (liquidity, leverage and profitability), where we use the value of the controls pre-reform interacted with year dummies to limit the problem of "bad controls."

In all cases, the point estimate is stable and firms exposed to the tax hike reduce their dividend payment by €0.032 for each euro of capital, implying a 16% drop relative to the pre-reform sample mean. In Appendix A.2.2, we also show that

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20. Of course, it is by design impossible to test whether this assumption is valid in the post period.

Table 2: Effect of 2013 Tax Reform on Dividend Payments

Dependent Variable	Dividends / Capital			
	(1)	(2)	(3)	(4)
Treated×Post	-.034***	-.032***	-.032***	-.031***
	(.0025)	(.0025)	(.0025)	(.0024)
Fixed Effects				
Firm	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓
Industry × Year	—	✓	✓	✓
County × Year	—	—	✓	✓
Time Varying Controls	—	—	—	✓
Observations	1,028,149	1,028,149	1,028,149	1,028,149

This table shows the effect of the 2013 dividend tax increase on dividend payments. The dependent variable is dividends scaled by total capital in 2011. Size is pre-reform average capital decile. In column 3, "county" corresponds to the French administrative division "département" that partitions France into one hundred distinct entities. In column 4, we include time-varying controls for liquidity (cash over lagged assets), leverage (total debt over lagged assets) and profitability (operating income over lagged assets). We use the baseline level of these variables pre-shock and interact them with year fixed effects. Standard errors are clustered at the firm level. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

treated firms progressively bunch their dividend payment around a kink created by the reform, consistent with agents not immediately understanding the subtleties of the new tax regime but optimizing over time (e.g. Aghion, Akcigit, Lequien, and Stantcheva, 2017).

Taken together, these results show that the tax hike was both salient and meaningful for treated firms, and they swiftly adjusted their behavior.

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:

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

While we know that the old tax rate τ_{div}^{old} 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 (SSC). 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 into 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 benefits received does not equate the amount of money paid one-for-one.[21] Based on the work done by the French Institut des Politiques Publiques (IPP), the value of retirement contributions for treated owner-managers in our sample is around 20% of the taxed income.[22] This gives us a lower bound for the effective increase in the dividend tax rate. If owner-managers 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 would increase to 46%. This could happen if, for instance, they think the government will default on the benefits it promised in the future.[23] Therefore, even in the case of a perfect valuation of their future benefits, the new tax rate of treated firms is 26% (the net-of-tax dividends plus the benefits associated with the contribution), 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, so in all the tables we report the reduced forms results rather than the implied elasticity. Readers can apply their own assumed tax change to the raw estimates as they see fit and compute their preferred elasticity.

If we assume that treated entrepreneurs do not value the benefits associated with SSC, the effective new tax rate is 46%, implying an elasticity of dividend

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

22. 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.

23. 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%.

reaction to one-minus-the-tax-rate of 0.43,[24] 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 SSC, 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. In the rest of the paper, we report elasticities assuming that the new effective tax rate is 46%, which provides 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 find in Section 2, higher dividend taxes make dividend payments less desirable and leave treated firms with higher retained earnings. Theoretically, they can use these to finance larger investments or to pay their employees more.

Second, higher dividend taxes can increase the user cost of capital, which negatively affects investment for firms that finance their marginal investment with new equity and use the return to investments to pay dividends (the "old view" of 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, plants and equipment (PPE) 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).

Figure 5 plots the yearly coefficients and the 95% confidence intervals of the differences-in-differences event studies estimation of equation 1 of the tax's impact on investment. The differential investment of treated and control firms fluctuates

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24. $(0.16)/(\tau_{div}^{new}\text{-}0.155/0.845) = 0.43$

around zero in the years before the reform, providing visual evidence of the absence of differential pre-trends before the shock. Investment by treated firms increases progressively relative to control firms the years after the tax hike and plateaus at a 1.4 p.p. higher level three years after the reform.

Figure 5: Effect of 2013 Tax Reform on Investment
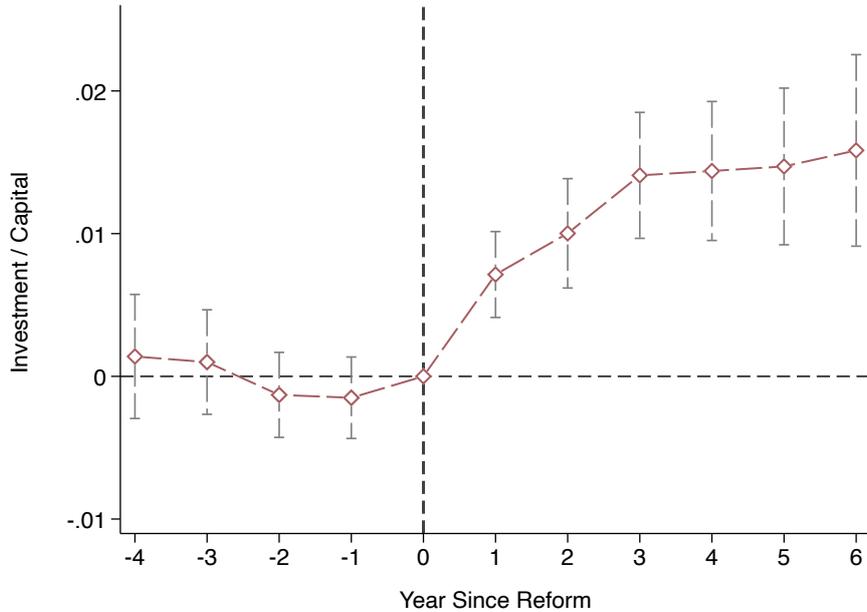
This figure plots the yearly coefficients and their 95% confidence intervals of the difference-in-differences estimator in equation (1) of the 2013 dividend tax increase. The dependent variable is total investment scaled by total capital in 2011.

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 €0.0083 (column 1) to €0.0091 (column 3) for every euro of capital, which represents an increase of around 14% 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 €0.053 per euro of capital. In Panel B, we report the estimates after accounting for book depreciation and again find similar, albeit smaller, 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 has an effect of +€0.0092 per euro of capital, with a standard error of €0.0014, 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 48%.[25]

Table 3: Effect on Investment

Dependent Variable	Total Investment			Tangible Investment		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Gross Investment						
Treated×Post	.0083***	.0091***	.0092***	.0058***	.0056***	.006***
	(.0014)	(.0014)	(.0014)	(.001)	(.0011)	(.0011)
Panel B: Net Investment						
Treated×Post	.0083***	.0085***	.0082***	.0056***	.0056***	.0057***
	(.0012)	(.0012)	(.0013)	(.0009)	(.00092)	(.00097)
Fixed Effects						
Firm	✓	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓	✓
Industry × Year	—	✓	✓	—	✓	✓
County × Year	—	✓	✓	—	✓	✓
Time Varying Controls	—	—	✓	—	—	✓
Observations	1,026,752	1,026,752	1,026,752	1,026,752	1,026,752	1,026,752

This table shows the effect of the 2013 dividend tax increase on investment. Total investment includes tangible (property, plant and equipment) and intangible (software, patents, licences) investment. Net investment is total investment minus depreciation. Pre-reform sample means for the dependent variables are 0.068 (total gross investment), 0.053 (tangible gross investment), 0.007 (total net investment) and -0.0003 (tangible net investment). All variables are scaled by total capital in 2011. Time-varying controls are: liquidity (cash over lagged assets), leverage (total debt over lagged assets) and profitability (operating income over lagged assets). Time-varying controls are the value of the control before the shock interacted with year fixed effects. Standard errors are clustered at the firm level. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Employment. 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 A3. We report the results when we look at employment in full-time equivalent terms, average wages, and labor shares (defined as the sum of wages and salaries, payments for employee benefit programs and contributions to pension, all divided by the firm value-added). We measure 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

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25. The elasticity is estimated as follows: $(0.0092/0.068)/(0.3/0.845)$. The confidence interval is obtained by replacing 0.0092 by 0.0011 +/- 1.9 times the standard error of 0.0014.

fixed effects: industry-by-year, size bin-by-year and county-by-year. We find that employment increases by 1.2% (column 2), average compensation does not change, and the labor share slightly increases relative to the pre-reform sample mean by 2.6%.

Within-treatment identification. Our identification does not require firms to randomly choose their legal status but only requires that treated and control groups have parallel trends absent the shock, and we provide graphical evidence that they have no differential trends before the shock in Figure 4 and Figure 5. However, it is possible that even within the same size bin, county and industry, SARL (treated) firms were exposed to other additional shocks after 2013 that would explain the divergence between treated and control firms post 2013.

To address this potential threat to identification, we exploit that the fact there is variation even *within* the treated group of how exposed firms were to the reform. We isolate a sub-group of firms within the group of treated firms that used to pay a lot more dividends before the tax increase and split firms into two groups, high and low-dividend payers pre-reform. We can then use SARL firms with low-dividend payment pre-reform as a new control group and therefore compare firms with the *same legal status*. Such a strategy controls for all the additional differences specific to SARL firms that could potentially explain their different investment behaviors after 2013 that are not related to the dividend tax reform studied in this paper.

To implement this strategy, we compute the average amount of dividends paid before the reform for the treated group of firms and split firms along the sample median. We create a dummy variable "*High-Dividends Pre-Reform*" that takes the value one if the firm's pre-reform mean dividend over capital ratio is above the sample median and zero otherwise, and we interact all explanatory variables and fixed effects with this dummy. We then re-run our main regressions as:

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

Since we now use within-treated-group variation (between ex-ante high and low-dividend payers), we can include a set of fixed effects treated-by-year to account for time-varying unobserved heterogeneity across firm legal status and ensure that the parameter of interest β is solely estimated by comparing firms with the same legal status. In this case, β gives the marginal difference in outcomes between

high-dividend paying treated firm relative to low-dividend paying treated firms.[26]

Table 4 reports the results. In the odd columns we show the effect when we only compare treated and control groups using the baseline specification (equation 1). In the even columns, we only exploit within group variation, across high and low-dividend payers pre-reform. For each outcome (dividends, total investment, tangible investment), the interaction *Treated×Post×High-Dividends Pre-Reform* is highly significant and either of larger magnitude (for dividends, column (2)) or almost equal magnitude (for investment, columns (4) and (6)) as the baseline coefficient. This implies that almost all the baseline effect is driven by firms more exposed to the reform that were paying more dividends prior to the tax hike, which strongly attenuates the risk that our results are driven by other concurrent shocks that could have differentially affected SARL (treated) or SAS (control) firms.

Table 4: Effect on Investment: Within Treated Group Comparison

Dependent Variable	Dividends		Total Investment		Tangible Investment	
	(1)	(2)	(3)	(4)	(5)	(6)
Treated×Post	-.032***		.0091***		.0056***	
	(.0025)		(.0014)		(.0011)	
Treated ×Post × High Dividends Pre-Reform		-.062***		.0067***		.0046**
		(.0038)		(.0028)		(.0021)
Fixed Effects						
Firm	✓	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓	✓
Treated × Year	—	✓	—	✓	—	✓
Observations	1,028,508	1,028,508	1,028,508	1,028,508	1,028,508	1,028,508

This table shows the effect of the 2013 dividend tax increase on dividends and investment. Odd columns (1, 3, 5) report the baseline effect, even columns (2, 4, 6) reports the results when we estimate the effect of the reform *within* the treated group. *High-Dividends Pre-Reform* is a dummy variable that equals one if the average of dividend payments (measured as dividends over capital) before the reform is above to the sample median. All the fixed effects are interacted with the new variable *Treated×Post* is no longer estimated as it is absorbed with the new set of treated-by-year fixed effects. Standard errors are clustered at the firm level. ***, **, * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

5.2 External validity and robustness

All the results are local and specific to the sample in which they are estimated. In particular, they might not apply to publicly listed firms and firms outside the 95th

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26. Note that in this case, we can no longer estimate *Treated×Post* as it is colinear with the treated-by-year fixed effects. $Post \times High\ Dividends_i$ is also not estimated as it is colinear with the interaction $High\ Dividends_i$ and the year fixed effects.

percentile of the size distribution. We conduct a series of tests to see the extent to which the results are robust to alternative sample definitions and how much they can be generalized. To do so, we start with the universe of firms, including publicly listed firms, and estimate equation 1 for dividends and total investment and report the results in Appendix Table A4.

Second, we progressively restrict the sample either from below (removing the bottom 5%) or from above (removing the top 1%, then top 10%). Across all sample selections, the results appear very stable indicating they appear to reflect the response of the whole economy. Of course, we recognize that extrapolations would require more research to support such out-of-sample conclusions, in particular for listed firms, as due to the design of the reform, they do not have any treated firms in their sub-sample.

5.3   Discussion of magnitudes

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 firms to increase their investment by 0.38%.

Another way to interpret the economic magnitude of this tax-induced change in investment is to compare it with the drop in corporate earnings triggered by the tax hike. On average, firms reduce their payouts by €0.03 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.[27]

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. Previous estimates exploit different sources of variation from different sets of firms and shocks, but subject to these caveats, the comparison suggests that our estimate is large but not implausible. Lamont (1997) finds that for every $1 in oil cash-flow, non-oil investment rises $0.12. Rauh (2006) finds an elasticity of 0.6 by exploiting a discontinuity in funding rules for defined benefit pension plans. 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 investment cash-flow coefficients of around $0.15.[28]

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

28. 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.

Therefore, the elasticity of 0.30 appears in the middle of the cash-flow shock to investment sensitivity estimated by the literature.[29]

Even if the tax increase leads to higher *quantity* of investment, it does not tell us anything about the *quality* of this investment, i.e. whether these new investments are economically profitable or essentially "wasteful," which is a classic caveat of the literature studying firm investment.[30]

It is unfortunately impossible to have data on the return to specific investments. However, we explore three dimensions suggesting that treated firms use the tax-induced increase in 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 5.4. 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.

5.4 Effect on firm performance

We investigate how the increase in dividend taxes and investment affects firm performance in Table 5. Following the tax hike, sales (column 1) and value-added (column 2) of treated firms increase by 2% and 1.7% respectively, while productivity and profit margins are unaffected (columns 3 and 4).

In column (5), we look at the probability the firm disappears from the sample in year $t + 1$ and find that a higher dividend tax rate reduces the probability of exit. To estimate this linear probability model, we keep the firm in the data until 2018 (even if it exited before) create the dummy variable *Exit* that equals one for all years after the firm exited. 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

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29. We view these comparisons as informative, although we want to be cautious as these are not one-to-one comparisons. The reform did relax firms' credit-constraints in the sense that treated firms accumulate more cash in their balance sheets over time thereby increasing the amount of internal liquidity they can immediately tap into when investment opportunities appear. However, this shock is different from most of the papers cited above, as this increase in liquidity is not coming from a "helicopter drop" of cash, but instead from dividends they could have chosen not to pay in the first place. We provide a detailed discussion of the implications for the interpretation of our results and for the quality of this tax-induced investment and welfare in Section 8.

30. For instance, studying an episode of accelerated depreciation in Germany, Eichfelder, Jacob, and Schneider (2020) finds suggestive evidence that in their context, tax incentives in the form of bonus depreciation lowered the quality of investment.

suggest that the tax-induced higher investment allows firms to expand their size without reducing their efficiency.

Table 5: Effect on Firm Performance

Dependent Variable	Log(Sales)	Log(VA)	Productivity	Profit margin	Prob(exit)
	(1)	(2)	(3)	(4)	(5)
Treated×Post	.021***	.019***	-.00088	.013	-.0063***
	(.002)	(.0025)	(.002)	(.032)	(.0015)
Fixed Effects					
Firm	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓
Observations	1,028,508	1,028,508	1,028,508	1,028,508	1,263,537

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(value-added) on capital and labor (in logs). In column (5) *Exit* is a dummy variable that equals 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 the 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 happens 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

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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 still possible, 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 for some personal spending (e.g. personal car, personal home) using the firm's money.

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 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-by-county level. We then sort firms into terciles of investment opportunities and reestimate equation 1 over each sub-sample.

Table 6 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 by comparing high and low-dividend payers before the reform. We find that there is no difference between these two groups in their investment response in the first tercile of investment opportunity (column 4). The difference becomes significant and economically meaningful between the two groups of entrepreneurs exposed to the tax hike when investment opportunities increase (columns 5 and 6). 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.

6.2   Marginal returns on capital

Another approach to study if the reform led to wasteful investment is to examine 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. We then test if the reform has differential effects for firms with a high level of marginal return on capital (MRPK), namely firms that are likely to be capital constrained.

Table 6: Sensitivity by Investment Opportunities

Dependent Variable	Total Investment					
Investment Opportunity Bin	1st	2nd	3rd	1st	2nd	3rd
	(1)	(2)	(3)	(4)	(5)	(6)
Treated×Post	.003	.0063***	.015***			
	(.0019)	(.0023)	(.0031)			
Treated ×Post				.00002	.0083*	.023***
× High Dividends Pre-Reform				(.0038)	(.0046)	(.0064)
Fixed Effects						
Firm	✓	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓	✓
Treated × Year	—	—	—	✓	✓	✓
Observations	326,006	325,951	326,017	326,006	325,951	326,017

This table shows the effect of the 2013 dividend tax increase when firms are sorted by their investment opportunities. We compute investment opportunity by using a leave-one out mean at the industry-county level of investment over the post period and sort firms into terciles, 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 Pre-Reform* is a dummy equal to one if the firm dividend payouts over capital is below the sample median and to zero otherwise. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Under the assumption that firms' production functions are Cobb-Douglas, the firm 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 α_j^k, $\frac{Revenue_{it}}{K_{it}}$ is 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 terciles within each industry and reestimate equation 1 over each sub-sample.

Columns (1) to (3) of Table 7 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 1.3% of capital, three times more than firms in the first tercile.

We also compare the investment response between high and low-dividend payers prior to the reform. 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 the group of treated firms increases,

except for firms in the first tercile of MRPK.

Note that because all the effects are estimated with size bin-by-year fixed effects and MRPK is computed within industries, it is unlikely that our effects are driven by the fact that firms with limited capital (for instance because they are in industries with mostly intangible capital like consulting) react more to the reform and have higher MRPK. The effects are *not* estimated by comparing firms in the consulting sector versus firms in a manufacturing sector requiring large plants, but rather by comparing firms in the same narrowly defined industry. Nonetheless, in Appendix A5, we replicate the results when we either control for capital directly or when we interact capital with the *Post* dummy variable.

Table 7: Sensitivity by Ex-ante Marginal Returns on Capital

Dependent Variable	Total Investment					
Ex-ante MRPK Bin	1st	2nd	3rd	1st	2nd	3rd
	(1)	(2)	(3)	(4)	(5)	(6)
Treated×Post	.0044**	.0088***	.013***			
	(.002)	(.0021)	(.0031)			
Treated ×Post				.00083	.0069**	.023***
× High Dividends Pre-Reform				(.00071)	(0.0025)	(.0064)
Fixed Effects						
Firm	✓	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓	✓
Treated × Year	—	—	—	✓	✓	✓
Observations	343,251	342,498	341,456	343,251	342,498	341,456

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 Pre-Reform* is a dummy equal to one if the firm dividend payouts over capital is below the sample median and to zero otherwise. 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 dividend payments (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 payments 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 leading to 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.

However, as we discuss in more detail 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, our results show that in partial equilibrium, the reform leads to new investment that are likely to have been profitable and therefore increase the amount of wealth created by treated firms.

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

6.3 Looking for the old view

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 be binding for this specific sub-group of firms, which could be problematic in the long-run because these firms tend to be younger and more dynamic.[32] This will happen 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 in Appendix A.6.

First, we split firms along bins of age. In firm life cycle models (Sinn, 1991), young firms start life cash-constrained and finance investment via equity issuance before becoming mature and generating enough cash-flows to finance their invest-

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32. Note that Table 7 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.

ment internally. We estimate equation 1 separately for each quintile of age and report the point estimate for each bin in Table A6. For each within-quintile estimate, the reform always has a precise, positive effect and displays no upward or downward trends in point estimates, implying no differential effects on the younger, more equity-dependent firms. Second, we do a similar exercise with size and again find very similar point estimates.

Our third proxy is the probability that a firm issues equity, following Auerbach and Hassett (2003). We create a dummy *New Equity Issuance* that equals 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 a set of firm controls. We then split the sample into quintiles and again estimate equation 1 on these subsamples and failed to find any drop in investment, even for the firms most likely to be more equity-dependent (Table A7).

Fourth, 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 0.023, meaning that every euro of capital has been financed with only 2.3 cents of equity. Table A8 shows that across these different bins, the effect of the tax increase on investment is always positive and statistically significant.

Fifth, we look at the number of times a firm issues equity during the sample period (Table A9). Because instances of equity issuance are rare, we split the sample into only two categories: firms that never issue equity (column 1) and firms that issue 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 issuances (column 5). As with other proxies of equity-dependence, we find that a higher dividend tax rate always increases investment for the various subsamples.

We want to stress here that truly measuring equity-dependent firms is impossible for any empiricist and we have to rely on imperfect proxies. Yet taken together, these results are inconsistent the "old view" theory of dividend taxation

that predicts that young, equity-dependent firms should reduce their investment following an increase in the dividend tax rate.[33]

Overall, the distributive effects of the reform point to 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 results indicate that the increase in the dividend tax rate has both a positive effect for the investment of the average firm and for the reallocation of investment across firms.

7   Additional margins of adjustments

Since treated firms after the tax hike reduce their dividends payments and only 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 firms 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 firms could adjust other elements of their balance sheets and in particular their current assets (customer credit, cash, and short-term investment holdings) and their current liabilities.

7.1   Tax avoidance

Because the tax reform only affected entrepreneurs owning at least 50% of the capital of the treated firm type, 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 paying themselves a dividend first and then buying the good or service.[34]

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33. 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. We do not explore this "extensive margin" in this paper because it would require a completely different estimation strategy, and we leave this question for future research. There are several reasons to believe however that the reform had limited effect on the entry of new firms, as new firms 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 2) also supports this hypothesis.

34. Classic examples of such behaviors include declaring the personal housing rent as a "work office" or personal dinners as "work dinner." Another would be that the CEO can no longer pay a dividend to buy a fancy car that impresses her friends, but she could use the cash to redesign

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 assets" (*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 and a fine of €375,000. Should the company be on the verge of bankruptcy, the CEO also becomes personally liable for the losses of the company and no longer benefits from limited liability protection (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.

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 on "raw materials," "intermediary consumption of goods," and "intermediary consumption of services" (which includes office rent, cars rentals, external consultants, etc.). The data also provides firm value-added, defined as total revenues minus all the costs related to production.

We express each variable as a percentage of the firm 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 sales. This increase in intermediary consumption should lead to a decrease in the fraction of euros of revenues transformed to euros of value-added.[35]

For each variable, we estimate equation 1 and report the results in Table 8. 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 precisely estimated zeros reflecting

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the lobby of her firm to impress the same friends.

35. We do not scale by capital in 2011 as in the other specifications because as we have shown, treated firms are growing due to the reform so this will create a mechanical increase in their consumption of intermediary goods.

changes of around 0.015% of revenues. If anything, the share of intermediate services 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 relabel some expenses and increase the firm's "discretionary expenses" for their personal benefit appears to have limited support in the data. 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. It is well possible that before the reform they were optimizing as much as possible and have simply no more leeway after the tax increased.

Some of the investment results might be consistent with this income-shifting hypothesis, but we view this interpretation as implausible. For instance, if the owner-manager buys a company car, it will be recorded in the data as an investment. However, this explanation would imply that treated firms should increase their investment irrespective of their ex-ante level of MRPK or their ex-post investment opportunities, in particular when they used to pay a lot of dividends before the tax-hike. The fact that entrepreneurs facing the tax increase prefer to leave the cash in the firm instead of investing suggests that while not impossible, these types of wasteful investments are unlikely to have increased after the reform.

Table 8: No Evidence of Income-Shifting

Dependent variable / Sales	Intermediate Goods	Intermediate Services	Raw Materials	value-added
	(1)	(2)	(3)	(4)
Treated×Post	-.00019	-.0015**	.00012***	.0015***
	(.0004)	(.000061)	(.00004)	(.00044)
Fixed Effects				
Firm	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓
County × Year	✓	✓	✓	✓
Observations	1,028,508	1,028,508	1,028,508	1,028,508
Mean LHS	.19	.13	.24	.43

This table shows the effect of the 2013 dividend tax increase on different types of intermediate consumption by the firm. Intermediate services include rents, consulting, vehicle rental 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 adjustments

Entrepreneurs 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.[36] They could also use this extra cash to repay their suppliers faster, increasing their net working capital (gross working capital minus short-term liabilities).

To trace out the change in net working capital, we estimate equation (1) with different dependent variables, where each dependent variable is an item of the firm balance sheet scaled by capital. We also decompose and report the *Post* dummy into four dummies for each year after the reform for full transparency of the dynamics of the effects.

Table 9 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 (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 other firms in the economy.

8 Discussion of theory

8.1 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

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36. 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's working capital.

Table 9: Balance Sheet Adjustments

Dependent variable	Net Working Capital/ Capital	Liquidity/ Capital	LT Debt/ Capital	Supplier Debt/ Capital	Customer Debt/ Capital	Supplier Debt/ Sales	Customer Debt/ Sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treated×Reform(t+0)	.0077	.0094	.0068	.015***	.036***	.00068***	.0017***
	(.01)	(.0085)	(.0097)	(.0054)	(.0078)	(.00027)	(.00037)
Treated×Reform(t+1)	.042***	.031**	.0098	.031***	.049***	.0013***	.0018***
	(.015)	(.013)	(.0097)	(.017)	(.011)	(.00038)	(.00052)
Treated×Reform(t+2)	.071***	.036**	.0048	.022***	.048***	-.000033	.0016***
	(.018)	(.015)	(.0097)	(.0085)	(.013)	(.00043)	(.00061)
Treated×Reform(t+3)	.099***	.057***	.0058	.038***	.05***	.0014***	.0014**
	(.018)	(.016)	(.0067)	(.0086)	(.013)	(.00044)	(.00061)
Treated×Reform(t+4)	.11***	.084***	.0092	.055***	.039***	.003***	.0016***
	(.014)	(.012)	(.0097)	(.007)	(.01)	(.00035)	(.00049)
Fixed Effects							
Firm	✓	✓	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓	✓	✓
Observations	1,026,568	1,026,568	1,026,568	1,026,568	1,026,568	1,028,508	1,028,508

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.

finance and the magnitude of liquidity-constraints[37] (e.g. Sinn, 1991); (ii) the value of wasteful investment by the manager[38] (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 affect equity issuance and investment, which themselves eventually affect dividends when the additional investment pays off. The timing of dividend

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37. The difference between cash-rich and cash-poor firms corresponds to the distinction between the "old view" and "new view" of dividend taxation. In the "old view" investment will decrease because it is financed with new equity issuance and higher taxes raising the cost of equity (e.g. Harberger, 1962, Feldstein, 1970, Poterba and Summers, 1983). By contrast, in the "new view" higher taxes reduce 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).

38. 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).

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. In equilibrium, investment opportunities arise randomly and future dividend payments are discounted at a higher rate than the market rate, so 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. We do find that consistent with this model, treated firms invest relatively more when they have higher investment opportunities, particularly so when they distributed a lot of dividends prior to the reform.

Our results show that in equilibrium, many firms pay dividends despite being financially constrained, i.e. do not leave enough liquidity in their firm balance sheet to overcome financial frictions when profitable investment opportunities arise. This implies that the value of one euro outside the firm is perceived as 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 that 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 a "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. Managerial myopia, imperfections in risk markets that may result in households being even more credit rationed than firms, or simply the accumulated retained earnings tax, which punishes firms for holdings excessive cash balances.

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 also likely that a combination of all these explanations are at play in the data.

8.2   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 into 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 into a new firm, or depositing them into their saving accounts, which then increases 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 benefits 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 setting.

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 then saved in 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.

Finally, the reform leads treated firms with high returns to capital to invest more, which in partial equilibrium implies a reduction in misallocation. Therefore, 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 the last four decades. At the same time, it is becoming harder to clearly distinguish 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, which resulted in a three-fold increase in the dividend tax rate. We show that led treated firms to swiftly cut their dividend payments, resulting in higher liquidity retention.

Such 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 firm 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. Taken together, our results suggest that the tax increase led firms to increase the quantity of investment without sacrificing the quality, leading to a reduction in capital misallocation in the economy.

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Appendix

A.1 Detailed differences across SAS and SARL

Differences for the firm. The differences and similarities 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 + ≥ 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 are many 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 that they do not necessarily trust, or for unsophisticated entrepreneurs. SARL by-laws are almost "plug and play" and do not require a lawyer to design them.

- As a consequence, while SARL firms are constrained to only issuing ordinary shares, SAS firms can issue all type of share classes (e.g. preferred, ordinary).

- SAS also have 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 on the number of shareholders while SARL are capped at one hundred. In practise this constraint rarely binds as firms that need to have a large base of shareholders, for instance in prevision of an IPO, adopt the legal status "SA".

What these differences reflect is that how the reform affected the incentives to incorporate as a SAS or a SARL firm is complicated. Indeed, 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.

Payment of the managers in SAS firms. 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 2.5 times 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 collective agreement of their industry and go as high as €65,000 yearly.

Why did entrepreneurs prefer the SARL status before the tax reform?

There are multiple reasons for why the SARL status was preferred despite the lower flexibility regarding access to external financing.

First, the taxation of total compensation might be advantageous for SARL owner-managers when they paid themselves mostly in dividends. Second, the default pension regime is slightly different, with managers of SARL firms facing lower social contributions (but also lower attached benefits). Third, the SARL status provides the possibility for the spouse of the owner-manager to work in the firm and be eligible for social benefits, without having to pay a wage.[39] Fourth,

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39. The spouse only has to pay the social contribution that would be associated with wage the employer would have paid.

the lack of by-laws flexibility can be appealing for many entrepreneurs who do not have legal background and are worried they could be deceived by their other shareholders.[40]

A.2   Discussion of the reform

A.2.1   Why did the reform only impact SARL firms?

There are two main reasons the reform only affected SARL firms:

Reform of independent workers' status.   The first one is related to the status of the owner-manager and the social benefits 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 benefits regime. Independent workers contribute to the "*Régime Social des Indépendants*" (RSI), whereas employees contribute to the French standard regime ("*Régime Général de la Securité Sociale*"). Furthermore, in 2009 another category of independent French workers, the "*professions libérales*" (high skill self-employed) experienced the same change in taxation on their own dividends that affected SARL owner-managers in 2012.[41] One year after the 2012 reform, it was finally extended to another category of independent workers, the agricultural workers. The relationship between these three reforms is that they all concerned independent workers paying social contributions to the same RSI regime.

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 firms are, on average, bigger than SARL firms. In turn SA and SAS firms are more likely to have a higher lobbying power. This appears clearly in 2015 when a parliamentary amendment to extend the tax reform to SA and SARL was rejected following intense lobbying by France's two main employers' organisations. In 2014, a French deputy proposed an amendment to the social security funding law to enlarge the reform to SA and SAS firms which was also ultimately rejected. The amendment specifically stipulates that its aim was to reduce fiscal optimization

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40. This is actually a point that is commonly raised in the different blogs or articles for aspiring entrepreneurs that explains the differences in legal status, with a majority of them advising for the SARL status in case the entrepreneur is not "legally sophisticated."

41. French "*professions libérales*" include lawyers, doctors, notaries, etc.

of SA and SAS owner-managers while ensuring equity between them and SARL owner-managers.[42]

From an article in the leading French newspaper *Le Monde*, we learn that its rejection was the result of an intense lobbying campaign by the two french employers' organizations.[43] The article reports that they lobbied 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 than were SARL firms.

Subsequent reactions to the reform The exclusion of SA and SAS firms from 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," lobbied against it but ultimately failed.[44] The election of Emmanuel Macron generated some hope that the reform would be abolished but it has remained in place.

A.2.2 Details of the reform and kink

The new tax rate did apply to 100% of the dividends paid, but actually only kicked in for dividends accounting for *more* than 10% of the firm nominal share capital owned by the manager and her family.[45] Below this threshold, the payroll tax rate remains at 15.5%. The rational for this kink was that the total compensation of an entrepreneur is a mix of compensation for the labor (and as such should be taxed like any wage) and compensation for the capital (and as such should be taxed like all other capital income). Therefore, the reform essentially introduced the notion that above a certain amount, dividends could not be considered as compensating the capital invested by the entrepreneur (hence the ratio set relative to the value of equity owned by the entrepreneur) but instead, was necessarily the remuneration of labor.

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

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

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

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

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

receives a dividend of €50,000. She will have to pay the following payroll taxes:

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

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: $15.5\% \times 50,000$ = €7,500 instead of €19,950.[46]

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. We also directly test if treated firms increase their share capital after the reform and find no difference between treated and control firms. This can also be explained by the fact since we are looking at private firms, increasing the amount of share capital is difficult for these firms as there is no centralized market on which they can issue new equities.

It is important to note that share capital is *not* equivalent to total equity but only accounts for a subset of it. In particular, there is *no mechanical relation* between investment or retained earnings and share capital. Firms can increase their investment and accumulate more retained earnings without it having any effect on the amount of share capital in the firm.

Kink optimization. Figure A1 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

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46. 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.

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.[47]

Figure A1: Dividend Payment Around the 10% Threshold of Share Capital
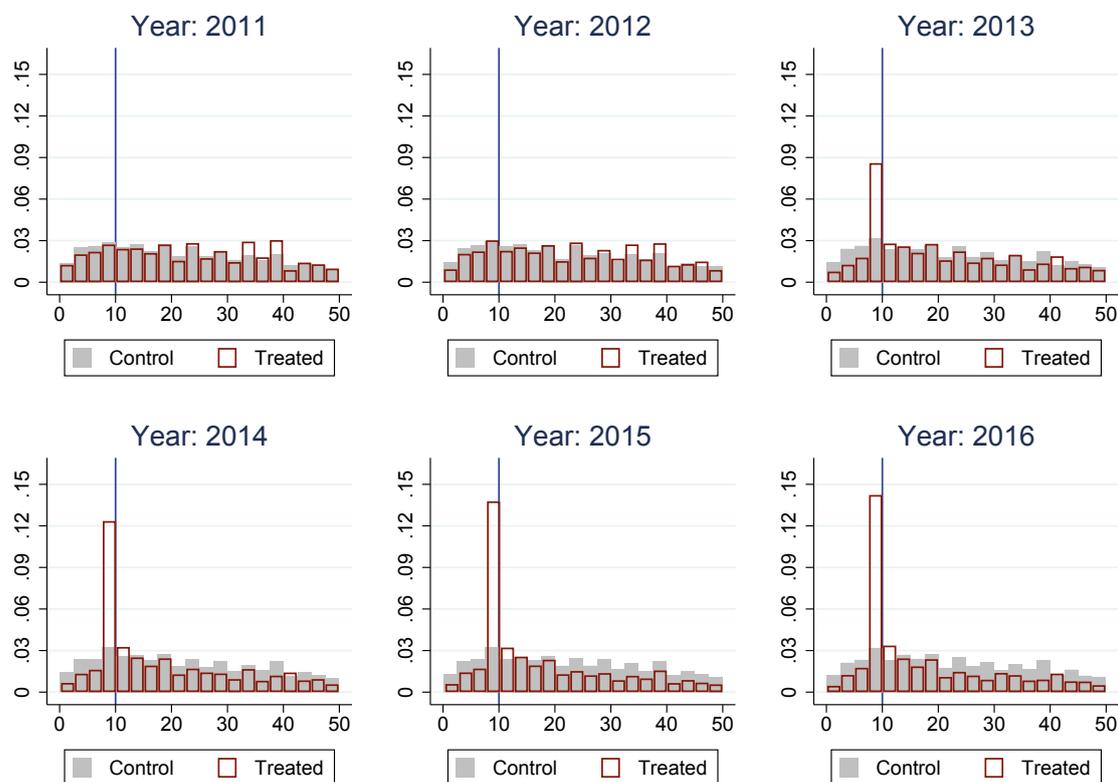
The figure plots the distribution of the ratio of dividends over share capital for the years 2011–2016 for firms paying dividends. The x-axis is the ratio dividend/share capital (in percentage). The y-axis is the fraction of firms in a specific bin of dividend/share capital. "Treated" firms are firms 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 not affected (SAS).

A.2.3   Interaction with taxation around liquidation

The reform did not affect the taxation regarding liquidation and both SARL and SAS firms are exposed to the same taxation. 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

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47. 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.

2.5% of the net value of assets. The distribution of the remaining money is then taxable at the appropriate dividend tax rate.[48]

A.2.4 Additional reforms around this period

Following the election of Francois Hollande, several reforms related to the taxation of individuals and firms were implemented. The two main reforms are:

- The cancellation of the flat tax on capital income. The reform is described in detailed in Aghion, Akcigit, Lequien, and Stantcheva (2017). Following the reform, all types of capital income (dividends, bonds and capital gains) became taxed through the progressive income tax schedule only while before that, it was possible for individual to opt in for a flat-tax. This reform led to an increase in the marginal rate faced by the most affluent households and could potentially explain why aggregate dividends went down after 2013. From 2008 to 2012, taxpayers receiving dividends have the choice between progressive income tax and a flat-rate withholding tax called *Prélevement forfaitaire obligatoire* or PFL in France. The 2013 reform abolishes the PFL and reintroduces dividends into the progressive income tax schedule, leading to a potential increase in the level of taxation for some (well-off) taxpayers. In 2018, the introduction of the single flat-rate tax (PFU) optionally re-establishes a system of flat-rate taxation of capital income and in particular dividends.

- In the same period, the government also implemented a tax credit aimed at boosting competitiveness and employment, named the CICE (standing for Competitiveness and Employment Tax Credit or *Crédit d'impôt pour la compétitivité et l'emploi* in French), which is explained in detailed in Malgouyres and Mayer (2018). This tax credit is set proportional to the share of the wage-bill paid to workers under a certain threshold (2.5 times the national minimum wage). Each firm receives a transfer of 4% (raised to 6% since 2014) of the total wagebill that is under the threshold.

While concomitant to the reform analyzed in this paper, these two reforms are unlikely to be important source of biases for two reasons.

First, as they are not specific to a particular legal status and as such, both treated *and* control firms are affected in the same way. They do, however, strengthen

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48. 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.

the importance of having a tight control group and therefore justify the inclusion of multiple fixed effects in the baseline specification even more.

Second, we show in Table 4 that we find very similar results when, instead of exploiting the distinction between SARL and SAS, we exploit *within* legal status differences and compare high dividend payer SARL to low dividend payer SARL and include legal status×year fixed effects, to net out any additional differences existing between SARL and SAS.

A.3   Discussion of tax incidence

How should wage earners incorporate expected social benefits into their labor supply decision? Early empirical studies have found that social security contributions (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 benefits 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 guaranteed by the government is very limited. The

best estimate we have comes from Finkelstein, Hendren, and Luttmer (2019) who, using the Oregon Medicaid Experiment, estimate the recipients value Medicaid benefits at around 50%. Since this estimation of the benefits valuation by recipients is made in a very specific context: Medicaid in the U.S. and might therefore not be representative for French entrepreneurs.

A.4   External Validity

A.4.1   Comparison with Europe

Eurostat, the European statistical office in charge of harmonizing data across European countries, produces many statistics to help us understand how France compares to the rest of Europe. We use data from structural business statistics (SBS), which gathers administrative data from members of the European Union and are used as a source of information to understand the detailed structure, economic activity and performance of businesses across the European Union.

We start by plotting the distribution of firm size for each European economy, which can be split into three categories: small firms (fewer than 50 employees), medium firms (between 50 and 250 employees) and large firms (over 250 employees). Figure A2 shows the distribution when we sort countries in ascending order of the share of small firms in the economy.

Two facts appear. First, the distribution of small and medium firms across countries is pretty similar, with small firms accounting for around 45% of the distribution in the EU. Second, France's fraction of small (40%) and medium (20%) firms is very representative, implying that conclusions draw on the French economy when looking at the population of small and medium size firms are likely to be valid for a large part of the European economy.

We can also examine the sectoral composition of France and the average of the European Union in Figure A3 and find very similar distributions in economic production.

A.4.2   Firm Size Distribution and Zipf's Law

A well established empirical regularity in economics (and in other disciplines) is that the distribution of different variables follows a power law (see Gabaix (2016) for an overview). Power laws take the form $Y = aX^{\beta}$, where β is called the power law exponent. Such laws imply that if X is multiplied by a factor of 10, then Y

Figure A2: Firm Size Distribution in Europe
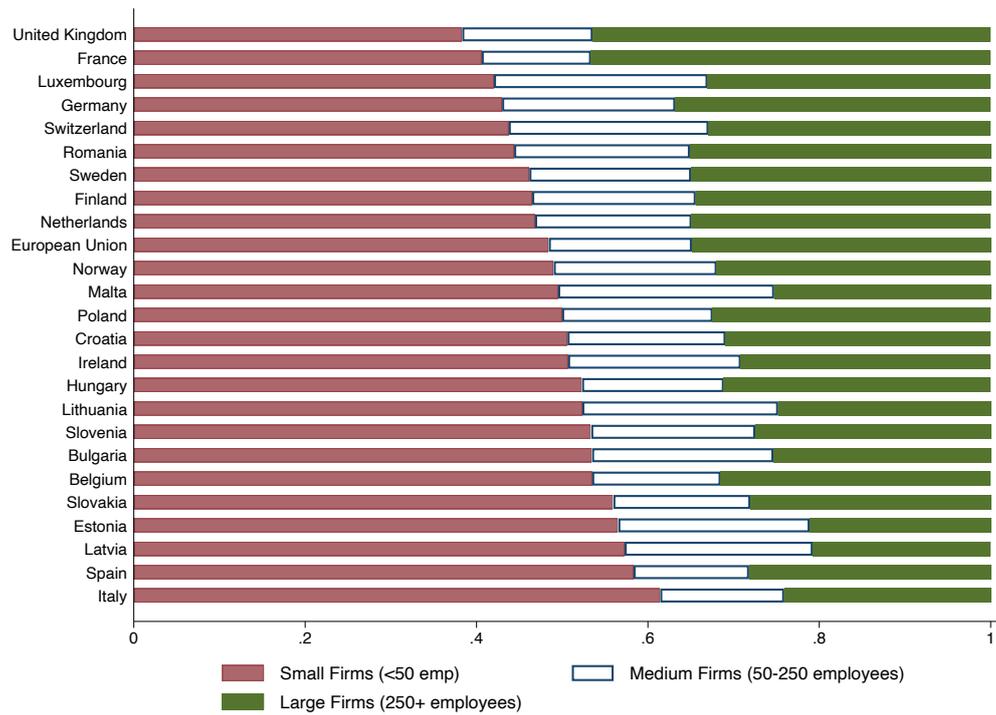
This figure plots the distribution of firm size across different European countries. Data comes from Eurostat.

is multiplied by a factor 10^{β}.

To estimate the value of β, we can simply estimate the following equation:

$$log(Rank) = \alpha + \beta \, log(Size)$$

where $Rank$ is the position of the firm in the distribution and $Size$ is the number of employees. When the slope (or power law exponent) is equal to one, we say that the distribution follows a Zipf's law, based on a name of the Harvard linguist who first gathered evidence of the existence of such distribution. To estimate the relation for France, I follow Axtell (2001) who estimates it for the U.S. and put firms in "bins" according to their size as measured by their number of employees. I then regress the log rank on log size and obtain a β of -1.026 (s.e. = .107 and $R^2 = 0.92$), very close to the slope estimated by Axtell who finds $\beta = $ -1.059.

Figure A3: Sectoral Composition: France vs Europe
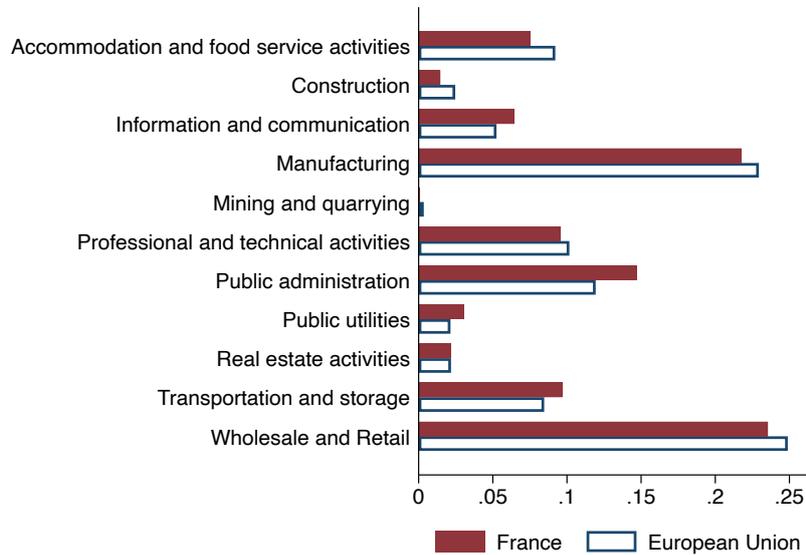
This figure plots the distribution of economic activities across sectors for France and the average of the E.U. Data comes from Eurostat.

Figure A4: Firm Size Distribution: Zipf's Law for France
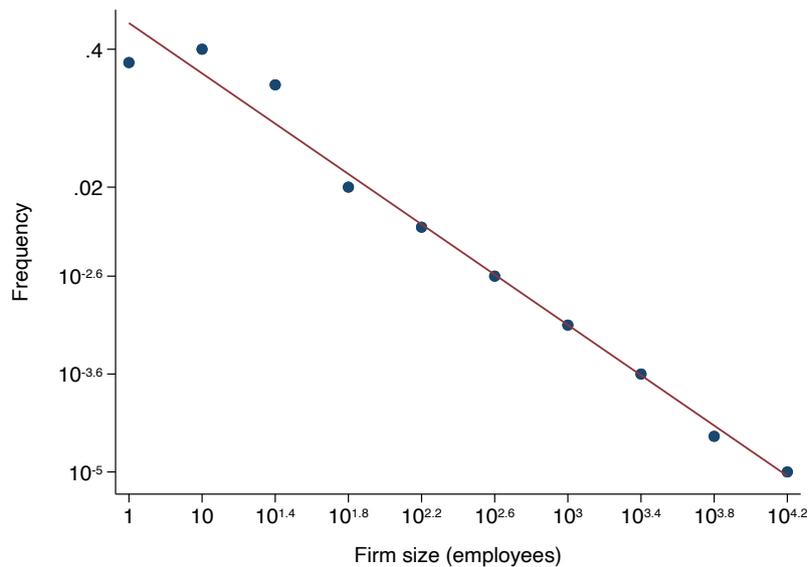
This figure plots the log frequency over log size of firms in France for 2009.

A.5 Shareholder Data

SARL firms are affected by the reform if the manager owns, jointly with its family, at least 50% of the equity. We use the shareholder data in Amadeus to assess how often this is is the case.

We start with the shareholder data using the Amadeus CD of 2012 to ensure that we are not missing some firms.[49] The data are at the firm-individual level and reports the share of stocks that a given individual owns of the firm.

BvD compiles information about shareholder composition and managerial team from a variety of sources. Because the coverage is far from perfect (around 40% of firms) and the data accuracy about the exact shareholder composition is likely to be lower than for the administrative tax files, we view this information as mostly suggestive and do not use it in our analysis.

We start by summing all the stocks and dropping firms for which we cannot recover at least 90% of the total equity. This removes 25% of the firms in the Amadeus data, leaving us with roughly 30% of the firms in the French economy. We then need to construct the total holding at the family level, as the reform defines "majority owner" not at the shareholder level but at the family level. To do so, we exploit the fact that the data provides the name of the shareholder as well as her type (e.g. "individual" or "government owned"). We extract the last name of each individual for individual shareholders and sum the amount of equity at the family level.[50]

As an example, we can see in the data that the firm with the siren 016650343 has four shareholders: Hubert Chassy (holding 24% of the firm), Bernard Chassy (holding 20% of the firm), Michel Chassy (holding 16%) and Patrick Chassy (holding 40%). So while individually, none of them are the majority shareholder, the Chassy family together owns 100% of the firm.

This procedure allows us to identify firms with a majority shareholder (defined at the family level). Around 95% of firms in our sample have a majority owner. Note that this not necessarily imply that 95% of SARL are affected by the reform, as it could be the case (even though quite unlikely) that the family owners have appointed a *professional* manager who is outside the family. To test if this is the case or not, we need to merge the shareholder data with another

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49. One well-known problem with Amadeus data is that it suffers from serious survivorship bias as Bureau Van Dick (BvD) removes firms that have been inactive in the dataset after 10 years. Using the 2012 CD implies that inactive firms will be kept up to 2022 ensuring the analysis of firms around the reform does not suffer from the survivorship bias.

50. We consider shareholders are individuals if they belong to the following categories: "Employees/Managers/Directors", "One or more named individuals or families", "Self ownership."

dataset which reports all the top management composition of the firm, including their title (which contains 4101 distinct categories) and their names. We harmonize the function and consider that someone is a manager if she belongs to one of the following categories: business manager, associate business manager director, president, associate business manager, co-business manager, business operate, partner, chairman of the board of directors, chairman of the executive board, chief executive officer, independent director, member of the board and president, director, associate business manager. For all firms we are able to identify at least one person who is potentially the true manager of the firm.

We then match on the name with the shareholder data to check if the name of the manager appears also among the name of shareholders (and therefore if the firm is run by an *owner*-manager). Because name matching is always tricky and subject to error, the procedure we use is the following. We start by cleaning obvious typos in first name as much as possible (e.g. "Ardien" or "Adrine" becomes "Adrien".) and then compare all firms in the shareholder data with all firms in the manager data and use string distance.

We then match these data with our sample coming from the tax-files. We manage to match slightly over 40% of observations. We report below some statistics for shareholders. The bottom line is that consistent with the statistics reported by the French statistical office, the over 95% of SARL firms is operated by an owner-manager, meaning that the approximation of using *all* SARL as the treated group is not an important source of noise.

Table A2: Summary Statistics on Shareholders

	SARL			**SAS**		
	Mean	s.d.	p50	Mean	s.d.	p50
Nb of shareholders	4.54	3.10	4	4.52	2.9	4
Largest shareholder	0.71	0.26	70	0.69	0.25	69
HHI Share	0.67	0.29	0.58	0.65	0.22	0.60
Has a majority owner	0.96	0.20	1	0.92	0.22	1
Has an owner-manager	0.95	0.18	1	0.88	0.22	1

This table reports summary statistics for firms for which we can identify their shareholders. Data from Amadeus BvD. "Largest shareholder" is the fraction of shares own by the largest shareholder. "HHI share" is the HHI of shares across all the shareholders of the firm.

Appendix Tables

Table A3: 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	✓	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓	✓
Observations	1,028,508	1,028,508	1,028,508	1,028,508	1,028,508	1,028,508

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 logs. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A4: Robustness

	Investment	Dividends	Sample
Treated×Post	.011***	-.034***	No restriction
	(.0012)	(.0025)	
Treated×Post	.012***	-.032***	Drop bottom 5%
	(.0012)	(.0025)	
Treated×Post	.01***	-.032***	Drop top 1%
	(.0012)	(.0025)	
Treated×Post	.0094***	-.031***	Drop top 10%
	(.0013)	(.0024)	

This table shows the effect of the 2013 dividend tax increase for different sample selections. All specifications are estimated as equation 1 with size bin, county and industry by year fixed effects. Restrictions are based on the asset distribution in 2012 and include both listed and private firms. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A5: Sensitivity by Ex-ante Marginal Returns on Capital

Dependent Variable	Total Investment					
Ex-ante MRPK Bin	1st	2nd	3rd	1st	2nd	3rd
	(1)	(2)	(3)	(4)	(5)	(6)
Treated×Post	.0042**	.0078***	.015***	.0035**	.0073***	.013***
	(.002)	(.0015)	(.0031)	(.0015)	(.0013)	(.0028)
Log(Capital)	.36***	.38***	.35***	.38***	.4***	.36***
	(.0075)	(.0053)	(.0035)	(.007)	(.0051)	(.0035)
Log(Capital) × Post				-.03***	-.028***	-.014***
				(.0013)	(.0015)	(.0014)
Fixed Effects						
Firm	✓	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓	✓
Observations	343,251	342,498	341,456	343,251	342,498	341,456

This table shows the effect of the 2013 dividend tax increase when firms are sorted by their MRPK (construction explained in Section 6.2). *Log(capital)* is the predicted value of capital after 2012 using a linear regression. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

A.6 Cross section of equity-dependence

Table A6: Cross Sectional Results: Age and Size

Dependent variable	Investment				
Bin	1st	2nd	3rd	4th	5th
	(1)	(2)	(3)	(4)	(5)
Cross Section: Size					
Treated×Post	.011***	.0076***	.011***	.0075***	.011***
	(.0019)	(.0018)	(.0022)	(.0018)	(.0041)
Cross Section: Age					
Treated×Post	.010***	.0086***	.009***	.0085***	.011***
	(.0014)	(.0018)	(.0013)	(.0018)	(.0041)
Fixed Effects					
Firm	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓
Observations	205,691	205,691	205,691	205,691	205,691

This table shows the effect of the 2013 dividend tax increase when firms are sorted by size pre-reform (first row) or by age (second row). We estimate equation 1 for each group separately. Standard errors are clustered at the firm level. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table A7: Equity Dependence: Probability of Issuing Equity

Bin probability equity issuance	1st	2nd	3rd	4th	5th
	(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	✓	✓	✓	✓	✓
Size × Year	✓	✓	✓	✓	✓
County × 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 equals 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 investment, 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 A8: Equity Dependence-Fraction of Capital Financed Through Equity

Bin of Equity Issued / Capital_{2012}	1st	2nd	3rd	4th	5th
Value within bin	.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	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓
Observations	204,376	204,477	204,503	204,482	204,425

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 A9: Equity Dependence: Number of Equity Issuances

# equity issuances	2009–2016		2003–2016		
	0	1	0	1	2
	(1)	(2)	(3)	(4)	(5)
	Total Investment				
Treated×Post	.011***	.0076***	.011***	.0075***	.011***
	(.0019)	(.0018)	(.0022)	(.0018)	(.0041)
	Tangible Investment				
Treated×Post	.010***	.0086***	.009***	.0085***	.011***
	(.0014)	(.0018)	(.0013)	(.0018)	(.0041)
Fixed Effects					
Firm	✓	✓	✓	✓	✓
Size× Year	✓	✓	✓	✓	✓
Industry × Year	✓	✓	✓	✓	✓
County × Year	✓	✓	✓	✓	✓
Observations	205,691	205,691	205,691	205,691	205,691

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 issues (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.