Dividend Taxation and Firm Performance with Heterogeneous Payout Responses

Katarzyna Bilicka* İrem Güçeri†
Evangelos Koumanakos ‡

June 21, 2024

Abstract

We analyze the performance of firms that were differentially affected by an unexpected tax on dividends before the Global Financial Crisis. We use exogenous policy variation for firms with different legal statuses and financial year-end dates to separately identify the policy announcement and implementation effects. We provide causal evidence for a sharp drop in dividends, but zero change in equipment purchases. Treated firms accumulate investment goods that are likely to be owner-manager's personal assets instead of productive capital. At a time of severe liquidity shortage, some of the funds kept in the firm are used to pay back short-term debt. [1]

JEL: H32, H25, G32, G11
Keywords: Dividend tax, firm survival, investment, intertemporal tax arbitrage

* kat.bilicka@usu.edu, *Utah State University, NBER, CEPR and Oxford University Centre for Business Taxation; Jon Huntsman Business School, Logan, UT, United States,*

†Irem.Guceri@bsg.ox.ac.uk, *Oxford University Blavatnik School of Government, CEPR and Oxford University Centre for Business Taxation*

‡koumanakos@eap.gr, *School of Social Sciences, Hellenic Open University*

[1]We would like to thank Kristoffer Berg, Steve Bond, Will Boning, Pierre Boyer, Antoine Bozio, Arthur Guillouzouic, Todd Griffith, Matt Jaremski, Aija Leiponen, Clement Malgouyres, Adrien Matray, Jakob Miethe, Sarah Wolfolds, and Eddy Zanoutene for their comments. Special thanks to Michael Devereux for extensive discussions on our conceptual framework and to Daniela Scur for making the World Management Survey data available to us. We would also like to thank seminar participants at CMU, Cornell, Manchester, NHH, Oxford University Center for Business Taxation, and Utah State University and conference participants at CESifo Public Economics week, ZEW Public Finance conference, CESifo Public Economics conference, and the IIPF congress for their helpful suggestions.

I Introduction

The extent to which capital taxation affects companies' real activity is subject to an ongoing debate in public finance (Alstadsaeter et al., 2014; Alstadsæter et al., 2017; Becker et al., 2013; Moon, 2022; Yagan, 2015). Recent contributions using administrative data from advanced economies suggest heterogeneous and asymmetric real effects in response to changes in dividend taxes. There remain many unresolved questions concerning the causal link between taxation of dividends, the timing of payout reactions, and the type, if any, of investment responses. We build on the recent findings in the literature and ask new questions about the timing, size, and real consequences of the introduction of a new dividend tax, focusing on responses of privately-held firms. As with many policy measures, the introduction of a dividend tax is likely to generate vastly heterogeneous short-term responses by companies.

To our knowledge, we are the first to causally identify the impact of the introduction of a dividend tax, examine the timing of responses, and assess firm outcomes at a time of financial distress. Further, we offer novel results on the mechanisms driving changes in different types of investment and debt within a conceptual framework that highlights the role of private spending within the firm.

In this paper, we set out to explore implications of responses to tax policy in a volatile context. We start with the first-order effects and ask the following questions. Do firms immediately change their payout decisions following the *announcement* of a future dividend tax? We then ask whether the *introduction* of a dividend tax dampens payouts, and if so, whether the tax incentivizes companies to keep funds within the firm and explore what the firms do with the retained funds; whether they accumulate cash inside the firm, invest in productive assets or personal assets, or pay back debt. To answer these questions, we study the introduction of a dividend tax at the 10% flat rate in a setting where a dividend tax did not exist before. We leverage a unique quasi-experiment that applied the new dividend tax immediately on the distributions of some firms (based on financial year-end date) while it applied on the distributions of others at a future date. We find that payout decisions strongly respond to taxation for both groups; the immediately-affected group reduces payouts dramatically, while the later-affected group significantly increases their payouts in response to the announcement of the policy. We then examine the real effects of the policy distinguishing between firms with different dividend payout policies before the reform.

We present a conceptual framework in which we model the behavior of owner-managed

firms that decide on within-firm productive investment, personal spending, borrowing, and dividend distributions to maximize firm value. We allow the owner-manager to distinguish between investment in productive assets and within-firm personal assets such as real estate or vehicles. We derive cost-of-capital expressions for both types of assets and show the effects of dividend taxation: dividend taxation does not affect the user cost of capital for productive machinery and equipment, but it affects the marginal cost of accumulating personal assets within the firm. The owner-manager prefers to distribute dividends in the absence of taxation, but when dividends are taxed, and as the dividend tax rate rises, she increases investment in personal assets from within the firm.

We use the population of company tax returns matched with company accounts at the micro level in Greece over the period 2003 - 2013. To identify the causal effect of the introduction of dividend taxes on the payout decision, we use variation in how this policy affected companies with different legal ownership and with different financial year-end dates in the same calendar year. The dividend tax was introduced in Greece on 25 September 2008 after an announcement event in mid-September 2008 at the Athens Stock Exchange. The reform was a response to the infringement procedure of the European Commission, as the absence of a dividend tax in the Greek tax system constituted a breach of EU Law. The circumstance in which the reform was introduced raises our confidence in the exogenous and unanticipated nature of the reform that we study in this paper. In our benchmark estimates, we compare the dividend payout responses of two types of limited liability corporations: 'Limited by Shares' (SA) legal form and limited liability companies (LLCs). Dividend taxes were first introduced only for SAs, whereas LLCs were initially untreated by the reform, making them a suitable control group for our analysis.

The first set of empirical results that we present leads to two main findings regarding dividend payout responses. First, we show that privately-owned treated firms immediately and significantly reduce distributions.[2] Our result is mainly driven by the extensive margin response, where we show that 7% of companies on which the new dividend tax is levied stop paying dividends right after the introduction of the new tax. Second, we provide novel evidence on heterogeneous responses depending on whether firms are affected by the reform immediately upon its announcement (December year-end firms) or are allowed to declare one more year of tax-free dividends (June year-end firms). In particular, the negative immediate reaction to the reform is driven by firms with December year-ends, while June year-end

[2]We find no significant effect of the new tax on distributions for publicly-traded firms, see Online Appendix B for a discussion. This is in line with the dividend-smoothing policies for listed firms (Fudenberg and Tirole, 1995; Leary and Michaely, 2011).

firms substantially increase the amount of dividends that they distribute in the tax-free year. June year-end firms become 16.6 percent more likely to distribute dividends in the reform year, relative to LLCs before the reform. The magnitude of the total effect, which is the sum of the extensive and the intensive margins, is large, suggesting a 22.5% increase in distributions relative to the pre-reform mean for the control group, and a 12.5% decrease for the immediately-treated (December year-end) firms. These results also provide a first direct empirical test of Korinek and Stiglitz (2009) and are consistent with their theory of intertemporal tax arbitrage, in which anticipated tax increases can accelerate dividend payments.

The strong response that we find in terms of distributions is comparable to the estimates in Jacob and Michaely (2017); Yagan (2015), but larger in magnitude than Yagan (2015). We offer three explanations for this finding. First, our elasticity estimates reflect a short-run response, and the sharp results may dampen in the longer run. Second, it is plausible that an introduction of a new tax is more salient than a change in the rate for a tax that already exists, generating stronger responses to the reform. Finally, the extensive margin responses drive a large part of the impact of the reform, rendering a large average change in distributions. We provide a detailed discussion on how we translate our findings to elasticity estimates comparable to the existing literature in Section V.

In the second part of the paper, we focus on December year-end firms, which are the majority of tax filers in Greece, and analyze what firms do with the funds that they do not distribute after the introduction of the flat tax. First, we consider the overall investment response and we find no average effect of the reform. Our detailed financial data allows us to separate the types of investment that firms have, beyond the split between tangibles and the rest that was explored in the previous literature. We find significant investment adjustments are made using land and buildings, vehicles and furniture (BVF), but not machinery and equipment (Yagan, 2015). This is consistent with our conceptual framework in which land and BVF can be treated as the personal asset, while machinery and equipment are more likely to be the productive asset. We find that the reform induced firms to reduce their short-term leverage, without affecting long-run borrowing, and to locate their money in tax-free reserve accounts, likely to avoid or delay paying the tax altogether.

Privately-held firms have very different motives and behavior in terms of dividend distributions. Most of the existing literature on dividends developed around considerations of firm valuation and asset pricing of the shares of publicly-traded corporations. Privately-held companies are more likely to distribute high dividends relative to their public counterparts. We

complement our results on real responses by analyzing the heterogeneity of these responses depending on high- or low-dividend paying status in the pre-reform period.[3] We find that the strong positive effect on investment in land and BVF is driven by the group that we identify as high-distributors. Those firms also significantly reduce their short-term borrowing. Our results support the view that dividend taxes may incentivize high-distributing owner-managed firms to reallocate money away from high distributions towards investment within the firm. The dividend tax also incentivized both formerly high-distributing and low-distributing firms to keep the funds within the firm and lower their short-term borrowing.

Our findings contribute to the growing evidence on the effects of taxation on payout policy. First, this evidence comes predominantly from episodes of dividend tax cuts. Recent findings on the asymmetric impact of other taxes, such as corporation tax and value-added taxes suggest that companies may respond differently to the introduction of a policy than the way they respond to a rate reduction or the abolition of a tax (Benzarti et al., 2020; Hussain and Malik, 2016). We find that the treated firms in our sample sharply reduce dividend payments relative to control firms after a tax introduction, similar to evidence from the recent body of work by Alstadsæter and Fjærli (2009), Alstadsaeter et al. (2014), Hanlon and Hoopes (2014) and Bach et al. (2023) who show a reduction in dividend payments in response to tax increases.

Both Alstadsæter and Fjærli (2009) and Hanlon and Hoopes (2014) show sharp responses to expected dividend tax increases using data for all affected firms. Their exploration is similar to the variation that we have with our June year-end firms. Unlike our December year-end firms, the June year-end firms had one last opportunity to distribute tax-free dividends after the announcement of the policy but before the policy applied to them. Relative to Alstadsæter and Fjærli (2009), Hanlon and Hoopes (2014), and also Alstadsaeter et al. (2014), our setting has the advantage of: (1) providing a comparison between the responses of the immediately-affected (December year-end) firms and the later-affected (June year-end) firms, and (2) offering a clear control group against which to benchmark the responses of both groups of treated firms. Our setting is also different from the studies in France in two main dimensions: (i) we exploit the timing differences in how the dividend tax affects payout decisions, providing us with a direct test of the intertemporal arbitrage view of dividend taxation following Korinek and Stiglitz (2009); and (ii) we examine changes in different investment types (akin to what Love (2020) does for intangibles).

[3]We use various thresholds for the ratio of dividends-to-profit in the pre-reform period to define high distributions. In the baseline, we assign high distributor status to firms that have a higher dividend distribution ratio than 50% dividends-to-profits.

Second, we find the strongest responses on the extensive margin, with a stark overall effect. Fama and French (2001) explore this margin in their analysis of the trends of US dividends for decades up to the start of the 21st century. Chetty and Saez (2005) and Alstadsæter and Fjærli (2009) document extensive margin responses in before/after studies of the US 2003 tax cut and Norwegian dividend tax introductions in the 2000s, respectively. Prior literature has not addressed the question of the probability to distribute in the context of the introduction of a dividend tax with comparable treatment and control groups. The recent literature exploring the impact of payout taxation relies on changes in the rate or the base of an existing tax. In our setting, profits distributed to shareholders in the form of dividends were not taxed at all before the reform, and the novelty of this tax may explain the sharp extensive margin responses.

Our third set of contributions is in examining the consequences of dividend taxes on the real business operations of firms. There has been much theoretical discussion on the importance of dividend taxation since Feldstein (1970); Harberger (1962); Poterba and Summers (1983, 1984). Theoretically, depending on the ownership characteristics of firms, dividend taxes may be important for company outcomes as they interfere with the relationship between the company and its investors (as reviewed in Allen and Michaely (2003) and Auerbach (2002)). Following this school of thought, dividend taxation may also dampen equity-financed investment by increasing the user cost of capital. In line with that prediction, some of the prior literature shows increases in investment and employment in response to dividend tax cuts (e.g. Becker et al., 2013). More recent evidence suggests that dividend tax cuts have a limited impact on overall firm outcomes such as investment in physical capital (Alstadsæter et al., 2017; Auerbach, 2002; Yagan, 2015).[4] We contribute to this literature in two ways. First, we consider the effects of tax increases rather than cuts, which allows us to discuss asymmetric effects of dividend taxation on real firm operations. Second, we present a much more nuanced view of investment, by splitting investment into some of the categories for which we have available data. While we confirm the null effect on equipment purchases (as in, among others, Yagan (2015)), we find a strong positive impact of spending on asset classes that support the view that personal spending from within the firm rises. We show novel evidence for how land, buildings, vehicles, furniture, and equipment are differentially affected by dividend taxation. This opens up new research areas for future work on the lumpiness of such investments, their use as collateral for future debt accumulation, and

[4]While majority of this work utilizes tax cuts to examine the effects of dividend taxes on investment, two concurrent papers consider the effects of tax increases Bach et al. (2023); Matray (2022).

firm-level productivity.[5]

The remainder of the paper is organized as follows. We describe the policy context in Section II. We develop our conceptual framework in Section III. We present our datasets and descriptive characteristics of the data in Section IV, and we discuss our empirical approach in that same section. We discuss our baseline results in Section V, followed by our analysis of the reform on real outcomes in Section VI. We conclude in Section VII.

II Policy context

II.A How do we define 'treatment group'? Legal forms of organization in Greece

Corporations in Greece can choose between two legal forms of organization: Société Anonyme (SA) or Limited Liabilities Company (LLC). The main difference between those two forms of organization is the minimum amount of capital required for its formation; €4,800 for LLCs and €60,000 for SAs. Further, LLCs are not allowed to operate as financial intermediaries, enter into the stock exchange, or issue preferred stock or corporate bonds. For both types of firms, the liability of the shareholders/partners is limited to the amount contributed. Unlike general partnerships and sole proprietorships, which face simpler financial reporting regulations, both LLCs and SAs are required to follow similar accounting practices and make their financial reports public.[6] All types of businesses in Greece are mandated each year to file tax returns. Both SAs and LLCs are similar to US C-corporations. More specifically, LLCs we analyze here can be considered similar to the French "Sarl" or German "GmbH", while SAs are equivalent to the French "Société Anonyme" or the German "AG". We show descriptive statistics for SAs and LLCs separately in Table 1.

Both SAs and LLCs in Greece predominantly have financial year end dates in June or in December. All corporations in Greece should prepare, finalize and approve through their Board of Directors their financial statements before filing their tax returns no later than six months after their financial year end date.

[5]There is also growing evidence that point towards the use of closely-held businesses as tax shelters in the presence of a dividend tax (Norway and France; Alstadsaeter et al., 2014; Bach et al., 2023).

[6]Corporations with smaller size in terms of sales/assets/number of employees can opt for publication of shorter financial statements.

II.B Reform timeline

When did the policy become effective? The new dividend tax was introduced in Greece by tax law 3697/2008. The policy was introduced in response to the infringement procedure of the European Commission (EC) against Greece for the discriminatory tax treatment of inbound dividends. Before the reform, Greece did not tax dividend income at any level. Following the reform, Greece amended the legislation governing the taxation of dividends to make it compatible with the European Commission law standards. The law that introduced the reform was passed on 25 September 2008 and applied only to SAs.

Which firms became subject to the new tax and when? We examine three types of corporations: SAs with December year-end dates are the first group to be treated by the reform. SAs with June year-end dates are the second group to be treated by the reform. For the duration of our sample period, LLCs were not treated and there was no discussion or expectation that this group would be subject to dividend taxation at any point in the foreseeable future.

Corporations in Greece typically have financial year-end dates either in June or in December. For firms with financial statements closing in mid-year (June 30th), payout decisions to distribute took place in November-December 2008. Hence, these firms were not affected by the new law immediately. They had one final opportunity to distribute tax-free dividends before the tax started to apply to them. We therefore use the responses of the group of June year-end firms to isolate announcement effects. For firms closing the financial year in December 2008 (which represent the vast majority), the meeting of directors and general assembly happened in May-June, and therefore any dividends paid out by these firms were immediately subject to the new dividend tax.

This distinction is useful for our identification strategy when we exploit differences between December year-end firms that were 'caught' by the policy immediately, and June year-end firms that had one more financial year to distribute tax-free dividends. Descriptive evidence on announcement effects were offered previously by Alstadsæter and Fjærli (2009); Hanlon and Hoopes (2014). These studies did not have benchmark groups similar to our December year-end firms or LLCs to compare against announcement effects. To our knowledge, we are the first to be able to separate the announcement and implementation effects and estimate these effects causally.

Did the treatment group firms anticipate the changes? In September 2007, the EC infringement procedure started, but such cases have no specific time horizon for implementation. There are even cases where countries do not comply with court rulings and pay fines over a number of years after the final EC decision. In the case of dividend taxation in Greece, the final EC decision was taken months after the introduction of the dividend tax. There was also no prior communication by the government about this reform. In particular, the first time companies and accountants were informed about this reform was in mid-September 2008 in an information event that took place in the Athens Stock Exchange.[7]

Dividend tax was introduced only for SAs as a flat 10% tax where final shareholder-level tax is withheld by the distributing company, with no further personal taxation. The law applied from the time the decision was made by the general assembly of shareholders. The new dividend tax applied both to individuals who receive dividends and to firms that pay dividends to their parent companies.[8]

Could control group firms anticipate and react to a possible change in their dividend tax status? The introduction of dividend taxation for SAs was followed after a few years by reforms that expanded the dividend tax net. A natural question therefore is whether the LLCs that constitute our control group anticipated that the dividend taxation may also apply to them in the future.

There are two main reasons why we do not expect LLCs to anticipate the introduction of a dividend tax on them. First, the EU infringement procedure did not apply to LLCs, so there was no external reason to expect that LLCs would also be included in the dividend tax net. Second, the political climate at the time was more towards tax cuts for businesses rather than for tax hikes. At the time of the introduction of the dividend tax in 2008, the centre-right New Democracy party that generally favours tax cuts was in power. Given the political orientation of the Greek parties and their attitudes toward taxation, business expectation was more towards a reduction or elimination of dividend taxation than a tax increase. It is worth noting that currently, under the New Democracy government, the dividend tax (after having risen to 15% under the government of the centre-left party "Siriza" in 2015-1019) has been reduced to 5%.

In 2010, Greece introduced another dividend tax that replaced the flat tax with a with-

[7] A news article is available at https://www.capital.gr/oikonomia/575515/o-exeuropaismos-tis-forologisis-merismaton-stin-ellada/.

[8] Dividends distributed by Greek subsidiaries to EU parent companies (holding at least 10% of shareholders' capital for two consecutive years) are exempted from this taxation. We do not include these firms in the analysis.

holding dividend tax on LLCs and SAs at a higher rate of 21%. Figure 2 demonstrates that LLCs do not show any anticipatory reactions in dividend payments before 2010. Because this second reform then equalizes the tax treatment of ditributions by LLCs and SAs, our quasi-experimental identification is only valid until the introduction of this second reform.[9]

II.C GFC and the Greek sovereign debt crisis

The reform that we study narrowly pre-dates a period of back-to-back economic crises. We therefore safeguard against any confounding effects of the Global Financial Crisis (GFC). The dividend tax reform was announced in September 2008 which was a time when the GFC had started to unfold in the UK and the US. Therefore, the first question regarding identification is whether the reform was introduced in response to the crisis. We describe a mandate by the European Commission to Greece regarding the discriminatory tax treatment of dividends as the sole motivator of the dividend tax introduction in Section II.B.[10] From an exogeneity perspective, the introduction of the policy was independent of the global economic conditions or the type of legal form that it affected; the government introduced the law to comply with an EU requirement. Still, in our baseline analysis, we restrict attention to the short-run effects of the reform to avoid any potential confounding effects of the Global Financial Crisis.

Relevant to our setting, the "Greek Updated Stability and Growth Program 2008-2011" submitted to the European Commission on January 30th, 2009 includes "forecasts that—against the global trends— were extremely optimistic, [with] 1.1% growth in 2009, 1.6% in 2010 and 1.9% in 2011" according to Bank of Greece (2014), p.34. This suggests that business activity continued as normal in early 2009, with liquidity conditions and macroeconomic indicators deteriorating shortly afterward. In Figure E1a, we plot the evolution of quarterly GDP, exports, and imports. In panel b, we plot the evolution of international bank claims on all Greek counterparts. These two figures suggest that the financial crisis only visibly affected the Greek economy starting in early 2009, or even in late 2009 in the case of international bank claims.

For our identification strategy to be valid, we require that both SAs and LLCs were similarly affected by the financial crisis, not necessarily that they were not affected at all.

[9] In Figure E3 we plot the evolution on dividend payouts after 2010. We can see that the dividend distributions of LLCs dropped substantially in 2010.

[10] Failure of a State to fulfill obligations — Breach of Articles 43 EC and 56 EC — 'National rules providing for tax exemption for dividends distributed by national companies but not for dividends distributed by companies whose seat is in another Member State'.

Similarly, we require that June and December firms have similar knowledge of the financial crisis if we want to distinguish between announcement and immediate effects. In Figure E2, we show that revenues and profits of SAs (both June and December) and LLCs evolved similarly between 2007 and 2011.

III A model of investment in personal assets, payouts and firm value

Conceptual framework We propose a simple model to describe the owner-managed firms' decision-making process regarding within-firm consumption and dividend distributions. When there is no dividend taxation, the owner-manager prefers to distribute dividends for personal consumption and investment. We denote personal assets that are accumulated through personal investment goods within the firm as G. An example of such investment could be the acquisition of real estate for personal use. We posit that without a dividend tax, the owner-manager would prefer to invest in the personal investment good outside the firm. When the investment takes place inside the firm, the owner-manager does not generate the full value G from it, as it shares some of the benefit from the purchase of the asset with the firm. The owner-manager then derives benefit from the asset through its contribution to the value of the firm. In the case of real estate, the asset can be used for company's activities for example, or as collateral when the firm applies for a loan. The contribution of asset G to the value of the firm can be represented as $S(G)$, with $S_G > 0$ and $S_{GG} < 0$.

The firm maximizes present discounted company value V_0, which is a function of dividends distributed in period 1, D_1, value derived from private assets $S(G_0)$ and future value V_1:

$$V_0 = \beta(1-m)D_1 + S(G_0) + V_1 \tag{1}$$

Dividends are taxed at the dividend tax rate m. In Equation 1, $(1-m)D_1$ is the net dividend received by the owner-manager in period 1, G_0 is beginning-of-period stock of "private" assets inside the firm, $S(G_0)$ is the benefit derived from the stock of private assets. $\beta = 1/(1+r)$ is the discount factor based on real interest rate r. In period 1, the firm pays out dividends. Equation 2 is a sources and uses of funds identity that describes the dividend payment in period 1:

$$D_1 = f(K_0)(1-\tau) - (1-A)I_1 - (1-pA_G)g_1 + B_1 - B_0(1+i(1-\tau)) \tag{2}$$

The first term on the right hand side of Equation 2 is the earnings of the company after corporation tax at rate τ and with prices normalized to one. The company can deduct the cost of investment in company assets I with A representing the net present value of allowances for firm investment. Analogously, A_G represents the net present value of allowances for the private investment, g, that is used to accumulate the in-firm private asset G. p is the probability that private investment costs are tax deductible. In period 0, the company's long-run borrowing is an amount B_0 at the nominal interest rate $i(B_0)$ with $i_B > 0$ (due to a rising interest rate with higher leverage) and the firm pays this amount back with tax-deductible interest in period 1. B_1 is the new borrowing in period 1. Investment in both the company asset and the in-firm private asset follow the standard equations of motion:

$$K_1 = (1 - \delta)K_0 + I_1 \tag{3}$$

$$G_1 = (1 - \delta_G)G_0 + g_1 \tag{4}$$

At the beginning of each period t, the owner-manager chooses K_{t+1}, G_{t+1}, and B_t to maximize V_t. To solve the owner-manager's optimization problem, we substitute Equations 3 and 4 into Equation 2 to replace I_1 and g_1 and plug into Equation 1.

We obtain the following first order conditions that pin down the company capital K_1, private capital G_1 and optimal long-run borrowing B_0:

$$f'(K_1) = \frac{(1 - A)(r + \delta)}{1 - \tau} \tag{5}$$

$$S'(G_1) = (1 - m)(1 - pA_G)(r + \delta_G) \tag{6}$$

$$B_0 = \frac{r - i(1 - \tau)}{1 + i_B(1 - \tau)} \tag{7}$$

The first order condition for the company capital K_1 is the well-known user cost of capital as in the neoclassical optimal capital accumulation framework (Hall and Jorgenson, 1967). Similarly, we find that the first order condition for the private capital G_1 describes the cost of capital for the private asset. Equation 7 shows the optimal borrowing condition as a function of the real interest rate, the tax-deductible nominal interest and i_B. We assume that capital accumulation does not affect the cost of borrowing.

Crucially, a higher dividend tax, m, reduces the cost of capital for G, but does not affect the cost of capital for I. Consequently, in equilibrium, a rise in the dividend tax rate m increases investment in private asset, G, but does not affect investment in equipment or

other company-only assets, I, or borrowing, B.

Deviation from agency models Unlike in agency models (e.g. Chetty and Saez, 2010), our model does not lead to 'empire building' by the manager. By contrast, the owner-manager uses the firm to accumulate certain kinds of asset that will benefit her personal use. The agency model has a clear prediction about heterogeneous behavior between high-cash and low-cash firms. According to Chetty and Saez (2010), for high cash firms at the intensive margin, the dividend tax would have no effect on payouts and equity, a drop in productive investment, and a rise in 'pet project' investment. For very high cash firms, the dividends would decrease, pet project investment increases, without any effect on equity or productive investment. We make two observations that counter the agency model and favor our owner-manager model. The first is simply the size and scale of firms within our sample vis-a-vis the large, listed firms mainly studied in this literature. A vast majority of the firms that we study in Greece are family-owned with concentrated ownership (Vassiliadis and Vassiliadis, 2014). Agency and pet project concerns are likely replaced by management efficiency considerations which we discuss shortly. In fact, in the Online Appendix B we show results for listed firms which are mostly out of the scope of this paper. For listed firms, we do not find a significant effect of the reform on payouts. Our second observation against agency models is through heterogeneities in cash holdings, as hypothesized by Chetty and Saez (2010). We do not find any meaningful heterogeneity in responses between firms with different levels of cash holdings (Figure E6 in the Online Appendix E).

Pace of adjustment in personal assets A natural extension to this model is the introduction of adjustment costs in the accumulation of private capital G (this can also be applied to the accumulation of company capital K without loss of generality).

We do not explicitly model adjustment costs, but we predict that introducing a convex adjustment cost (as discussed in, for example, Abel and Eberly (1997); Cooper and Haltiwanger (2006)) slows down the accumulation of the personal and firm capital at differing rates. Because the firm plans for a future rise in capital accumulation, it is left with additional cash holdings that it would not have in the absence of the dividend tax. Convex adjustment costs in the accumulation of the personal asset would then lead to a gradual accumulation of G_1 to reach its steady state level and a higher amount of cash holding than in steady state. The firm could use this additional cash to repay short-term loans or allocate to reserve accounts. At a given interest rate, both the personal and the firm assets enable more borrowing due to a larger stock of collateral. In normal times, this could raise borrow-

ing. During a financial crisis, the stock of cash could be used as a buffer to pay back debt, lowering the likelihood of bankruptcy.[11]

Management quality, family firms and payout policies A potential driver of heterogeneity among firms' dividend payout behavior is management quality. Previous work found that formally-managed firms find themselves in less need to distribute high dividends (Chemmanur et al., 2009). One of the main reasons for this pattern is a lower need to signal quality or success through dividends. Another group of firms that display high dividend distributions is family firms, either directly or because family firms are less likely to be formally-managed (Lemos and Scur, 2019). Isakov and Weisskopf (2015) find that family firms distribute much higher dividends than their dispersed-owner counterparts and propose three possible channels: agency theory, reputation building and family income needs. They find that the third channel, that is, family income needs, dominates in the family firms' payout behavior.

We cannot directly test differential responses to dividend taxation by formally-managed or family-owned firms in our full sample. However, we know from previous work that more than half of Greek businesses are family-owned (Vassiliadis and Vassiliadis, 2014). We also match a small subset of approximately 300 firms in our data with the *World Management Survey - Manufacturing* (2021) to assess the links between management quality and payout behaviors of formally- and informally-managed companies. This data also includes information on whether the firm is a family firm.[12] Using this descriptive evidence, we find that both family and informally-managed firms are much more likely to distribute dividends, and conditional on distributing dividends, they are more likely to distribute very large amounts relative to their earnings (Figure 1). To capture some of this management-based heterogeneity, we conduct an analysis of differential responses to dividend taxation by high-dividend-paying firms and low-dividend-paying firms. For this analysis, we believe that we predominantly capture differences between well-managed, dispersed ownership firms and informally-managed, family-owned firms. These measures of management are correlated with firm-level productivity, profitability and survival rates (Bloom et al., 2013; Bloom and Van Reenen, 2007). Taken together, this suggests that high-dividend paying firms may be more inefficient than their low-dividend paying counterparts.

[11] We explore these long-run implications descriptively in the Online Appendix D using data from *Hellenic Statistical Authority* (2021).

[12] This data was first used and described in Bloom and Van Reenen (2007). Family-owned firms are those where the family member is the CEO and/or the largest shareholder.

Testable predictions The considerations that we have outlined in this section lead to the following testable predictions. A higher dividend tax rate m leads to:

1. lower cost of capital for G, leading to a rise in personal assets, such as, e.g., real estate.
2. no change in cost of capital for company investment, such as, e.g., equipment.
3. no change in long-run borrowing.
4. higher accumulation of collateralizable assets to refinance secure loans, leading to a lower likelihood of bankruptcy for a given interest rate.

With adjustment costs in the accumulation of G:

5. the increase in G is lower than optimum, leaving the company with a higher stock of cash.
6. the firm may use this stock of cash to repay short-term loans or allocate this amount to the tax-free reserves account.

Finally, given heterogeneity in management quality and family-firm structures:

7. we should observe heterogeneity in policy responses and outcomes across high-dividend-paying and low-dividend-paying firms.

IV Data and estimation

IV.A Data, sample construction and variable definitions

In this paper, we use the universe of Greek corporate tax returns matched with financial data from *ICAP CRIF* (2023), the leading private data source in Greece[13]. We match these two datasets with respect to three common variables included in both tax returns and published financial statements: i) sales, ii) accounting pre-tax profits, and iii) income tax. Our initial matched sample has a total of 610,016 firm-year observations over the years 2003 - 2018. To consider the effects of the dividend tax introduction we limit the sample to the years 2004 - 2009 in our benchmark analysis.

[13]The tax returns data comes from *Independent Authority for Public Revenue* (2019), while ICAP provides source data for *Bureau van Dijk Orbis* (2023) for Greece.

We then select multi-owner firms and focus on the comparison between LLCs and SAs that are not multinational enterprises. Using the tax returns data, we distinguish between SAs that have their financial and tax year ending mid-year (i.e June) and those that have their financial and tax years coinciding with the calendar year, i.e. ending in December. It is worth noting that all corporations are allowed to choose only between these two dates for closing their accounting period: the 30th of June or the 31st of December. Exceptionally, subsidiaries of foreign companies (holding at least 50% of share capital) can select a different date (e.g 31st of March) provided it coincides with that of the foreign parent company. In our sample, we exclude multinational firms and all firms that have closing dates outside of those two dates. This results in a sample that has 23,260 SAs and 2,205 LLCs. Of those SAs, 893 have a June closing date and 22,367 have a December closing date (see Table 1).

Dividend variables To analyze the effects of the reform on payouts, we use dividend information from financial statements. Firms have much higher incentives to report dividends in financial statements than in their tax returns, as these are publicly available to all stakeholders. In fact, many choose not to report dividend payouts in their tax returns during our analysis period. As a consequence, as our main measure, we use distributed dividends from the profit and loss statement. We consider the effect of the reform across two margins of dividend payments: extensive and intensive margins. We measure the extensive margin by using a dummy variable equal to 1 when dividends are non-zero in that year and zero otherwise. We measure intensive margin changes by scaling dividends by total assets measured in the final pre-reform year of 2007.

Other financial variables To analyze how the reform affects firm decisions beyond the distribution of dividends, we focus on how firms redistribute the additional funds that they do not distribute across the firm. As such, we consider the effects of the reform on required reserves, cash, retained earnings, leverage, and investment. We scale required reserves, cash, retained earnings and leverage by total assets in the final pre-reform period. Required reserves are accumulated net profits, which have not been distributed to shareholders or capitalized but appear in the liability side of the balance sheet under 'reserves' to increase the equity capital. There are two main differences between retained earnings and reserves. First, the amounts included in reserves are intended to be used in the future for a specific purpose which is decided either by legislation or by the company's Articles of Association. Amounts included in retained earnings are not intended for a specific purpose or required by law. Second, unlike retained earnings in the Greek context, reserves are not subject to

a tax. We split leverage into short-term and long-term leverage, where short term leverage comprises of short-term loans, while long-term leverage include long-term bank loans. We scale both by total assets in the final pre-reform period.

We define investment as the difference between fixed assets (net of depreciation) in year t minus fixed assets in year t-1. In our baseline estimations, we scale this variable by fixed assets in year t-1 and obtain a measure of investment rate. Further, our data allows us to consider the effect of the reform on investment categories. We divide net fixed assets into three distinct categories: (a) land, (b) buildings, vehicles and furniture (which we refer to as BVF in this paper), and (c) equipment (which includes machinery), as we have data on those three categories for our entire analysis time period.[14] For each of those asset types, we generate an investment variable as a difference between assets type (net of depreciation) in year t minus assets in year t-1. Again, in our baseline estimations, we scale this variable by corresponding asset classes in year t-1. For all investment variables, we replace a missing variable with zero when assets in period t-1 and in period t are both non-missing and zero.

IV.B Methodology

We use a difference-in-differences approach to investigate the responses of firms that were affected by the dividend tax reform in 2008 relative to those that were not. Companies in the SA legal form constitute the treated group, while LLCs that were not subject to the new dividend tax form the control group. We use the following general specification to evaluate the effects of dividend tax introduction:

$$Y_{it} = \beta \times SA_i \times post_t + \psi_i + \mu_{jt} + \epsilon_{it} \tag{8}$$

where, i is firm, t is year and j is sector. Y_{it} is the outcome variable at the firm level. We first consider the dividend payment-related outcome variables and then cash, reserves, leverage, retained earnings, and investment variables. SA_i is a dummy variable that equals one if a firm is an SA; $post_t$ is a dummy variable that equals one in 2008 and 2009; ψ_i is the firm-specific fixed effect, μ_{jt} are sector-year fixed effects, and ϵ_{it} is the error term. The parameter of interest is β, which captures the effect of the dividend tax introduction on a firm's behavior.

[14] We do not have the ability to disaggregate buildings, vehicles and furniture further, as a more detailed asset data is available only after 2006. Further, note that fixed assets is composed of seven categories: land, BVF, intangible assets and/or multi-year depreciation expenses, equipment, accumulated depreciation, long-term receivables, and participations.

We further split SAs into December closing firms and June closing firms, where December firms were affected immediately and June closing firms could anticipate the reform and had a year to adjust. As such we modify the SA_i dummy and split it into two separate dummies $SAJune_i$ and $SADec_i$. Here, we are interested in the differential effect of the reform for these two groups of firms. In our baseline regressions, we only use the first post-reform year, while to investigate the behavior of June year-end firms, we also include the year 2009. Note that in 2010, the dividend tax was also imposed on LLCs.

Our identification strategy relies on the assumption that in the absence of the dividend tax introduction, both SA and LLC corporation types would see their payouts and other real responses evolve in the same way. We verify the plausibility of this assumption using an event study design. We estimate Equation 9, which is a dynamic version of Equation 8. We replace dummy $post_t$ with a series of year dummies. We use the year 2007 as the benchmark year. We estimate the following equation:

$$Y_{it} = \sum_{\kappa=2004}^{2009} \gamma_t 1[t = \kappa] \times SA_i + \psi_i + \mu_{jt} + \epsilon_{it} \tag{9}$$

where Y_{it} is the outcome variable at the firm level. $\sum_{\kappa=2004}^{2009} 1[t = \kappa]$ is a series of year dummies that equal one in each of the κ years, with the dummy variable corresponding to $\kappa = 2003$ as the omitted category. All the other variables are defined as for Equation 8. The coefficients of interest are the γ_t, as they measure the average change in the outcome variable for SAs relative LLCs and relative to the κ year before or after the reform.[15]

V The effects on dividend distributions

V.A Benchmark results

In Table 2 we report the results estimating the effect of the reform on dividend payouts. In columns 1-3, we consider the average dividend distribution amount, while in columns 4-6, we consider the effect on the likelihood of paying dividends. In columns 1 and 4, we present the benchmark results comparing LLCs to SAs, while in columns 2, 3, 5 and 6, we split SAs in post-reform periods into June and December filers. June firms are those that have an

[15]To demonstrate the trends over a longer time series before the reform, in event study figures, we show coefficient plots for the period 2003 - 2009. For all other purposes, we focus on the period 2004 - 2009 due to some changes in the accounting of tangible assets in Greece starting in 2004. Using different timeframes does not have any material impact on our results.

additional tax-free year of paying dividends in Year T, before their dividends get subjected to the new dividend tax in Year $T+1$.

We find that after the reform firms are paying less dividends. The coefficient of -0.005 in column 1 implies that dividend payouts declined by 12.5% on average in the first year of implementation of the policy relative to the pre-reform mean distributions of LLCs. This result hides an important heterogeneity. June firms increased their dividend payouts before they started paying tax on distributions by almost twice as much as December firms reduced their dividend payouts, both relative to LLCs.[16] On the extensive margin, we find that the proportion of SAs that distribute dividends declined by 7% in the first year of implementation of the policy. Again, this masks the heterogeneity across taxable vs tax-free dividends, as December firms reduced their dividend payout incidence in both years after the implementation, but June firms increased their dividend payout incidence in Year T, while reducing it in Year $T+1$, when their dividends were subject to tax. In Year $T+1$, both December and June firms were now paying tax on their dividend distributions, which explains no differential response between them.

In Figure 2, we show that dividends scaled by total assets (Figure 2a) as well as proportion of firms distributing dividends (Figure 2b) have evolved similarly in years 2003 - 2007 for both LLCs and SAs (irrespective of the filing date). In 2008, we see LLCs continuing on the trend, while December firms (blue dashed line) reduced their dividend payouts substantially. June firms, in turn, increased their payouts. In 2009, we see that LLCs are still on the same path, while now both December and June SAs are subject to the reform. Both of their dividend payouts are lower than that of LLCs in 2009. Note that both June and December firms increased their dividend payouts in 2007 relative to 2006. However, the increase in dividend declarations between 2007 and 2008 is much larger in magnitude than earlier changes. Further, these figures also verify that LLCs did not substantially change the incidence of their distributions as well as the magnitude of those in anticipation of the 2010 reform that imposed dividend taxes on them.

In Panels c and d of Figure 2, we verify these common trends, using event study design. We plot the difference-in-differences coefficients for each of the 2004 - 2009 years separately for dividends scaled by total assets in panel c and for the dummy equal to 1 when a firm paid a dividend in panel d. Further, we split the post coefficient into June and December effects in the post period only. These figures confirm our main findings and allow us to rule

[16]This response is concentrated amongst firms that report profits, while we see a substantially smaller response for firms making losses, see Table C6 in the Online Appendix.

out differential pre-trends in the evolution of the main outcome variable.

Note that the higher, 21%, dividend tax rate imposed both on LLCs and SAs in 2010 helps us validate the identifying assumption that LLCs and SAs would behave similarly in the absence of the tax reform. In Figure E3 we plot the equivalent of Figure 2 panels a and b, but extend the plot to include the 2010 reform as well. The new dividend tax increased the rate for LLCs by 21 percentage points (from zero) and for SAs by 11 percentage points. If LLCs and SAs behave in the same way, we would expect that LLCs would reduce their dividend distributions by more than SAs following that reform, which is precisely what we observe in Figure E3.

The regular payout policy of firms may affect whether they respond to the tax or not. We present results that compare heterogeneities in the response to the reform across firms with different payout policies in the pre-reform period in the Online Appendix C. We compare firms across two dimensions. First, we do not find significant differences between firms that 'always' distributed or 'sometimes' distributed dividends before the reform. Second, we define groups of firms that regularly distribute more and less than 50% of their earnings before the reform and compare their responses. We define the former group to be the high-dividend payers. We find that high-dividend payers are more responsive to the reform, both at the extensive and intensive margins, but the response is particularly stark on the extensive margin. We conclude that the introduction of the dividend tax from a zero rate on dividends induced many firms with different payout policies to completely halt their distributions.

V.B Intertemporal tax arbitrage?

The sharp increase in dividend distributions by June firms immediately after the policy announcement, in contrast to the sharp reduction by December firms, is consistent with an intertemporal tax arbitrage model akin to Korinek and Stiglitz (2009) in which the company board attempts to reduce investors' tax burden. In our setting, in the first year of the policy, June firms did not have to pay dividend tax, if they took their distribution decisions early enough. Hence, distributing more and increasing the incidence of distributions in 2008 would still be tax-free. Those firms evidently took advantage of this, which suggests a strong focus on investor benefits in terms of tax payments. In 2009, these firms revert to a similar response as December firms, indicating that their behavior was consistent with intertemporal arbitrage.

V.C Elasticity calculations

In this section, we calculate the elasticity of the dividend response with respect to one-minus-the-tax-rate, focusing on the group of December firms in Year T before the effects of the GFC are felt in the economy. This exercise allows us to compare our estimates to the larger literature, even though our setting is very different because we start from a zero rate. We use a standard elasticity formula used in this literature[17]: $elasticity_{\tau div} = \Delta Y_i/[(\tau_{newdiv} - \tau_{olddiv})/(1 - \tau_{olddiv})]$, where ΔY_i is a change in payouts in response to the tax introduction, τ_{newdiv} is the 10% flat tax rate and τ_{olddiv} is zero. In the case of Greece, the elasticity is simply $elasticity_{\tau div} = \Delta Y_i/\tau_{newdiv}$, where the new tax rate was 10%. Note that, we cannot calculate the corresponding elasticity for June firms, as the effect we obtain is an increase in distributions in response to the *anticipation* of a tax.

With the average pre-reform mean distributions of 0.04 for LLCs (Table 1), the -0.005 coefficient for the Year T response for December firms (column 2) translates into a 12.5% decrease in payouts relative to the control group. December firms reduced their distributions by 12.5%, which suggests an elasticity of 1.25. This elasticity is larger than the corresponding recent estimates in the US and France. In particular, Chetty and Saez (2005); Yagan (2015) estimate these to be close to 0.5 for tax reductions and Matray (2022) at 0.43 for tax increases. On the other hand, this is lower than earlier estimates in the literature, such as 1.57 in Poterba (1987).

There are, at least, three reasons why our estimates differ from the recent empirical literature that uses data from other countries. First, we estimate the response to an introduction of a new tax. This new tax may be more salient than a change in an already existing tax. Second, the elasticities calculated here are one-year responses. It is entirely plausible that firms overreact to such a tax and that in the longer run the large elasticity may converge to the previous, smaller estimates. In the second year of the policy implementation, the average dividend distributions declined by 0.0004 relative to the pre-reform years. Combined with the initial response, we estimate the average of the two years to be a 0.003 reduction. This 7.5% reduction in payouts translates into a much smaller elasticity of 0.75. As such, the magnitude of this average response is closer to the previous estimates in the literature. Finally, Greek firms have much higher corporate tax elasticities than firms in the US and other European countries. This suggests that Greek firms may simply be more sensitive to tax system changes. Along with the findings of Jacob and Michaely (2017) on Sweden with corresponding elasticities of up to 5.3, this highlights the importance of cross-country

[17] Matray (2022); Yagan (2015)

heterogeneities and the need for further research across a variety of countries.

At the extensive margin, Chetty and Saez (2005) show that following a 2003 US dividend tax rate cut, the fraction of firms paying dividends increased from 20% to 25% within a year and a half. This 25% increase is much larger than what we find for Greek firms. A potential explanation could be that in their sample they only consider the publicly traded firms and these firms may have different incentives than the private firms we consider here.[18]

VI Investment and other outcomes

Given heterogeneous responses to the dividend tax between December and June firms in the year of introduction of the policy, in that year, we have two types of firms: (a) those that reduced their payouts immediately because they were subject to the reform — December firms, (b) those that increased their payouts in that year because that was the last tax-free year for them — June firms. In what follows, we focus on the responses of December firms, as they are the majority of firms in Greece. Further, we limit our focus to responses in year T, i.e. in 2008, for two reasons. First, one could plausibly argue that Greece started feeling the effects of the GFC in 2009 and we want to avoid the confounding effects of that crisis. Second, and relatedly, the average intensive margin payout response in 2009 in not statistically different from zero. As such, we consider how firms reallocated the funds that they did not distribute across other accounts in the firm in 2008. We start the discussion with investment and then continue with additional margins, such as reserves, cash, retained earnings, and leverage.

VI.A Investment responses

In Table 3, we summarize the results for investment in fixed assets. In Column 1, we show the overall effects, while in columns 2-5 we split fixed assets into land, BVF (buildings, vehicles and furniture), and equipment. We find that, on average, the reform did not significantly affect investment. In Figure 3, we show that the common trends assumption holds and there was no differential evolution of investment between December SAs and LLCs in any of the pre-reform periods.

This overall effect masks important heterogeneities across asset classes. In column 2 in Table 3, we show that investment in BVF increases significantly after the introduction of

[18] We consider the differential response of listed firms separately in the Online Appendix B.

the reform. The magnitude of the coefficient in column 2 suggests that in 2008 investment in BVF increased by 1.7 percentage points. Results in column 3 indicate that investment in land rose by almost three percentage points. In column 4, we aggregate investment in BVF and land into one number and the overall effect suggests a significant, 2.1 percentage point, increase in the two asset categories together. This is a 17% increase relative to the mean investment in that category. Finally, we find no statistically significant effect for equipment in column 5, consistent with Yagan (2015). Those effects are not only statistically significant but also economically large and meaningful.[19] Calculating the elasticity of investment types with respect to 1 minus tax rate, we obtain elasticities of 1.3 for BVF and 1.7 for BVF and land.

How should we interpret these findings? Our conceptual framework predicts that for owner-managed firms, the increase in dividend tax leads to an increase in personal assets, G, and no change in company investment, I. In a simplified manner, if we considered land, buildings, vehicles and furniture as personal assets and equipment as purely company investment, these results are consistent with our conceptual framework. Additionally, investment in land and BVF could be considered less productive and may curtail further growth. This could be a sign that firms are investing in assets that will allow them to avoid paying dividend taxes and will help them securely keep the money within the firm rather than give it to the government.

VI.B Other margins of response

In this section, we investigate additional margins of firm responses to the dividend tax reform. We already know that some of the funds kept in the firm go to certain types of investment. If firms do not invest all of the funds that they save on dividend distributions, they could potentially leave it as cash or use it to repay their debts. Under shareholders' equity, this may balance as either retained earnings or reserves. In Table 4, we provide evidence on these margins of response.

On average, we do not find a significant response in retained earnings, but this is compensated by the large rise in reserve holdings which increase by 10% relative to the mean.[20] Note that the mean of retained earnings is negative, suggesting that a lot of firms in our sample may be loss-making. When we include only profitable firms, we find a large positive

[19] Consistent with the intertemporal tax arbitrage theory we also find a large and significant reduction in investment for June firms in 2008 in all categories but equipment, see Table E1 in the Online Appendix.

[20] Corporation tax may apply on retained earnings whereas reserves are not taxable.

effect on retained earnings (see Table C7 in the Online Appendix). These results suggest that affected firms choose to put the money in the untaxed reserves account or retained earnings (if making profits), perhaps to avoid paying dividend taxes for a period of time.

Consistent with the adjustment costs channel that we propose in our conceptual framework, we find that affected firms increase their cash in response to the reform. We also find that treated firms substantially reduce their short-term debt stock with no changes in long-term leverage. Taken together, our findings support a model of firms that respond to the dividend tax by retaining funds within the firm and using them to pay off their short-term debt.[21]

High dividend payers We then consider differences in responses between firms depending on how much dividends they paid out before the reform. The median firm in each sector distributes no dividends. We therefore label the firms that distribute over 50% of their after-tax profits (prior to the reform) as 'high dividend payers'.[22] We design the following event study: we divide all firms in our sample into high and low-dividend payers. We then benchmark our treated firms against their control group counterparts by running split sample regressions of investment categories, reserves, cash holdings, retained earnings, and debt stock on the $SA_i \times post_t$ interaction term along with all the fixed effects that we use in the specification in Equation 8. These split-sample analyses provide us with a test of how the policy response may generate the second-order outcomes of interest for firms that had particularly high dividend distributions in the pre-reform period.

We plot the regression coefficients for $Year = T$, which is 2008, in Figure 4 and report them in Table C5 in the Online Appendix. Red hollow diamonds represent the reaction of high dividend payers, while blue full circles represent the reaction of low dividend payers. The results suggest that the dividend tax reform generates larger real responses for the high dividend payers. The positive average investment responses for land and BVF are driven by firms that paid high dividends before the reform. While we continue to find no effect for equipment in either of the sub-samples, the overall investment effect is large in magnitude though not statistically significant in the subsample of high dividend payers.

The results from Panel b suggest that firms with high payouts also substantially increased their retained earnings and reduced leverage. The retained earning effect together with the

[21] Note that since we scale all variables by total assets in 2007, the reduction in leverage is not the mechanical one that is tied to an increase in retained earnings or reserves.

[22] For a Table that summarizes the heterogeneous effects of the reform on payouts see the Online Appendix C.B.

strong reserves response suggest that firms may purposefully choose to avoid paying this tax, by locating their money in relatively easily accessible accounts that provide a tax-free way to keep the money in the firm. Further, a large increase in retained earnings for this subsample, paired with a significant increase in investment in land and BVF, suggests that these firms may be financing their marginal investment with retained earnings. A larger reduction in short-term leverage suggests that these firms use the portion of the undistributed funds to pay off their debts, with the response focused on short-term debt repayment only. As such, we find that high payers are the firms that behave particularly consistently with our theoretical model, suggesting that they highly value personal investment from within the firm and respond in a way that allows them to avoid paying taxes altogether.

A relatively larger reduction in short-term leverage for high dividend payers is also consistent with these firms financing more of their distributions with short-term borrowing before the reform (Alstadsaeter et al., 2014). In fact, evidence from Table C3 suggests that high-dividend payers had substantially, 23%, higher short-term leverage than low-dividend payers before the reform, while having lower long-term borrowing.

Crucially, this particular heterogeneity in real responses is only present when we consider high dividend payers. We do not find similar differential responses for investment, retained earnings, leverage or reserves when we look at firms that have high leverage, retained earnings, cash, or reserves. We provide these results in Figure E5 where we define 'high' in each category as above median for each sector in the last year before the reform.

Differential impact for strong responders. We now consider the heterogeneous response of firms to the new dividend tax by exploring differences in outcomes depending on the initial payout response. This is to verify that the real responses are tied to the payout responses of firms. Even though we show that payouts decline on average, this average drop is driven only by 27% of firms that reduced their dividends in 2008. 62% of firms do not change their payouts, while 11% of firms even increased their payouts in the reform year, 2008. We summarize the results in Figure C4 and report them in Table C8 in the Online Appendix to provide further context to the exposition in Figure 4. We find that firms that responded to the reform by sharply decreasing their dividends, also significantly increased investment, in particular in land and BVF. In turn, for firms that did not decrease their dividend payouts, we find no such responses. Further, we find a positive retained earnings response and a much larger negative short-term leverage response in the sub-sample of firms that reduced their dividends, relative to those that did not. This confirms that the real responses we find are

responses to dividend taxation and are also consistent with the conceptual framework we present in Section III.

The role of financial constraints A potential concern is that our results could be driven by financial frictions. This could be especially true in the context of the Greek economy in the run-up to the GFC, where many firms were likely to be financially constrained. To test this hypothesis, we use two proxies for financial constraints: firm size and the availability of cash, both before the reform. We find little heterogeneity in dividend and investment responses between smaller and larger firms as well as those with higher and lower cash holdings before the reform (see Figure E6 in the Online Appendix). These results suggest that financial constraints do not explain our dividend and investment results.

Quantifying the relative importance of different margins. To understand the contribution of each margin discussed above to the overall real response to the new dividend tax, we do some back-of-the-envelope calculations. We summarize these calculations in Table 5. First, we take the regression coefficients from Tables 3 and 4 and multiply them by the average of the dependent variable in 2007 for SAs to obtain the percent changes in each of those margins. We do not have information on every balance sheet item, and the estimates have wide confidence intervals, so we do not carry out a full decomposition exercise. Instead, we calculate the relative importance of: (i) the increase in cash holdings; (ii) the increase in investment; (iii) the decreases in short-term leverage; and, (iv) the decrease in long-term leverage. We multiply the average level of investment, cash, and leverage for SAs in 2007 by the percent change induced by the reform. This gives us the level change in each of the margins. We use these levels to compute the relative size of each of those changes. As such, we find that, on average, 40% of the reallocated funds went to investment, 45% to repaying short-term leverage, 11% to repaying long-term leverage, and 4% cash.

We then do the same calculation, but only for the subsample of firms that were high dividend payers before the reform. We find that 46% of the reallocated funds went to investment, 42% was used to repay short-term debt and 5% was used to repay long-term debt. The remaining 6% was kept in cash.

VII Conclusion

In a quasi-experimental setting, we show that the introduction of a dividend tax has immediate and large effects on certain decisions of firms. The payout effect is overwhelmingly driven by the extensive margin, that is, the firms that stop distributing dividends completely. Among the firms whose dividends were subject to the new tax, we identify two groups on which we can test the announcement effect of the policy and the immediacy of the response: firms with a financial year-end in June could distribute tax-free dividends one more year before the tax applied on their dividends. This is in contrast to the December year-end firms, which had to pay tax on their dividends right after the policy was announced. The June year-end firms sharply increased their payouts before reducing them in the following year when they were liable to pay the tax. December year-end firms immediately reduced or stopped their distributions. These sharp responses support the view that firms engage in inter-temporal tax arbitrage to minimize the tax burden on owners.

The new tax significantly reduces dividend distributions, but how do the companies then use the funds retained in the firm? To shed light on this question, we estimate companies' uses of undistributed dividends on different categories of investment and company financials such as cash and debt. We take these results further and dissect investment categories into those that are more likely linked to personal use and productive use for the company. We find that, while the dividend tax does not generate a response in equipment purchases for the average company, owner-managers hold cash in the firm and spend a significantly larger amount on investment goods that are more likely to be for 'personal use' such as real estate assets, vehicles and furniture.

To quantify the size of the revenue that was foregone due to this reform, we take the total value of dividends distributed in Greece in 2007, which was 3.9 billion Euros. Absent any behavioral response, the government was anticipating to collect annually about 390 million in additional revenues with the 10% flat tax on dividend distributions. Total tax revenue from taxes on income, profits, and capital gains in Greece in 2007 was 17.2 billion Euros (with 10 billion from individuals), which means that this reform was projected to bring in an additional 2.3% (0.39/17.2) of those revenues. Our estimates suggest that in 2008, treated firms distributed 12.5% less dividends than in prior years. As such, this has cost the government about 47.5 million Euros in uncollected revenues annually.

Our findings allow us to answer some of the longstanding and unresolved questions on the impacts of dividend taxation. To shed light on these issues, we used detailed administrative

data from Greece on dividend distributions and company financials in a quasi-experimental setting. Our results have broad policy implications for the effects of dividend taxes on payouts and investment. In particular, we observe significant differences among firms in the way they utilize funds held internally in response to a dividend tax. These results suggest that the effects of dividend taxes on investment differ by types of firms and asset classes; the overall effect on the economy will depend on the asset composition and payout tendencies of firms in each country. Our conclusions are predominantly derived from a short-run analysis. We leave the important question of the long-run effects of dividend taxes to future work. As such, our findings highlight the importance of detailed data and further analysis into heterogeneities in company responses to dividend taxation.

References

Abel, A. B. and Eberly, J. C. (1997). An exact solution for the investment and value of a firm facing uncertainty, adjustment costs, and irreversibility, *Journal of Economic Dynamics and Control* **21**(4): 831–852.

Allen, F. and Michaely, R. (2003). Payout policy, *in* G. Constantinides, M. Harris and R. M. Stulz (eds), *Handbook of the Economics of Finance*, 1 edn, Vol. 1, Part 1, Elsevier, chapter 07, pp. 337–429.

Alstadsæter, A. and Fjærli, E. (2009). Neutral taxation of shareholder income? corporate responses to an announced dividend tax, *International Tax and Public Finance* **16**(4): 571–604.

Alstadsaeter, A., Kopczuk, W. and Telle, K. (2014). Are Closely Held Firms Tax Shelters?, *Tax Policy and the Economy* **28**(1): 1–32.

Alstadsæter, A., Jacob, M. and Michaely, R. (2017). Do dividend taxes affect corporate investment?, *Journal of Public Economics* **151**(C): 74–83.

Auerbach, A. (2002). Taxation and corporate financial policy, *in* A. J. Auerbach and M. Feldstein (eds), *Handbook of Public Economics*, 1 edn, Vol. 3, Elsevier, chapter 19, pp. 1251–1292.

Bach, L., Bozio, A., Fabre, B., Guillouzouic, A., Leroy, C. and Malgouyres, C. (2023). Follow the money! Why dividends overreact to flat-tax reforms, *PSE Working Papers halshs-02415470*, HAL.

Bank of Greece (2014). The Chronicle of the Great Crisis, *report ISBN: 978-960-7032-65-2*, Bank of Greece.

Becker, B., Jacob, M. and Jacob, M. (2013). Payout taxes and the allocation of investment, *Journal of Financial Economics* **107**(1): 1–24.

Benzarti, Y., Carloni, D., Harju, J. and Kosonen, T. (2020). What goes up may not come down: Asymmetric incidence of value-added taxes, *Journal of Political Economy* **128**(12): 4438–4474.

Bloom, N., Eifert, B., Mahajan, A., McKenzie, D. and Roberts, J. (2013). Does Management Matter? Evidence from India, *The Quarterly Journal of Economics* **128**: 1–51.

Bloom, N. and Van Reenen, J. (2007). Measuring and explaining management practices across firms and countries, *The Quarterly Journal of Economics* **122**: 1351–1408.

Bureau van Dijk Orbis (2023). Last Accessed: 2023-08-25.
URL: *https://login.bvdinfo.com/R0/Orbis*

Chemmanur, T. J., Paeglis, I. and Simonyan, K. (2009). Management quality, financial and investment policies, and asymmetric information, *The Journal of Financial and Quantitative Analysis* **44**(5): 1045–1079.

Chetty, R. and Saez, E. (2005). Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut, *The Quarterly Journal of Economics* **120**(3): 791–833.

Chetty, R. and Saez, E. (2010). Dividend and corporate taxation in an agency model of the firm, *American Economic Journal: Economic Policy* **2**(3): 1–31.

Cooper, R. W. and Haltiwanger, J. C. (2006). On the Nature of Capital Adjustment Costs, *The Review of Economic Studies* **73**(3): 611–633.

Fama, E. F. and French, K. R. (2001). Disappearing dividends: changing firm characteristics or lower propensity to pay?, *Journal of Financial Economics* **60**(1): 3–43.

Feldstein, M. S. (1970). Corporate Taxation and Dividend Behaviour1, *The Review of Economic Studies* **37**(1): 57–72.

Fudenberg, D. and Tirole, J. (1995). A theory of income and dividend smoothing based on incumbency rents, *Journal of Political Economy* **103**(1): 75–93.

Hall, R. E. and Jorgenson, D. W. (1967). Tax policy and investment behavior, *The American Economic Review* **57**(3): 391–414.

Hanlon, M. and Hoopes, J. (2014). What do firms do when dividend tax rates change? an examination of alternative payout responses, *Journal of Financial Economics* **114**(1): 105–124.

Harberger, A. C. (1962). The incidence of the corporation income tax, *Journal of Political Economy* **70**(3): 215–240.

Hellenic Statistical Authority (2021). Last Accessed: 2021-10-09.
URL: *https://www.statistics.gr/en/home/*

Hussain, S. M. and Malik, S. (2016). Asymmetric effects of exogenous tax changes, *Journal of Economic Dynamics and Control* **69**: 268–300.

ICAP CRIF (2023). Last Accessed: 2023-07-25.
URL: *https://www.icapcrif.com/en/*

Independent Authority for Public Revenue (2019). Last Accessed: 2019-05-13.
URL: *https://www.aade.gr/en*

Isakov, D. and Weisskopf, J.-P. (2015). Pay-out policies in founding family firms, *Journal of Corporate Finance* **33**: 330–344.

Jacob, M. and Michaely, R. (2017). Taxation and Dividend Policy: The Muting Effect of Agency Issues and Shareholder Conflicts, *The Review of Financial Studies* **30**(9): 3176–3222.

Korinek, A. and Stiglitz, J. E. (2009). Dividend taxation and intertemporal tax arbitrage, *Journal of Public Economics* **93**(1-2): 142–159.

Leary, M. T. and Michaely, R. (2011). Determinants of Dividend Smoothing: Empirical Evidence, *The Review of Financial Studies* **24**(10): 3197–3249.

Lemos, R. and Scur, D. (2019). The ties that bind: implicit contracts and management practices in family-run firms.

Love, M. (2020). Dividend taxes and corporate "non-capital" investment.

Matray, A. (2022). Dividend taxes, firm growth, and the allocation of capital, *Working Paper 30099*, National Bureau of Economic Research.

Moon, T. S. (2022). Capital gains taxes and real corporate investment: Evidence from korea, *American Economic Review* **112**(8): 2669–2700.

Poterba, J. M. (1987). Tax Policy and Corporate Saving, *Brookings Papers on Economic Activity* **18**(2): 455–516.

Poterba, J. M. and Summers, L. H. (1983). Dividend taxes, corporate investment, and 'q', *Journal of Public Economics* **22**(2): 135–167.

Poterba, J. and Summers, L. (1984). The economic effects of dividend taxation, *NBER Working Papers 1353*, National Bureau of Economic Research, Inc.

Vassiliadis, S. and Vassiliadis, A. (2014). The greek family businesses and the succession problem, *Procedia Economics and Finance* **9**: 242–247. The Economies of Balkan and Eastern Europe Countries in the Changed World (EBEEC 2013).

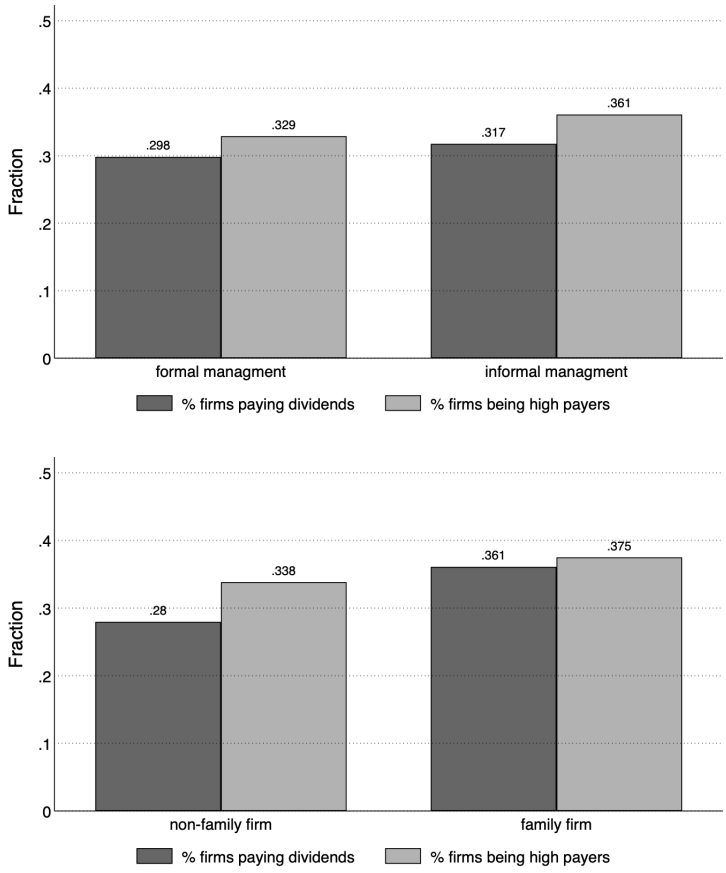
World Management Survey - Manufacturing (2021). Bloom, Nicholas; Lemos, Renata; Sadun, Raffaella; Scur, Daniela; Van Reenen, John.
URL: *https://doi.org/10.7910/DVN/OY6CBK*

Yagan, D. (2015). Capital tax reform and the real economy: The effects of the 2003 dividend tax cut, *American Economic Review* **105**(12): 3531–63.

Zodrow, G. R. (1991). On the 'traditional' and 'new' views of dividend taxation, *National Tax Journal* pp. 497–509.

Tables and figures

Figure 1: Management quality and dividend distribution behavior



Note: This figure plots the average dividend payouts scaled by total assets, percent of firms paying dividends, and percent of firms categorized as high-dividend payers – those that paid 50% of their profits out before the reform. In Panel a, we split firms according to the quality of management, while in Panel b, according to whether they are a family firm. Data on management structures and family firms comes from the World Management Survey, a survey of productivity-enhancing practices for a random sample of mid- to large-sized manufacturers from 21 countries first described in Bloom and Van Reenen (2007). The survey employs a double-blind, interview-based evaluating tool that defines and scores a set of 18 basic management practices on a scoring grid from one ("little/no formal management practices") to five ("best practice"). The definition of formal management comes from the methodological cutoff used in the scoring of each question by the WMS interviewers; a firm has a minimum level of formal management practices if it scored above 3 on the 1 to 5 scale. Family-owned firms are those where the family member is the CEO and/or the largest shareholder.

Table 1: Descriptive statistics: mean comparisons.

	Panel A : SAs vs LLCs			
	(1) SAs	(2) LLCs	(3) diff	(4) t-test
Divid/ total ass	0.018	0.040	0.022***	13.290
% firms paying dividends	0.280	0.379	0.099***	9.237
log revenue	12.209	12.934	0.726***	9.434
log assets	14.142	13.282	-0.860***	-28.261
inv rate	0.108	0.119	0.011	0.992
S.t. leverage	0.452	0.765	0.313***	31.656
L.t. leverage	0.047	0.025	-0.022***	-10.241
reserves/total ass	0.121	0.083	-0.038***	-7.488
cash/total ass	0.152	0.196	0.044***	9.029
ret. earnings/total ass	-0.167	-0.109	0.058***	4.836
firms	23260	2205	25465	

	Panel B : June vs December SAs			
	(1) June SAs	(2) December SAs	(3) diff	(4) t-test
Divid/ total ass	0.018	0.018	0.000	0.119
% firms paying dividends	0.321	0.278	-0.043***	-2.711
log revenue	12.866	12.182	-0.684***	-5.041
log assets	14.170	14.141	-0.029	-0.603
inv rate	0.100	0.108	0.008	0.554
S.t. leverage	0.527	0.449	-0.078***	-4.875
L.t. leverage	0.038	0.047	0.010**	2.530
reserves/total ass	0.117	0.121	0.003	0.408
cash/total ass	0.143	0.152	0.010	1.422
ret. earnings/total ass	-0.202	-0.166	0.036*	1.770
firms	893	22367	23260	

Note: This table summarizes average firm characteristics in 2007, the year before the reform. Panel A compares SAs and LLCs, Panel B compares June and December SAs.

Table 2: Dividend distributions: baseline results.

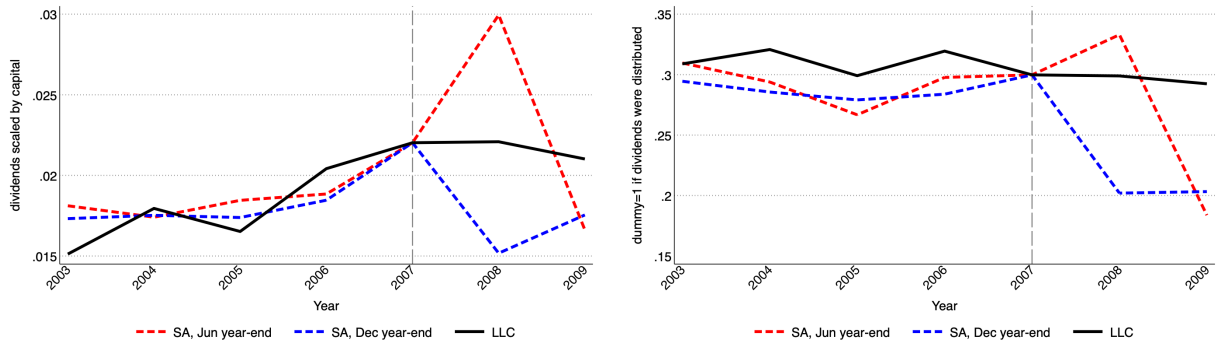
	(1) Div/ta	(2) Div/ta	(3) Div/ta	(4) $1_{(Div>0)}$	(5) $1_{(Div>0)}$	(6) $1_{(Div>0)}$
Treated x [Year = T]	-0.005***			-0.070***		
	(0.001)			(0.010)		
Tr. (Jun) x [Year = T]		0.008***	0.009***		0.063***	0.060***
		(0.002)	(0.002)		(0.016)	(0.016)
Tr. (Dec) x [Year = T]		-0.005***	-0.005***		-0.076***	-0.076***
		(0.001)	(0.001)		(0.010)	(0.010)
Tr. (Jun) x [Year = $T+1$]			-0.002			-0.103***
			(0.002)			(0.019)
Tr. (Dec) x [Year = $T+1$]			-0.000			-0.069***
			(0.002)			(0.012)
Observations	111,472	111,472	138,351	111,472	111,472	138,351
# firms	25,719	25,719	27,499	25,719	25,719	27,499
# June firms	999	999	1,056	999	999	1,056
Mean	0.020	0.020	0.020	0.289	0.289	0.288

Note: This table summarizes baseline results on dividend distributions. The dependent variable is dividends scaled by total capital (asset value fixed in 2007) in columns 1 - 3. In columns 4 - 6, the dependent variable is a dummy equal to 1 when a firm distributed dividends in a given year. In columns 2, 3, 5 and 6 we split the treated dummy into treated June and treated December firms. In each column we include year, firm and sector-year fixed effects. In columns 1,2,4 and 5, we include a sample that ends in 2008, in columns 4 and 6, we include a sample that ends in 2009. Standard errors are clustered at the firm level. Year T refers to the reform year, and Year $T+1$ is the year following the reform. In Year T, December year-end firms are directly affected by the reform, while June year-end firms are not taxed, but anticipate the tax in year $T+1$.

Figure 2: Dynamic effects of the reform dividend distributions.

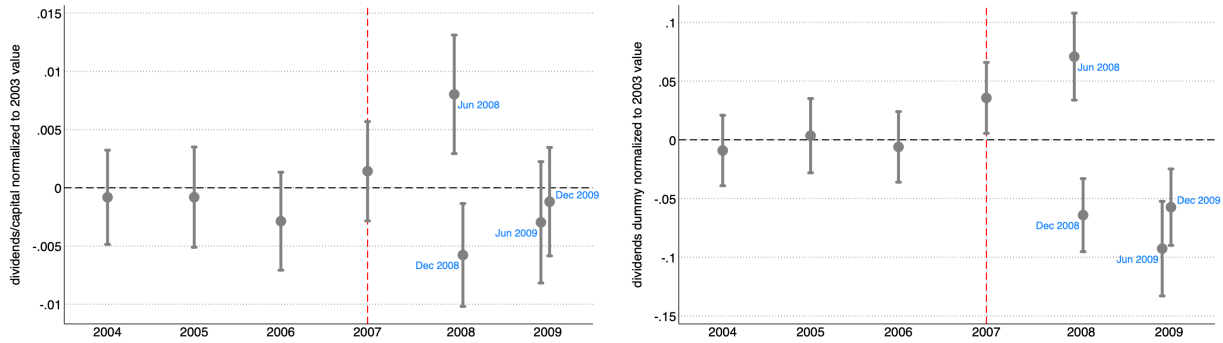
a Dividends scaled by total assets.

b Share of firms paying dividends.



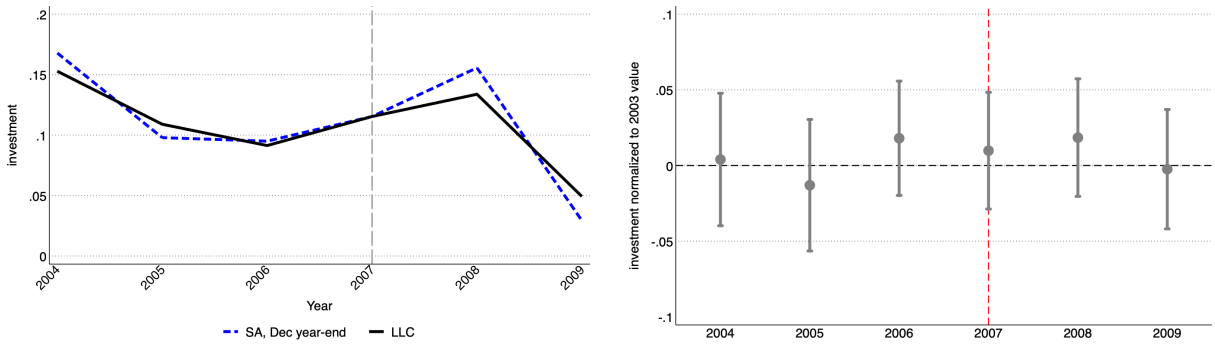
c Dividends scaled by total assets.

d Share of firms paying dividends.



Note: In Panel a, we plot the raw average dividend distributions for SAs and LLCs. As a dependent variable we use dividends scaled by total assets fixed in 2007. In Panel b, we plot the share of firms distributing dividends in each year. We split SAs into firms with December year end, the blue dashed line, and firms with June end year, the red dashed line. LLCs are represented by black solid line. For comparability, we remove firm fixed effects, subtract from each data point the group average for 2007 and add back the pooled mean from the same period. The vertical dashed line marks the last pre-reform period. In all samples, we remove MNEs, single-owner firms and the finance sector. In Panels c and d, we plot the annual coefficient estimates from the dynamic difference-in-differences specifications. Each coefficient is a difference relative to 2003, each dot represents coefficient estimate and vertical lines represent 95% confidence intervals. We include firm, year and sector-year fixed effects in each specification. Standard errors are clustered at the firm level. In the left-side of figures c and d, the post coefficient in 2008 is the average of June and December firms, while in the right-side of the figures, we split the effect.

Figure 3: Dynamic effects of the reform on investment.



Note: In Panel a, we plot the raw average investment for SAs and LLCs. As a dependent variable we use growth rate of fixed assets. We only use SAs with December year end, the blue dashed line. LLCs are represented by black solid line. For comparability, we remove firm fixed effects, subtract from each data point the group average for 2007 and add back the pooled mean from the same period. The vertical dashed line marks the last pre-reform period. In all samples, we remove MNEs, single-owner firms and the finance sector. In Panel b, we plot the annual coefficient estimates from the dynamic difference-in-differences specification. Each coefficient is a difference relative to 2003, each dot represents coefficient estimate and vertical lines represent 95% confidence intervals. We include firm, year and sector-year fixed effects in each specification. Standard errors are clustered at the firm level.

Table 3: Investment responses.

	(1) investment	(2) BVF	(3) land	(4) land and BVF	(5) equipment
Treated x [Year = T]	0.008	0.017*	0.029***	0.021**	0.003
	(0.015)	(0.009)	(0.004)	(0.009)	(0.004)
Observations	105,793	106,661	104,183	106,821	105,950
# firms	24,432	24,653	24,575	24,673	24,250
Mean	0.109	0.130	-0.012	0.123	0.014

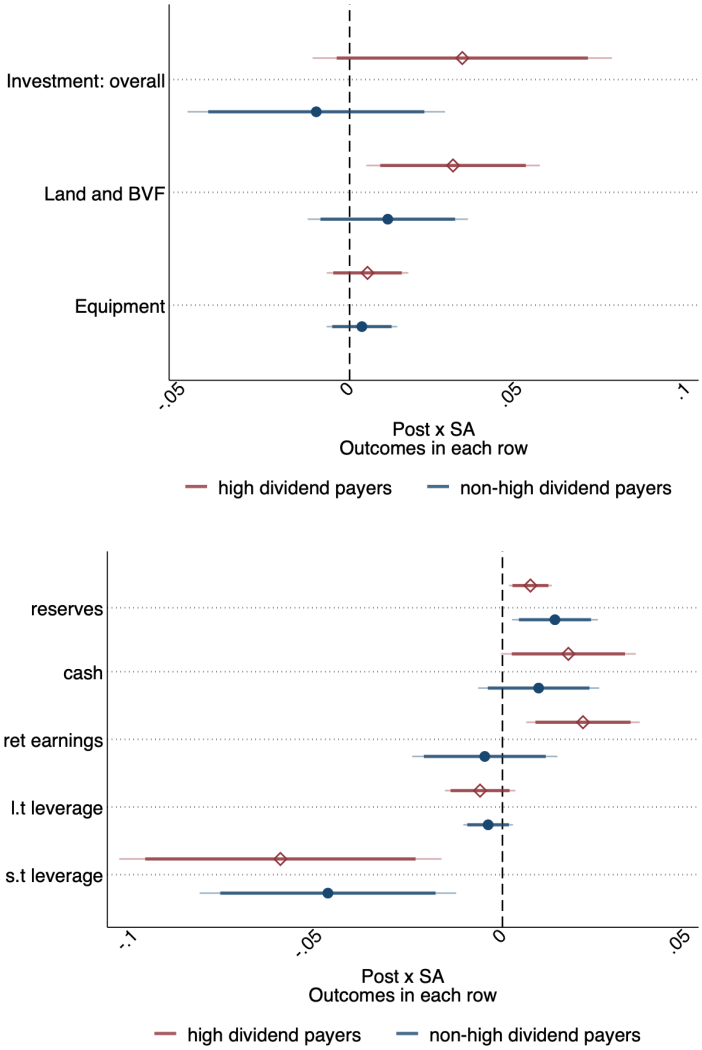
Note: This table summarizes baseline results for investment responses. In column 1, the dependent variable is the overall investment calculated as the growth rate of fixed assets. In column 2, it is the investment in buildings, vehicles and furniture (BVF); in column 3 it is investment in land, in column 4 it is the sum of investment in BVF and land, and in column 5 it is investment in equipment. In each column we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. Year T refers to the reform year. We exclude June firms in this table and only present the effect for December-year end firms.

Table 4: Other margins of responses.

	(1) reserves	(2) cash	(3) ret. earn.	(4) ret. earn. dummy	(5) short t leverage	(6) long t. leverage
Treated x [Year = T]	0.012***	0.012*	0.005	0.012	-0.051***	-0.004
	(0.004)	(0.006)	(0.007)	(0.009)	(0.014)	(0.003)
Observations	81342	81342	81342	81342	81342	81342
# firms	22,651	22,651	22,651	22,651	22,651	22651
Mean	0.121	0.153	-0.179	0.431	0.466	0.047

Note: This table summarizes results on reserve, cash, retained earnings, and leverage responses. The dependent variable is reserves divided by total assets in 2007 in column 1, cash scaled by total assets in 2007 in column 2, retained earnings scaled by total assets in 2007 in column 3, retained earnings dummy, which is equal to 1 if a firm has any retained earnings in column 4, short-term leverage in column 5, and long-term leverage in column 6. Short-term leverage is defined as short-term loans, while long-term leverage is long-term bank loans, both divided by total assets in 2007. In each column we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. Year T refers to the reform year. We exclude June firms in this table and only present the effect for December-year end firms.

Figure 4: Heterogeneity by high dividend payers.



Note: This figure summarizes the heterogeneous response to the reform from firms that paid more than 50% of their profits out before the reform - high dividend payers - and those that paid below 50% of their profits before the reform - non-high dividend payers. Each dot represents a coefficient estimate on $[Year = T] \times SA$, i.e. the response of SAs in 2008. Red hollow diamonds correspond to coefficient estimates for high dividend payers. Blue full circles correspond to coefficient estimates for non-high dividend payers. Lines are confidence intervals, where the darker ones are 90% and lighter ones are 95%. A dependent variable in each specification is listed on the left of the panel. Investment is growth rate of fixed assets. Land and BVF is growth rate of assets held in land, buildings, vehicles and furniture, similar for equipment. Reserves, cash and retained earnings are all scaled by total assets in 2007. Short-term leverage is defined as short-term loans, while long-term leverage is long-term bank loans, both divided by total assets in 2007. In each regression we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. Corresponding coefficient estimates are in Table C5 in the Online Appendix.

Table 5: Quantifying different margins of response.

Panel A: All firms

variable	(1) coeff	(2) mean outcome	(3) level outcome	(4) change in outcome	(5) relative importance
investment	0.008	0.108	3,218,179	238,384	40%
st leverage	0.051	0.452	2,375,080	267,985	45%
lt leverage	0.004	0.047	742,930	63,228	11%
cash	0.012	0.152	320,436	25,298	4%

Panel B: High dividend payers

variable	coeff	mean outcome	level outcome	change in outcome	relative importance
investment	0.03	0.13	1,274,909	324,397	46%
st leverage	0.06	0.52	2,524,742	293,913	42%
lt leverage	0.01	0.03	215,098	37,004	5%
cash	0.02	0.15	369,232	43,441	6%

Note: This Table summarizes the back of the envelope quantification of the contributions of each margin of real response. Column (1) takes the regression coefficients from Tables 2,3 and 4. Column (2) takes the mean of the dependent variables for SAs from Table 1. Column (3) takes the mean level of outcome variable, column (4) calculates the level change in the outcome variable, as = (col 1)/(col2) $\times$ (col3). Column 5 calculates the relative importance of each of the real margins of response by aggregating the level changes in column (4) and apportioning them to each margin of response. In panel A, we consider response of all firms, while in panel B, we only look at responses of high dividend payers, as analysed in Figure 4.

ONLINE APPENDIX—NOT FOR PUBLICATION, June 21, 2024
"Dividend Taxation and Firm Performance with Heterogeneous Payout Responses" by Katarzyna Bilicka, Irem Güçeri, and Evangelos Koumanakos

Appendices

A Comparison with previous literature on investment effects of dividend taxation

Why do the results for the effects of dividend taxes differ so much across countries and studies? Why do Matray (2022) find a positive effect of dividend tax increases on investment, while Yagan (2015) finds no investment response? There are several potential answers.

First, given differential investment responses across asset categories, we turn to examine differences in the share of machinery and construction in gross capital formation in private sector between France, Greece and US. OECD statistics on gross capital formation suggests that Greek firms have the largest share of equipment in all capital formation, followed by US, followed by France. In particular, Greek firms have, on average, 36% of their capital formation coming from equipment during the 2000 - 2019 period. In turn, French firms have only 23% and US firms have 33%. We find that dividend taxes have no effect on equipment investment, but large effects on land and BVF (buildings, vehicles and furniture), offering a likely explanation to the differential responses between countries. In Greece, where equipment capital formation plays a large role, we find no overall effect on investment. In France, where equipment capital formation is much less important for overall investment, Matray (2022) find a large overall positive investment response. In the US, which is very similar to Greece in that respect, Yagan (2015) also found no average investment response. Our new detailed asset breakdown data allows us to reconcile these findings.

Second, in France, a median firm distributes dividends according to descriptives provided by Matray (2022), while a median firm in Greece does not. This suggests much higher propensity for dividend distributions in France, and consequently a larger exposure to the dividend tax reform. We find that firms that have high dividend distributions prior to the reform, increase their investment, which is also consistent with results from Matray (2022). The lack of average investment effect that we find may be driven by relatively fewer firms for which this reform is binding.

Table A1: Recent empirical papers on payout taxation.

Paper	Tax base	Direction of policy change	Identifying variation	Main data source	Payout response	Payout elast.	Investment response	Other outcomes
Poterba (1987)	Dividend	Cut	Dynamic model, US (1986)	Aggregate NIPA, US	(+)	1.57	(+)	n.a
Chetty and Saez (2005)	Dividend	Cut	Before/After Owner taxable status	Listed firms, CRSP (US)	(+), ext.margin	0.5	n.a	Repurchases
Alstadsæter and Fjærli (2009)	Dividend	Expected rise	Before/After announcement [then implementation]	Shareholder & Accounting Register, Norway		(+) [then (-)]	n.a	Capital structure
Yagan (2015)	Dividend	Cut	US S-Corps vs C-Corps	Tax returns, US	(+)	0.5	Zero	Compensation
Alstadsæter et al. (2017)	Dividend	Cut	Closely- vs widely-held	Tax returns, Sweden	(+)	n.a	(+) for cash-constrained	Equity
Jacob and Michaely (2017)	Dividend	Cut	High-vs low-tax owners of closely-held	Tax returns, Sweden	(+)	[0, 5.3]	(+)	Wages
Moon (2022)	Capital gains	Cut	Small vs Large (Eligibility)	Tax returns, Korea	n.a	n.a	(+)	Various
Hanlon and Hoopes (2014)	Dividend	Expected rise	Before/After announcement	Listed firms, CRSP (US)	(+)	n.a	n.a	n.a
Bach et al. (2023)	Dividend	Rise, then Cut	Two reforms in France	Tax returns, France	(-), then (+)	n.a	Zero	Various
Our paper	**Dividend**	**Introduction**	**SA vs LLC year-end date**	**Tax returns, financials, Greece**	**(-), ext.margin**	**1.25**	**Zero or positive**	**Survival, growth, wages**

Third, according to the new view vs old view debate (see, for example, Zodrow (1991)), investment financing policies are likely to affect firms' responsiveness. If the financing source of marginal investment is new equity, a new dividend tax could reduce the amount of investment that firms do. If firms prefer funding investment using retained earning, then the amount of investment that firms do should not change. It is entirely plausible that an average Greek firm is very different from a French firm, in terms of how they finance their investment. For example, on average, before the reform SAs used more retained earnings than LLCs in Greece, which could explain a small investment response. Further, if an average Greek firm uses retained earnings more often than the French one, this would further explain diverging results.

B Are private firms different from listed ones?

Payout policies of listed firms may be significantly different from those of private firms. In principle, payout responses of listed firms are likely to be more sticky, as shareholders may demand dividend payouts. In turn, private firms may be more responsive to policies. Given that the majority of firms in our sample are private, with only 240 listed firms in 2007, the paper focuses on private firms. In Table B1, we show the differential response of listed firms. We include an interaction term between listed dummy variable and the SA dummy to have triple difference in difference interaction. We show results across all main outcome variables that we consider in the paper. First, we find that listed firms did not change how much dividends they paid out relative to LLC, confirming the payout policy stickiness for those firms. At the extensive margin, it even appears that listed firms increased the incidence of dividend distributions relative to LLCs. We also find that listed firms reduced overall investment and investment in land and BVF. This reduction in investment in response to a new tax is consistent with old view and runs contrary to the agency view proposed by (Chetty and Saez, 2010).

Table B1: Listed firms responses.

	(1) Div/ta	(2) $1_{(Div>0)}$	(3) investment	(4) land & BVF.	(5) equipment	(6) reserves	(7) cash	(8) ret.earn.	(9) s.t. leverage	(10) l.t. leverage
Treated x [Year = T]	-0.005***	-0.073***	0.006	0.020**	0.002	0.012***	0.001	0.004	-0.051***	-0.006***
	(0.001)	(0.010)	(0.015)	(0.009)	(0.004)	(0.003)	(0.005)	(0.005)	(0.011)	(0.002)
Treated x [Year = T]	0.004***	0.092***	-0.108***	-0.047	-0.003	-0.022*	0.004	0.005	-0.036**	0.004
× listed	(0.001)	(0.006)	(0.033)	(0.032)	(0.027)	(0.012)	(0.009)	(0.017)	(0.018)	(0.010)
Observations	93394	93394	91978	93394	92091	93394	93394	93394	93394	93394
Mean	0.020	0.288	0.106	0.123	0.014	0.119	0.154	-0.161	0.478	0.045

Note: This table summarizes results on dividend distributions for listed and unlisted firms. The dependent variable is dividends scaled by asset value fixed in 2007 in column 1, a dummy equal to 1 when a firm distributed dividends in a given year in column 2, overall investment calculated as the growth rate of fixed assets in column 3, investment in land and BVF (buildings, vehicles and furniture) assets in column 4, investment in equipment in column 5. In column 6, 7, 8, 9, and 10 we consider reserves, cash, retained earnings and leverage. Short term leverage is defined as short term loans, while long term leverage is long term bank loans, both divided by total assets in 2007. Listed equals 1 when a firm is publicly traded. In each column we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. Year T refers to the reform year. There is no listed firms with financial year ending in June, so we only include December year end firms here.

C Payout policy heterogeneity

C.A Heterogeneity of response by payout policy preferences

Figure C1 demonstrates that there is a large heterogeneity in firm payout policies in our sample even in the absence of tax reform. In Panel A, we show that the majority of firms actually never distribute dividends and this is the case across all legal ownership statuses. In Panel B, we show that firms that pay above median dividends are distributed across firm types. Table C1 also confirms that firms with different regular distribution policies are significantly different from those that never distribute dividends across all firm observable characteristics. Nevertheless, in Table C2, we show that the effect of the reform on dividend distributions at the extensive and intensive margin is prevalent both for firms that always distribute (Panel A) and those that do so only sometimes (Panel B).

Table C1: Descriptive statistics for firms with different payout policies.

	Never payer	Sometime payer	diff	t-test
Divid/ total ass	0.000	0.046	0.046***	68.555
% firms paying dividends	0.000	0.660	0.660***	145.310
log revenue	10.981	13.932	2.952***	57.548
log assets	13.847	14.364	0.517***	27.887
inv rate	0.093	0.127	0.034***	5.984
Short-term Leverage	0.433	0.535	0.103***	20.950
Long-term Leverage	0.051	0.037	-0.014***	-9.191
reserves	0.138	0.092	-0.046***	-16.053
cash	0.157	0.154	-0.003	-1.335
ret. earn.	-0.291	0.003	0.294***	50.982
Observations	14287	10879	25166	

Note: This table summarizes average firm characteristics in 2007, the last year before the reform, for firms the never distribute dividends (column 1) and firms that sometimes distribute dividends (column 2).

Figure C1: Dividend distribution patterns before the reform.

a Number of firms by payout patterns.

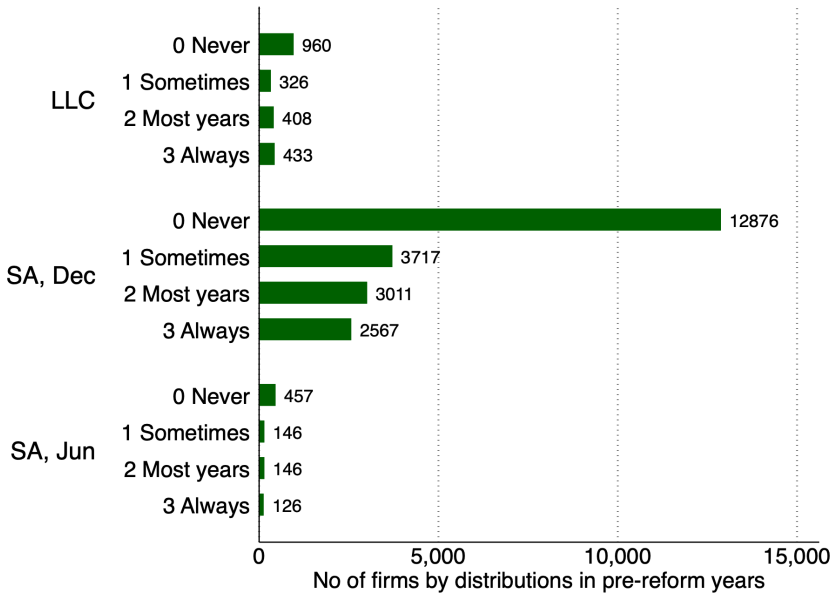
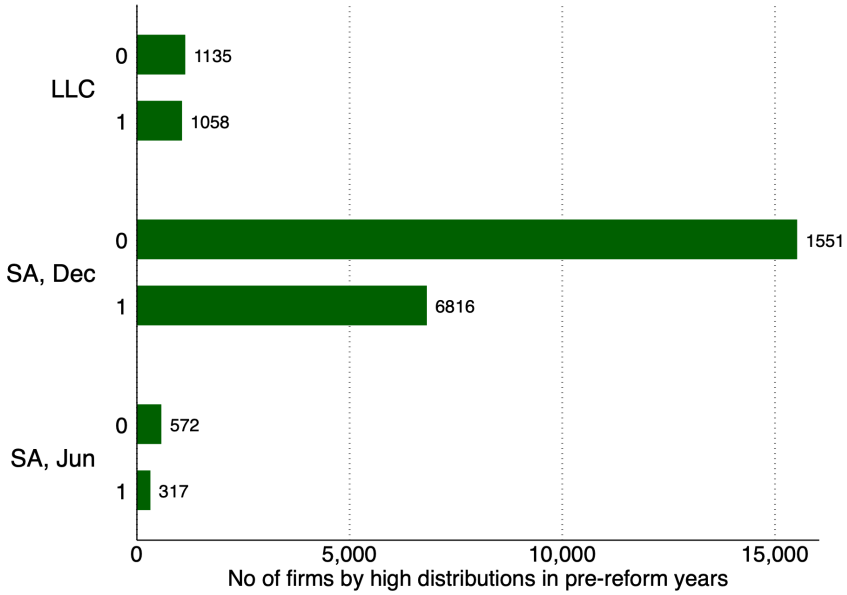


Figure C2: Number of firms by high dividend distribution patterns.



Note: In Panel A, we show the distribution of firms across payout categories before the reform. We classify firms according to whether and how often they distribute dividends before the reform. In Panel b, we classify firms according to whether they paid more than 50% of their profits out before the reform - high payers, value 1 - and those that paid below 50% of their profits before the reform - non-high payers, value 0.

Table C2: Dividend distributions: heterogeneity in payout persistence.

	(1) Div/ta	(2) Div/ta	(3) Div/ta	(4) $1_{(Div>0)}$	(5) $1_{(Div>0)}$	(6) $1_{(Div>0)}$
			Panel A: Always distributors			
Treated x [Year = *T*]	-0.008*			-0.133***		
	(0.004)			(0.024)		
Tr. (Jun) x [Year = *T*]		0.031***	0.033***		0.111***	0.108***
		(0.007)	(0.007)		(0.032)	(0.032)
Tr. (Dec) x [Year = *T*]		-0.011**	-0.010**		-0.148***	-0.145***
		(0.004)	(0.004)		(0.024)	(0.023)
Tr. (Jun) x [Year = *T+1*]			0.008			-0.169***
			(0.007)			(0.050)
Tr. (Dec) x [Year = *T+1*]			0.007			-0.115***
			(0.005)			(0.027)
Observations	13714	13714	17230	13714	13714	17230
Mean	0.082	0.082	0.082	1.000	1.000	1.000
			Panel B: Often and sometimes distributors			
Treated x [Year = *T*]	-0.006*			-0.112***		
	(0.003)			(0.021)		
Tr. (Jun) x [Year = *T*]		0.009**	0.008**		0.104***	0.100***
		(0.004)	(0.004)		(0.034)	(0.034)
Tr. (Dec) x [Year = *T*]		-0.006**	-0.006**		-0.123***	-0.120***
		(0.003)	(0.003)		(0.021)	(0.021)
Tr. (Jun) x [Year = *T+1*]			-0.004			-0.174***
			(0.004)			(0.037)
Tr. (Dec) x [Year = *T+1*]			-0.001			-0.132***
			(0.004)			(0.023)
Observations	35746	35746	43053	35746	35746	43053
Mean	0.031	0.031	0.031	0.523	0.523	0.523

Note: This table summarizes heterogeneity results on dividend distributions. In Panel A we include firms that distributed dividends in each of the years 2000 -2007 and in Panel B firms that distributed dividends in some of the years between 2000 - 2007. The dependent variable is dividends scaled by total capital (asset value fixed in 2007) in columns 1 - 3. In columns 4 - 6, the dependent variable is a dummy equal to 1 when a firm distributed dividends in a given year. In columns 2,3, 5 and 6 we split the treated dummy into treated June and treated December firms. In each column we include year, firm and sector-year fixed effects. In columns 1,2,4 and 5, we include a sample that ends in 2008, in columns 4 and 6, we include a sample that ends in 2009. Standard errors are clustered at the firm level. Year *T* refers to the reform year, and Year *T+1* is the year following the reform. In Year *T*, December year-end firms are directly affected by the reform, while June year-end firms are not taxed, but anticipate the tax in year *T+1*.

C.B Heterogeneity of response by payout policy types: high dividend payers

The median firm in each sector distributes no dividends. We therefore label the firms that distribute over 50% of their after-tax profits (prior to the reform) as 'high payers'.[23] We posit that the firms that distribute over 50% of profit (in the pre-reform period) have a strong preference to distribute dividends, and this may affect their response to the dividend tax introduction relative to the responses of other firms. On the one hand, these firms may choose not to respond to a dividend tax at all, given their strong preferences for distribution. On the other hand, given the large amount of distributions that they make, the total cost of the dividend tax will be large for them in absolute terms.

In Table C4 we test the responsiveness of these two types of firms. In Panel A, we focus on the effect for high payers, while in Panel B on non-high payers. The format of this Table follows the exposure in Table 2 in the paper, where in columns 1 and 4 we show baseline results, while in columns 2, 3, 4, and 5, we present results splitting SAs into June and December in the post period.

We show that the strong extensive margin response to the dividend tax is largely driven by high payers. High payers give a strong and sustained response by reducing their likelihood to distribute dividends by an average of 15-17 percentage points. In turn, for non-high payers, we find a much smaller response, at around half the magnitude (7 percentage points) of the coefficient for high payers. In Column 3, we show that the December year-end firms that paid high dividends prior to the reform have a large, *knee-jerk*-type short-lived overall response to the introduction of the dividend tax. Non-high payers with December year-ends, on the other hand, respond with a sustained average reduction on the intensive margin. This may mean that the firms that distributed in moderate amounts in the pre-reform period permanently reduced their payout amounts.

Further, the announcement effect (to distribute in the last tax-free year) for the June year-end high payers is strong both on the intensive and the extensive margin. On average, June year-end firms increased the dividend distribution (as a share of their asset size) by 1.5 percentage points. On the extensive margin, June year-end high payers increased the likelihood of distributing by 9.4 percentage points. At the same time, non-high payer June firms did not see a significant response to the announcement of the reform.

In Table C3 and Figure C3 we show descriptive statistics that compare high and non-high

[23] Changes to this threshold, or using the median value for positive dividend distributions lead to similar results and conclusions to the analysis that we present here.

payers both in terms of their observable characteristics and industry distribution. We show that these two types of firms are similarly distributed across sectors. However, we find that a much larger fraction of non-high payers is loss-making. This is a concern if loss-making and profit-making firms respond differently to dividend taxes. We explore this possibility in Table C6 to show that the payout response is mainly driven by profitable firms, especially with regard to June dividend payout increases.[24] However, we still observe a reduction in payouts for December loss-making firms, even though it is of a smaller magnitude than that for profitable firms.

[24]We define a loss-making firm as a firm that made losses in each of the years 2005 - 2007. These results are robust to alternative definitions of loss-making, such as, for example, being loss-making in all time periods.

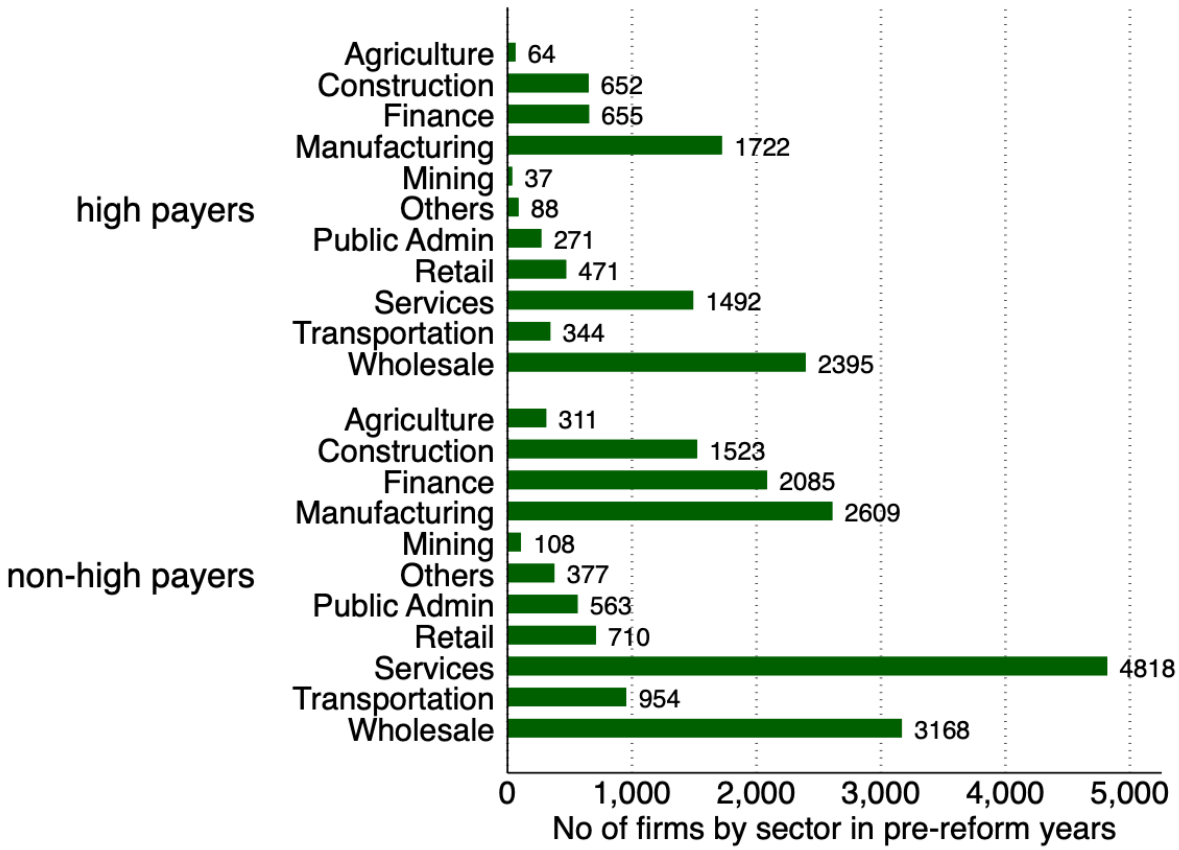
Table C3: Descriptive statistics: high vs non-high payers.

Panel A: All firms				
	(1) non-high	(2) high	(3) diff	(4) t-test
Divid/ total ass	0.001	0.059	-0.058***	-68.959
% firms paying dividends	0.052	0.787	-0.735***	-152.287
log revenue	11.485	13.965	-2.481***	-53.427
log assets	13.967	14.286	-0.319***	-16.958
tax prof/ total ass	-0.134	0.095	-0.229***	-62.466
acc prof/ total ass	-0.009	0.100	-0.109***	-53.785
% firms with tax loss	0.594	0.084	0.509***	105.198
% firms with acc loss	0.478	0.073	0.404***	84.729
inv rate	0.098	0.132	-0.034***	-5.545
land and buildings	0.111	0.145	-0.034***	-8.323
Short-term Leverage	0.446	0.548	-0.102***	-21.713
Long-term Leverage	0.051	0.033	0.018***	11.739
reserves	0.132	0.086	0.046***	18.160
cash	0.154	0.159	-0.004	-1.540
ret. earn.	-0.245	0.015	-0.260***	-53.256
Age	29.937	31.497	-1.561***	-9.545
SA=1	0.934	0.871	0.063***	15.210
Observations	17226	8191	25417	

Panel B: Profitable firms				
Divid/ total ass	0.003	0.063	-0.060***	-64.298
% firms paying dividends	0.130	0.845	-0.715***	-111.215
log revenue	13.641	14.179	-0.537***	-11.920
log assets	14.342	14.341	0.002	0.066
tax prof/ total ass	0.068	0.115	-0.047***	-20.793
acc prof/ total ass	0.062	0.114	-0.052***	-21.805
% firms with tax loss	0.031	0.003	0.027***	10.818
% firms with acc loss	0.091	0.010	0.081***	19.267
inv rate	0.148	0.135	0.014	1.636
land and buildings	0.146	0.148	-0.002	-0.265
Short-term Leverage	0.466	0.560	-0.093***	-17.846
Long-term Leverage	0.041	0.032	0.009***	4.511
reserves	0.108	0.082	0.026***	7.223
cash	0.155	0.154	0.000	0.064
ret. earn.	0.022	0.026	-0.004	-1.071
Age	31.114	31.742	-0.628***	-2.822
SA	0.896	0.865	0.032***	5.311
Observations	5046	6921	11964	

Note: This table summarizes the average firm characteristics for high and non-high dividend paying firms in 2007, the last year before the reform. We define high payers as those firms that have the ratio of dividend payments to adjusted earnings above 50% between 2005 and 2007. Adjusted earnings is after tax profits (accounting profits minus income tax) less 5% that has to be put aside for reserves.

Figure C3: Dividend distribution patterns before the reform: industry variation.



Note: We show the distribution of firms across sectors before the reform. We classify firms according to whether they pay out high dividends before the reform in years 2005 - 2007. We define high dividend payers as those firms that have the ratio of dividend payments to adjusted earnings above 50% between 2005 and 2007. Adjusted earnings is after tax profits (accounting profits minus income tax) less 5% that has to be put aside for reserves.

Table C4: Dividend distributions: high payout heterogeneity.

	(1) Div/ta	(2) Div/ta	(3) Div/ta	(4) $1_{(Div>0)}$	(5) $1_{(Div>0)}$	(6) $1_{(Div>0)}$
			Panel A: High-payers			
Treated x [Year = *T*]	-0.010***			-0.151***		
	(0.003)			(0.017)		
Tr. (Jun) x [Year = *T*]		0.015***	0.016***		0.092***	0.091***
		(0.004)	(0.004)		(0.029)	(0.029)
Tr. (Dec) x [Year = *T*]		-0.011***	-0.011***		-0.164***	-0.161***
		(0.003)	(0.003)		(0.017)	(0.017)
Tr. (Jun) x [Year = *T+1*]			-0.003			-0.211***
			(0.004)			(0.034)
Tr. (Dec) x [Year = *T+1*]			0.000			-0.160***
			(0.003)			(0.020)
Observations	36643	36643	44989	36643	36643	44989
Dep. var. mean	0.059	0.059	0.059	0.787	0.787	0.787
			Panel B: Non-high payers			
Treated x [Year = *T*]	-0.005***			-0.060***		
	(0.001)			(0.010)		
Tr. (Jun) x [Year = *T*]		0.002	0.002		0.020	0.017
		(0.002)	(0.002)		(0.016)	(0.016)
Tr. (Dec) x [Year = *T*]		-0.005***	-0.005***		-0.064***	-0.065***
		(0.001)	(0.001)		(0.009)	(0.010)
Tr. (Jun) x [Year = *T*]			-0.006***			-0.057***
			(0.002)			(0.017)
Tr. (Dec) x [Year = *T*]			-0.006***			-0.059***
			(0.002)			(0.012)
Observations	74699	74699	93228	74699	74699	93228
Dep. var. Mean	0.001	0.001	0.001	0.052	0.052	0.052

Note: This table summarizes heterogeneity results on dividend distributions. In Panel A we include firms that distributed more than 50% of their after tax profits before the reform and in Panel B firms that distributed less than 50% of their profits before the reform. The dependent variable is dividends scaled by total asset value fixed in 2007 in columns 1 - 3. In columns 4 - 6, the dependent variable is a dummy equal to 1 when a firm distributed dividends in a given year. In columns 2,3, 5 and 6 we split the treated dummy into treated June and treated December firms. In each column we include year, firm and sector-year fixed effects. In columns 1,2,4 and 5, we include a sample that ends in 2008, in columns 4 and 6, we include a sample that ends in 2009. Standard errors are clustered at the firm level. Year *T* refers to the reform year, and Year *T+1* is the year following the reform. In Year *T*, December year-end firms are directly affected by the reform, while June year-end firms are not taxed, but anticipate the tax in year *T+1*.

Table C5: Heterogeneity by high payers.

Panel A: High payers

	(1) investment	(2) land and BVF	(3) equipment	(4) reserves	(5) cash	(6) ret. earn.	(7) ret. earn. dummy	(8) s.t leverage	(9) l.t. leverage
Treated x [Year = T]	0.033	0.031**	0.005	0.008**	0.018*	0.022***	0.001	-0.060***	-0.006
	(0.023)	(0.013)	(0.006)	(0.003)	(0.009)	(0.008)	(0.018)	(0.022)	(0.005)
Observations	34874	35071	34899	22336	22336	22336	22336	22336	22336
Dep. var. mean	0.133	0.147	0.023	0.089	0.150	0.020	0.861	0.535	0.035

Panel B: Non-high payers

	(1) investment	(2) land and BVF	(3) equipment	(4) reserves	(5) cash	(6) ret. earn.	(7) ret. earn. dummy	(8) s.t leverage	(9) l.t. leverage
Treated x [Year = T]	-0.010	0.011	0.004	0.014**	0.010	-0.005	0.015	-0.047***	-0.004
	(0.019)	(0.012)	(0.005)	(0.006)	(0.008)	(0.010)	(0.011)	(0.018)	(0.003)
Observations	70801	71618	70924	58234	58234	58234	58234	58234	58234
Mean	0.098	0.112	0.009	0.131	0.155	-0.253	0.271	0.442	0.052

Note: This table summarizes results for investment responses for high (Panel A) and non-high dividend payers (Panel B). High payers are we firms that paid more than 50% of their profits out in years 2005 - 2007 before the reform, and non-high firms are those that paid below 50% of their profits before the reform. In column 1, the dependent variable is the growth rate of fixed assets. In column 2 it is the growth rate of land, buildings, vehicles and furniture assets; in column 3 it is growth rate of equipment assets. In column 4 w have reserves, in column 5 cash, in column 6 retained earnings, in column 7 retained earnings dummy, in columns 8 and 9 short term and long term leverage, respectively. Short term leverage is defined as short term loans, while long term leverage is long term bank loans, both divided by total assets in 2007. In each column we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. T refers to the reform year.

Table C6: Dividend distributions: profit- vs loss-makers.

	(1) Div/ta	(2) Div/ta	(3) Div/ta	(4) $1_{(Div>0)}$	(5) $1_{(Div>0)}$	(6) $1_{(Div>0)}$
			Panel A: Profitable firms			
Treated x [Year = *T*]	-0.008***			-0.119***		
	(0.002)			(0.013)		
Tr. (Jun) x [Year = *T*]		0.015***	0.015***		0.109***	0.103***
		(0.003)	(0.003)		(0.023)	(0.024)
Tr. (Dec) x [Year = *T*]		-0.009***	-0.009***		-0.131***	-0.130***
		(0.002)	(0.002)		(0.013)	(0.013)
Tr. (Jun) x [Year = *T+1*]			-0.001			-0.157***
			(0.003)			(0.029)
Tr. (Dec) x [Year = *T+1*]			0.000			-0.117***
			(0.002)			(0.015)
Observations	53330	53330	66224	53330	53330	66224
Dep. var. mean	0.038	0.038	0.038	0.544	0.544	0.543
			Panel B: Loss-making firms			
Treated x [Year = *T*]	-0.002			-0.036***		
	(0.002)			(0.013)		
Tr. (Jun) x [Year = *T*]		0.001	0.001		0.001	0.004
		(0.002)	(0.002)		(0.019)	(0.019)
Tr. (Dec) x [Year = *T*]		-0.002	-0.002		-0.038***	-0.035***
		(0.002)	(0.002)		(0.013)	(0.013)
Tr. (Jun) x [Year = *T+1*]			-0.008***			-0.066***
			(0.003)			(0.021)
Tr. (Dec) x [Year = *T+1*]			-0.005**			-0.046***
			(0.002)			(0.017)
Observations	58119	58119	72101	58119	58119	72101
Dep. var. mean	0.004	0.004	0.004	0.063	0.063	0.063

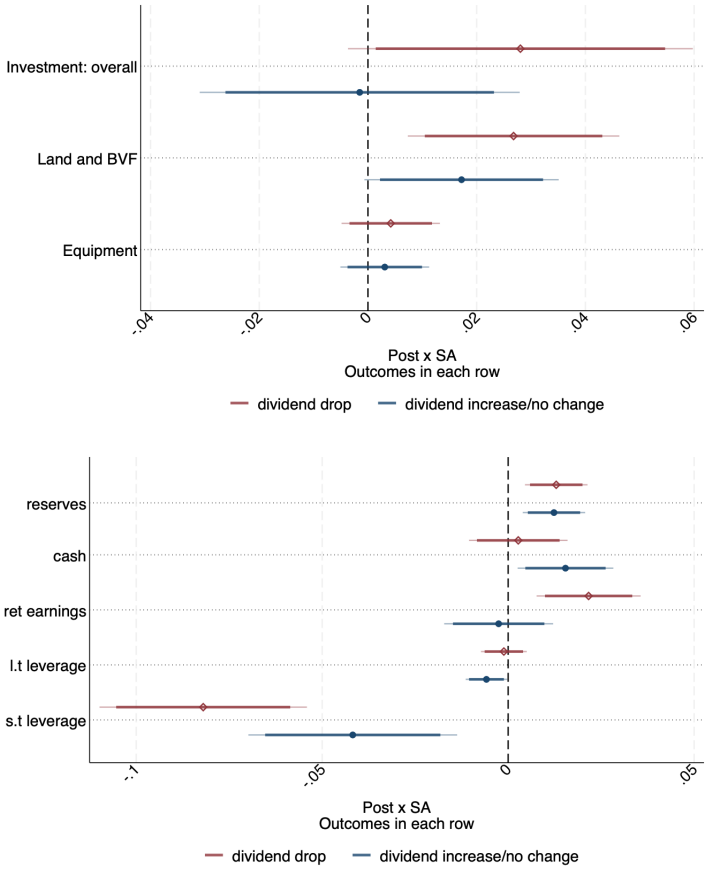
Note: This table summarizes results on dividend distributions dividing firms between profitable (Panel A) and loss-making (Panel B). Loss makers are those firms that have negative taxable profits in years 2005 - 2007. Profitable firms are defined as those that did not have negative taxable profits in any one of the years 2005 - 2007. The dependent variable is dividends scaled by total capital (asset value fixed in 2007) in columns 1 - 3. In columns 4 - 6, the dependent variable is a dummy equal to 1 when a firm distributed dividends in a given year. In columns 2,3, 5 and 6 we split the treated dummy into treated June and treated December firms. In each column we include year, firm and sector-year fixed effects. In columns 1,2,4 and 5, we include a sample that ends in 2008, in columns 4 and 6, we include a sample that ends in 2009. Standard errors are clustered at the firm level. Year *T* refers to the reform year, and Year *T+1* is the year following the reform. In Year *T*, December year-end firms are directly affected by the reform, while June year-end firms are not taxed, but anticipate the tax in year *T+1*.

Table C7: Other margins of responses: profit- vs loss-makers.

	(1) investment	(2) land and BVF	(3) equipment	(4) reserves	(5) cash	(6) ret. earn.	(7) ret. earn. dummy	(8) s.t leverage	(9) l.t. leverage
Panel A: Loss-making firms									
Treated x [Year = T]	0.022	0.020*	0.004	0.010***	0.003	-0.002	-0.011	-0.049***	-0.007
	(0.019)	(0.011)	(0.005)	(0.002)	(0.007)	(0.005)	(0.013)	(0.015)	(0.004)
Observations	50989	51156	50655	34957	34957	34957	34957	34957	34957
Dep.var mean	0.141	0.148	0.024	0.093	0.149	0.030	0.815	0.508	0.038
Panel A: Profitable firms									
Treated x [Year = T]	0.007	0.032**	0.006	0.014	0.025**	0.022	0.031**	-0.054**	0.000
	(0.024)	(0.015)	(0.007)	(0.009)	(0.012)	(0.015)	(0.013)	(0.026)	(0.004)
Observations	54778	55639	55267	45714	45714	45714	45714	45714	45714
Dep. var. mean	0.080	0.100	0.005	0.139	0.157	-0.334	0.145	0.437	0.054

Note: This table summarizes results on investment, reserve, cash, retained earnings, and leverage. We divide firms between profitable (Panel B) and loss-making (Panel A). Loss makers are those firms that have negative taxable profits in years 2005 - 2007. Profitable firms are defined as those that did not have negative taxable profits in any one of the years 2005 - 2007. In column 1, the dependent variable is the growth rate of fixed assets. In column 2 it is the growth rate of land and BVF (buildings, vehicles and furniture) assets; in column 3 it is growth rate of equipment assets. In column 4 w have reserves, in column 5 cash, in column 6 retained earnings, in column 7 retained earnings dummy, in columns 8 and 9 short term and long term leverage, respectively. Short term leverage is defined as short term loans, while long term leverage is long term bank loans, both divided by total assets in 2007. In each column we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. T refers to the reform year. We exclude June firms in this table and only present the effect for December-year end firms.

Figure C4: Heterogeneity by dividend response.



Note: This Figure summarizes the heterogeneous response to the reform from firms that either decrease their dividend payouts or increase/ do not change them. Each dot represents a coefficient estimate on $[Year = T] \times SA$, i.e. the response of SAs in 2008. Red hollow diamonds correspond to coefficient estimates for firms that decreased their dividends. Blue full circles correspond to coefficient estimates for firms that increased or did not change their dividends in 2008. Lines are confidence intervals, where the darker ones are 90% and lighter ones are 95%. A dependent variable in each specification is listed on the left of the panel. Investment is growth rate of fixed assets. Land and BVF (buildings, vehicles and furniture) is growth rate of assets held in land and BVF, similar for equipment. Reserves, cash and retained earnings are all scaled by total assets in 2007. Short term leverage is defined as short term loans, while long term leverage is long term bank loans, both divided by total assets in 2007. In each regression we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. Corresponding coefficient estimates are in Table C8 in the Online Appendix.

Table C8: Heterogeneity by dividend responses.

Panel A: Firms that reduced dividends

	(1) investment	(2) land and BVF	(3) equipment	(4) reserves	(5) cash	(6) ret. earn.	(7) ret. earn. dummy	(8) s.t leverage	(9) l.t. leverage
Treated x [Year = T]	0.028*	0.027***	0.004	0.013***	0.003	0.022***	-0.089***	-0.082***	-0.001
	(0.016)	(0.010)	(0.005)	(0.004)	(0.007)	(0.007)	(0.011)	(0.014)	(0.003)
Observations	34727	35024	34857	23460	23460	23460	23460	23460	23460
Mean	0.131	0.144	0.022	0.094	0.152	-0.019	0.775	0.565	0.037

Panel B: Firms that did not reduce dividends

	(1) investment	(2) land and BVF	(3) equipment	(4) reserves	(5) cash	(6) ret. earn.	(7) ret. earn. dummy	(8) s.t leverage	(9) l.t. leverage
Treated x [Year = T]	-0.002	0.017*	0.003	0.012***	0.015**	-0.003	0.052***	-0.042***	-0.006**
	(0.015)	(0.009)	(0.004)	(0.004)	(0.007)	(0.007)	(0.009)	(0.014)	(0.003)
Observations	76751	77603	76951	60386	60386	60386	60386	60386	60386
Mean	0.102	0.117	0.011	0.126	0.156	-0.231	0.315	0.453	0.050

Note: This table summarizes results on investment, reserve, cash, leverage, revenues and retained earnings responses by heterogeneous dividend response. Panel A includes only firms that reduced dividends in 2008. Panel B includes firms that did not reduce dividends (either did not change them or increased them). In column 1, the dependent variable is the growth rate of fixed assets. In column 2 it is the growth rate of land and BVF (buildings, vehicles and furniture) assets; in column 3 it is growth rate of equipment assets. In column 4 w have reserves, in column 5 cash, in column 6 retained earnings, in column 7 retained earnings dummy, in column 8 short-term leverage, and in column 9 long-term leverage. Short-term leverage is defined as short-term loans, while long term leverage is long term bank loans, both divided by total assets in 2007. In each column we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. Year T refers to the reform year.

D Long-run implications: survival and growth

In this Online Appendix, we explore whether responses to the dividend tax reform by the treatment group firms predict either the likelihood of going bankrupt during and after the financial crisis or the growth rate of surviving firms over the challenging period of 2010-2013. We carry out this analysis solely for the treatment group firms, because LLCs were subject to the dividend tax in 2010, which makes them an inappropriate control group after 2010. Further, we limit the sample to include only firms that reduced their payouts in response to the introduction of dividend taxation. In each specification we control for growth rate over the period 2004 - 2007.

For the analysis of bankruptcy, we use the information on all firms that have gone bankrupt in Greece after 2010 to create a dummy variable for firm status by the end of 2013. In a series of regressions, we estimate the probability of being bankrupt on dummy variables that capture how the firm responded to the reform. Specifically, we generate the following dummy variables to explain the probability of going bankrupt during the Greek sovereign debt crisis years: (i) investment increase (also splitting into investment increase in land and BVF and equipment), (ii) reserves increase, (iii) cash holdings increase, (iv) retained earnings increase, (v) decrease in short-term and long-term debt stock .

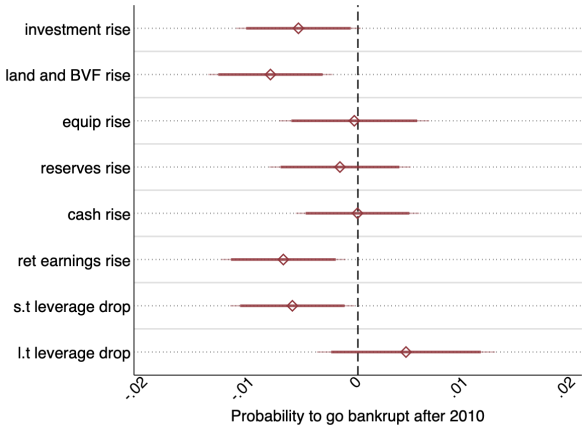
In Panel A in Figure D1, we show the relationship between each margin of response and the probability of bankruptcy during the 2010-2013 period. We find that firms that retained their earnings and consequently increased investment, especially in land and BVF, and/or reduced their short-term debt stock have a lower likelihood of bankruptcy during the liquidity crunch of 2010-2013. In fact, including both investment and short-run leverage in the same specification reveals that both of those matter equally to determine the probability to go bankrupt. Our results suggest that the tax may have improved the long-run economic performance of a subset of responding companies. In Panel B of Figure D1, we show the role of the dimensions (i-v) of response to the reform for sales growth during 2008-2013. Among the surviving firms, we find that the firms that use the funds that remain in the firm to increase investment have performed better in terms of sales growth (captured by the change in the log of sales between 2008 and 2013). In turn, treated firms that focused on 'avoiding to pay' this tax at all costs, i.e. increased their reserve accounts, see lower sales growth between 2008 and 2013 than those that did not increase these margins. While repaying short-term debt significantly reduces the risk of bankruptcy in a liquidity crisis, it does not significantly affect the overall firm growth relative to treated firms that did not reduce short-term debt.

However, our results suggest that reducing long-term debt has positive effect on sales growth during 2008-2013.

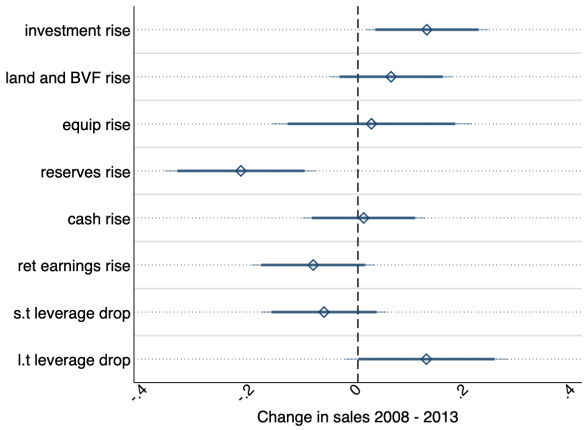
To establish the relationship between these long-run responses and the dividend payout heterogeneity, in Figure D2 we split the sample of treated SAs into those that were high dividend payers before the reform and those that were not and perform the same analysis as in Figure D1. We start by making an observation that being a high dividend payer increases the probability to go bankrupt and reduces the sales growth during 2008-2013 significantly. However, within the subsample of high dividend payers, those firms that increased investment in land and BVF, increased retained earnings, and reduced their short-term debt are those for which we observe a reduction in the probability to go bankrupt (LHS of Panel A). While we also see a reduction in probability to go bankrupt for firms that increase investment and retain earnings for the subsample of firms that are non high payers, all non-high payers have a lower probability to go bankrupt (RHS of Panel A). In Panel B, we find that high-dividend paying firms that use the funds that remain in the firm to increase investment have performed better in terms of sales growth, especially given that being high dividend payer, on average, substantially reduced firm's sales growth. For this subsample, we also observe the repaying long-term debt improves their performance. These results corroborate our findings from D1 and suggest that our effects are driven by high dividend payers, which we find are the firms that behave consistently with our conceptual framework.

Figure D1: Long-run responses: likelihood of bankruptcy and sales growth.

Panel A: Reform response and the likelihood of going bankrupt



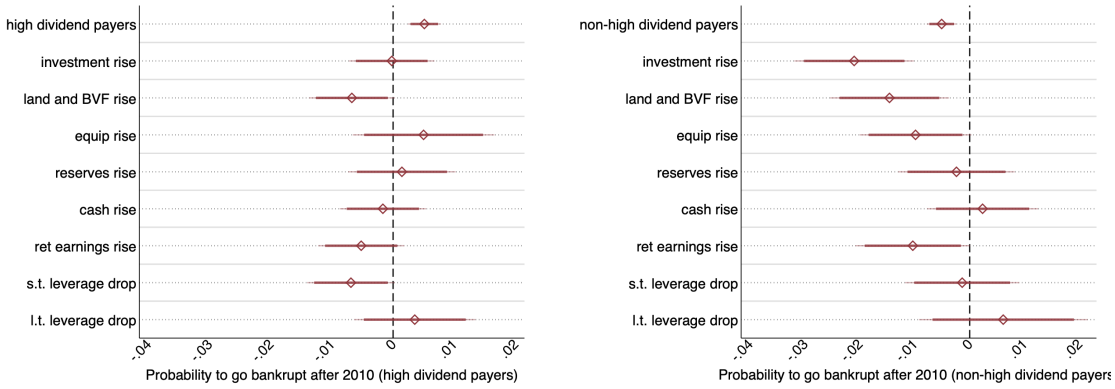
Panel B: Reform response and sales growth



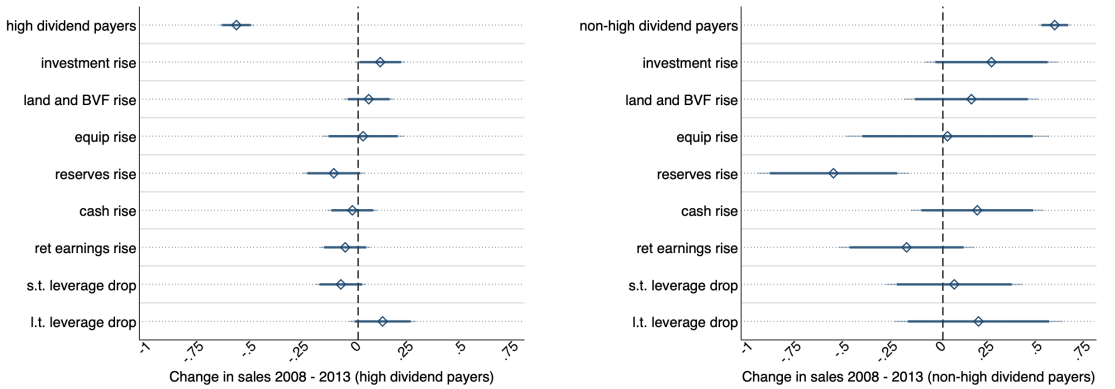
Note: In Panel A, we plot the coefficients from a regression of the likelihood of a firm going bankrupt after 2010 on dummy variables capturing how the firm reacted to the reform. In Panel B, we plot the coefficients from a regression of sales growth (in log) over the 2008-2013 period on dummy variables capturing how the firm reacted to the reform. Red and blue hollow diamonds correspond to coefficient estimates. Lines are confidence intervals, where the darker ones are 90% and lighter ones are 95%. Investment is growth rate of fixed assets. Investment categories: land and BVF (buildings, vehicles and furniture), and equipment are also growth rates of assets in these respective categories. Reserves, cash, retained earnings, and leverage are all scaled by total assets in 2007. Reserves, retained earnings, cash, and all investment categories are all equal to 1 if a firm increased any of those firm observables in 2008. For leverage, the dummy is equal to 1 if a firm decreased its leverage. Short-term leverage is defined as short-term loans, while long-term leverage is long-term bank loans, both divided by total assets in 2007. For each of those regressions, we collapse the dataset at the firm level using post 2007 data only and include only SAs that reduced their dividends. In each specification we control for growth rate over the period 2004 - 2007. Standard errors are clustered at the firm level. Corresponding coefficient estimates are in Table D1 in the Online Appendix.

Figure D2: Long-run responses: heterogeneity by high dividend payers status.

Panel A: Reform response and the likelihood of going bankrupt



Panel B: Reform response and sales growth



Note: In Panel A, we plot the coefficients from a regression of the likelihood of a firm going bankrupt after 2010 on dummy variables capturing how the firm reacted to the reform. In Panel B, we plot the coefficients from a regression of sales growth (in log) over the 2008-2013 period on dummy variables capturing how the firm reacted to the reform. The left-hand side panels show results for a sub-group of firms that were paying high dividends before the reform and the right-hand side panels show results for a sub-group of firms that were not. High dividend payers are firms that paid more than 50% of their profits out before the reform. Red and blue hollow diamonds correspond to coefficient estimates. Lines are confidence intervals, where the darker ones are 90% and lighter ones are 95%. High dividend payers is a dummy equal to 1 when a firm was a high dividend payer, non-high dividend payers is a dummy equal to 1 when a firms was a non-high dividend payer. Investment is growth rate of fixed assets. Investment categories: land and BVF (buildings, vehicles and furniture), and equipment are also growth rates of assets in these respective categories. Reserves, cash, retained earnings, and leverage are all scaled by total assets in 2007. Reserves, retained earnings, cash, and all investment categories are all equal to 1 if a firm increased any of those firm observables in 2008. For leverage, the dummy is equal to 1 if a firm decreased its leverage. Short-term leverage is defined as short-term loans, while long-term leverage is long-term bank loans, both divided by total assets in 2007. For each of those regressions, we collapse the dataset at the firm level using post 2007 data only and include only SAs that reduced their dividends. In each specification we control for growth rate over the period 2004 - 2007. Standard errors are clustered at the firm level. Corresponding coefficient estimates are in Tables D2 and D3 in the Online Appendix.

Table D1: Long-run responses: bankruptcy and sales growth.

Dep. var. bankrupt	**Panel A: Reform response and the likelihood of going bankrupt**							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
investment rise	-0.006*							
	(0.003)							
land & BVF rise		-0.008***						
		(0.003)						
equip. rise			-0.000					
			(0.004)					
cash rise				-0.000				
				(0.003)				
reserves rise					-0.002			
					(0.003)			
ret earn. rise						-0.007**		
						(0.003)		
s.t. leverage drop							-0.006**	
							(0.003)	
l.t. leverage drop								0.004
								(0.004)
Observations	8099	8099	8099	8099	8099	8099	8099	8099
Dep. var. sales growth	**Panel B: Reform response and sales growth**							
investment rise	0.129**							
	(0.059)							
land & BVF rise		0.062						
		(0.059)						
equip. rise			0.025					
			(0.095)					
cash rise				0.011				
				(0.059)				
reserves rise					-0.219***			
					(0.072)			
ret earn. rise						-0.084		
						(0.059)		
s.t. leverage drop							-0.063	
							(0.060)	
l.t. leverage drop								0.128*
								(0.077)
Observations	4818	4818	4818	4818	4818	4818	4818	4818

Note: This table summarizes the results for bankruptcy likelihood and sales growth following the financial crisis. In Panel A, we estimate the effects on the likelihood of a firm going bankrupt after 2010 on dummy variables capturing how the firm reacted to the reform. In Panel B, we estimate the effects on sales growth (in log) over the 2008-2013 period on dummy variables capturing how the firm reacted to the reform. Investment is growth rate of fixed assets. Investment categories: land and BVF (buildings, vehicles, and furniture), and equipment are also growth rates of assets in these respective categories. Reserves, cash, retained earnings, and leverage are all scaled by total assets in 2007. Reserves, retained earnings, cash, investment are all equal to 1 if a firm increased any of those firm observables in 2008. For leverage, the dummy is equal to 1 if a firm decreased its leverage. Short term leverage is defined as short term loans, while long term leverage is long term bank loans, both divided by total assets in 2007. For each of those regressions, we collapse the dataset at the firm level using post 2007 data only and include only SAs that reduced their dividends. Standard errors are clustered at the firm level.

Table D2: Long-run responses: bankruptcy high dividend payers heterogeneity.

Dep. var. bankrupt	**Panel A: High dividend**							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
investment rise	-0.000							
	(0.004)							
land & BVF rise		-0.007*						
		(0.004)						
equip. rise			0.005					
			(0.006)					
cash rise				-0.002				
				(0.004)				
reserves rise					0.001			
					(0.004)			
ret earn. rise						-0.005		
						(0.004)		
s.t. leverage drop							-0.007*	
							(0.004)	
l.t. leverage drop								0.004
								(0.005)
Observations	5393	5393	5393	5393	5393	5393	5393	5393
Dep. var. sales growth	**Panel B: Non-high dividend**							
investment rise	-0.021***							
	(0.006)							
land & BVF rise		-0.015***						
		(0.006)						
equip. rise			-0.010*					
			(0.005)					
cash rise				0.002				
				(0.005)				
reserves rise					-0.002			
					(0.005)			
ret earn. rise						-0.010*		
						(0.005)		
s.t. leverage drop							-0.001	
							(0.005)	
l.t. leverage drop								0.006
								(0.008)
Observations	2706	2706	2706	2706	2706	2706	2706	2706

Note: This table summarizes the results for bankruptcy likelihood following the financial crisis. We estimate the effects on the likelihood of a firm going bankrupt after 2010 on dummy variables capturing how the firm reacted to the reform. In Panel A, we estimate the effect of the reform for firms that had high dividend payouts before the reform, while in Panel B for firms that did not have high dividend payouts. High dividend payers are firms that paid more than 50% of their profits out before the reform. Investment is growth rate of fixed assets. Investment categories: land and BVF (buildings, vehicles, and furniture), and equipment are also growth rates of assets in these respective categories. Reserves, cash, retained earnings, and leverage are all scaled by total assets in 2007. Reserves, retained earnings, cash, investment are all equal to 1 if a firm increased any of those firm observables in 2008. For leverage, the dummy is equal to 1 if a firm decreased its leverage. Short term leverage is defined as short term loans, while long term leverage is long term bank loans, both divided by total assets in 2007. For each of those regressions, we collapse the dataset at the firm level using post 2007 data only and include only SAs that reduced their dividends. Standard errors are clustered at the firm level.

Table D3: Long-run responses: sales growth, high dividend payers heterogeneity.

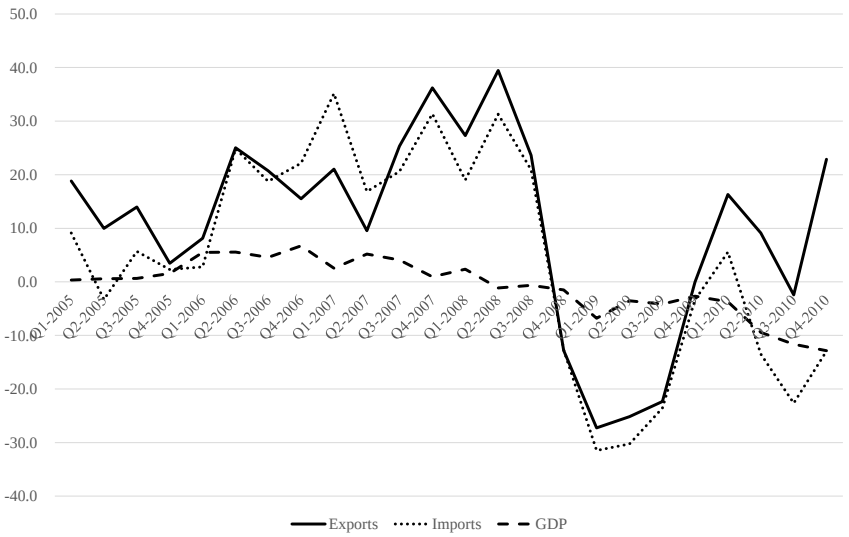
Dep. var. bankrupt	**Panel C: High dividend**							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
investment rise	0.105*							
	(0.061)							
land & BVF rise		0.051						
		(0.061)						
equip. rise			0.024					
			(0.100)					
cash rise				-0.027				
				(0.061)				
reserves rise					-0.116			
					(0.077)			
ret earn. rise						-0.062		
						(0.061)		
s.t. leverage drop							-0.082	
							(0.062)	
l.t. leverage drop								0.117
								(0.081)
Observations	3999	3999	3999	3999	3999	3999	3999	3999
Dep. var. sales growth	**Panel D: Non-high dividend**							
investment rise	0.252							
	(0.177)							
land & BVF rise		0.148						
		(0.178)						
equip. rise			0.024					
			(0.268)					
cash rise				0.178				
				(0.176)				
reserves rise					-0.568***			
					(0.201)			
ret earn. rise						-0.188		
						(0.179)		
s.t. leverage drop							0.059	
							(0.181)	
l.t. leverage drop								0.185
								(0.223)
Observations	819	819	819	819	819	819	819	819

Note: This table summarizes the results for sales growth following the financial crisis. We estimate the effects on sales growth (in log) over the 2008-2013 period on dummy variables capturing how the firm reacted to the reform. In Panel A, we estimate the effect of the reform for firms that had high dividend payouts before the reform, while in Panel B for firms that did not have high dividend payouts. High dividend payers are firms that paid more than 50% of their profits out before the reform. Investment is growth rate of fixed assets. Investment categories: land and BVF (buildings, vehicles, and furniture), and equipment are also growth rates of assets in these respective categories. Reserves, cash, retained earnings, and leverage are all scaled by total assets in 2007. Reserves, retained earnings, cash, investment are all equal to 1 if a firm increased any of those firm observables in 2008. For leverage, the dummy is equal to 1 if a firm decreased its leverage. Short term leverage is defined as short term loans, while long term leverage is long term bank loans, both divided by total assets in 2007. For each of those regressions, we collapse the dataset at the firm level using post 2007 data only and include only SAs that reduced their dividends. Standard errors are clustered at the firm level.

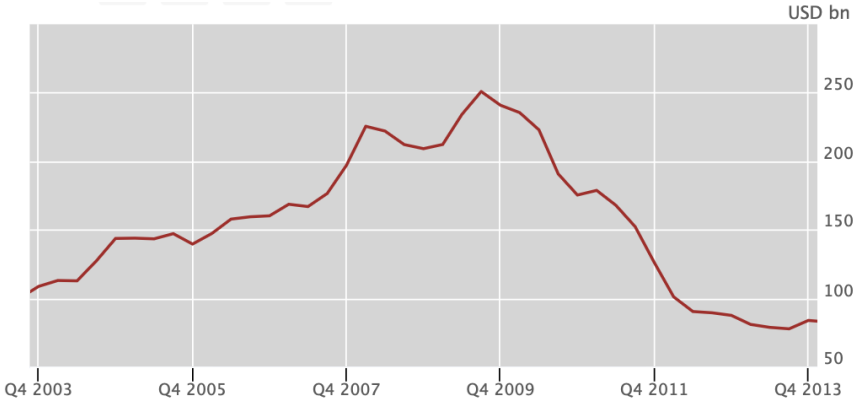
E Additional figures and tables

Figure E1: Financial Crisis evolution: Greece.

a Evolution of GDP, exports and imports.



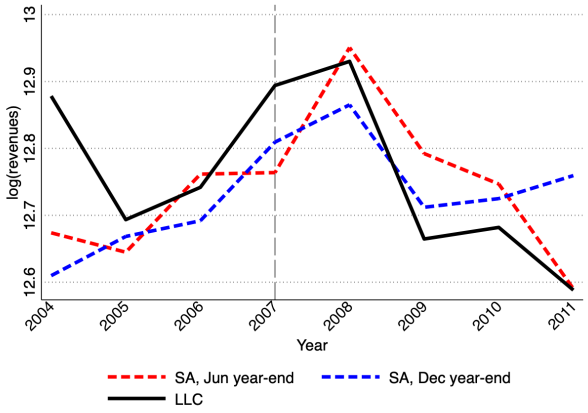
b Evolution of international claims on all Greek counterparts.



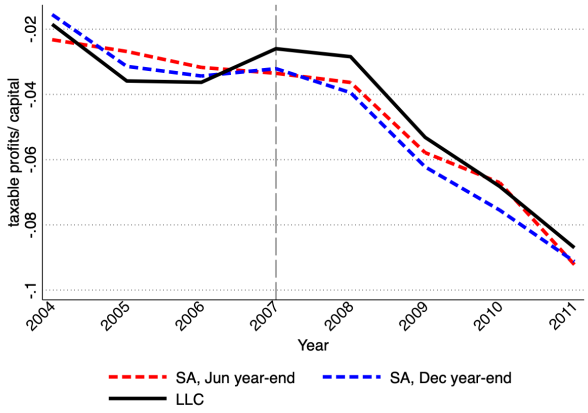
Note: In Panel A, we plot the quarterly evolution of GDP, imports and exports in Greece between 2005 and 2010. Each variable is a growth rate relative to the same period in the previous year. Source: OECD Quarterly statistics. In Panel B, we plot the quarterly evolution of banks' cross-border positions on residents of Greece. Source: Bank for International Settlement, Locational banking statistics.

Figure E2: Financial crisis: revenues and profits.

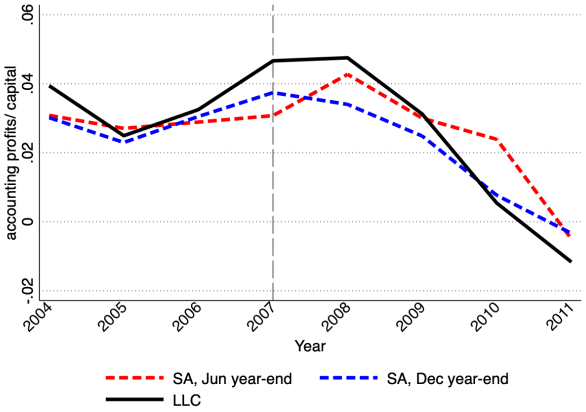
a Logarithm of revenues.



b Taxable profits scaled by total assets.



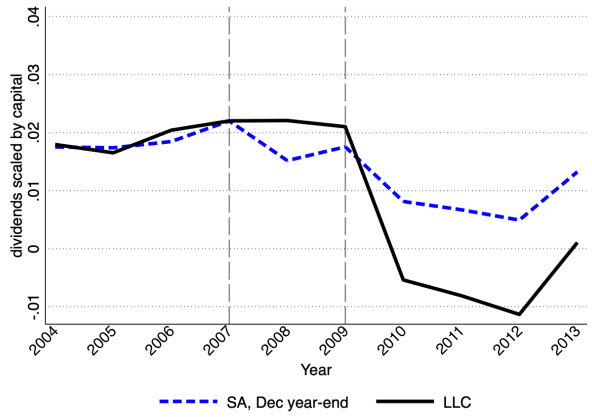
c Accounting profits scaled by total assets.



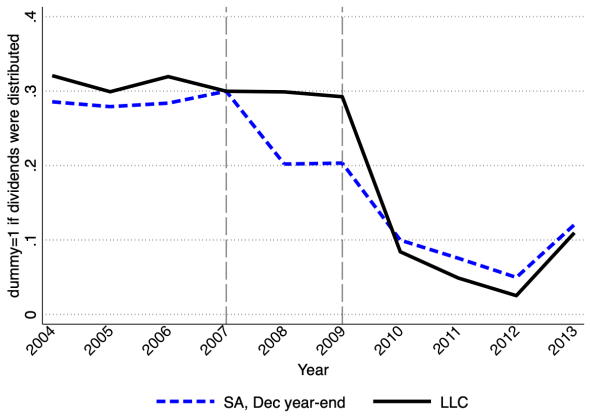
Note: In Panel A, we plot the raw average logarithm of revenues for SAs and LLCs. In Panel B, we plot the taxable profits scaled by capital. In Panel C, we plot the accounting profits scaled by capital. We split SAs into firms with December year end, the blue dashed line, and firms with June end year, the red dashed line. LLCs are represented by black solid line. In Panels B and C, we use as the scaling variable, capital, balance sheet total assets in 2007. For comparability, we remove firm fixed effects, subtract from each data point the group average for 2007 and add back the pooled mean from the same period. The vertical dashed line marks the last pre-reform period. In all samples, we remove MNEs, single-owner firms and the finance sector.

Figure E3: Dividend distributions in the long-run: SAs vs LLCs.

a Dividends scaled by total assets.

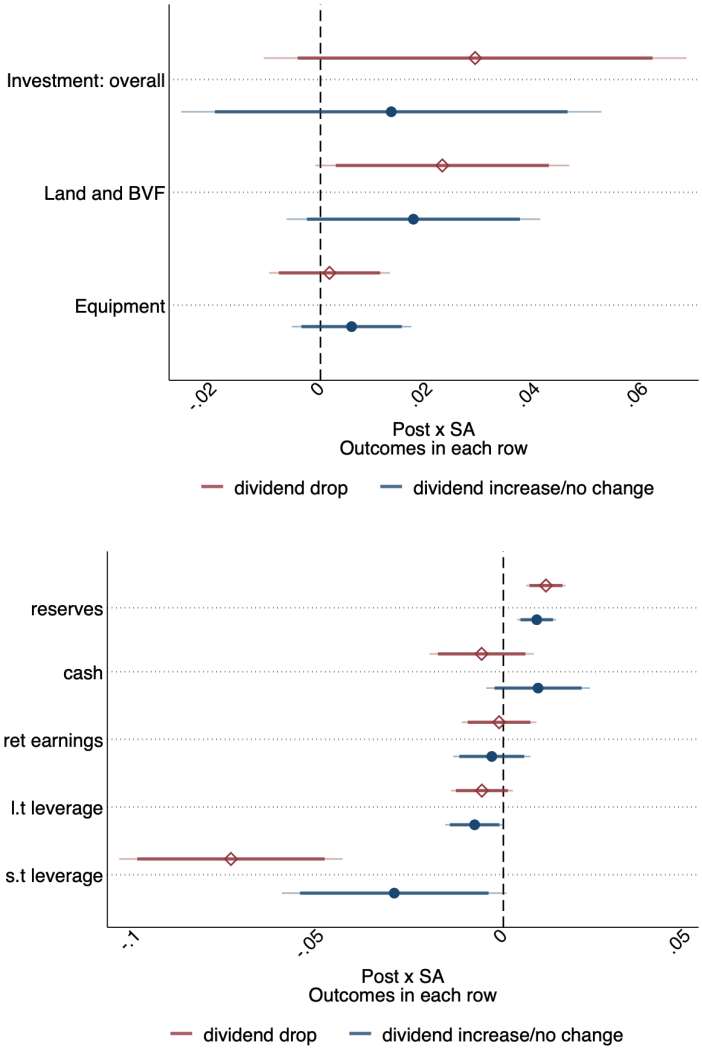


b Share of firms paying dividends.



Note: In Panel A, we plot the average dividend distributions scaled by capital for SAs and LLCs. In Panel B, we plot the share of firms distributing dividends in each year. SAs are represented by the red dashed line. LLCs are represented by black solid line. We use as the scaling variable, capital, balance sheet total assets in 2007. For comparability, we remove firm fixed effects, subtract from each data point the group average for 2007 and add back the pooled mean from the same period. The vertical dashed lines mark the last pre-reform periods. The first vertical line is when the SAs are subject to dividend tax for the first time, while LLCs are not. The second vertical line is when the new, higher, dividend tax rate is imposed on both LLCs and SAs.

Figure E4: Heterogeneity by dividend response: profitable firms only.



Note: This Figure summarizes the heterogeneous response to the reform from firms that either decrease their dividend payouts or increase/ do not change them. Here, we only include profitable firms, which are defined as those that did not have negative taxable profits in any one of the years 2005 - 2007. Each dot represents a coefficient estimate on $[Year = T] \times SA$, i.e. the response of SAs in 2008. Red hollow diamonds correspond to coefficient estimates for firms that decreased their dividends. Blue full circles correspond to coefficient estimates for firms that increased or did not change their dividends in 2008. Lines are confidence intervals, where the darker ones are 90% and lighter ones are 95%. A dependent variable in each specification is listed on the left of the panel. Investment is growth rate of fixed assets. Land and BVF (buildings, vehicles and furniture) is growth rate of assets held in land and BVF, similar for equipment. Reserves, cash and retained earnings are all scaled by total assets in 2007. Short-term leverage is defined as short-term loans, while long-term leverage is long-term bank loans, both divided by total assets in 2007. In each regression we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level.

Table E1: Investment responses: June vs December firms.

	(1) investment	(2) BVF	(3) land	(4) land and BVF	(5) equipment
Tr. (Jun) x [Year = *T*]	-0.046**	-0.042***	-0.037***	-0.042***	0.008
	(0.022)	(0.014)	(0.007)	(0.013)	(0.007)
Tr. (Dec) x [Year = *T*]	0.010	0.019**	0.028***	0.023***	0.003
	(0.015)	(0.009)	(0.004)	(0.009)	(0.004)
Tr. (Jun) x [Year = *T+1*]	0.103***	0.093***	0.073***	0.095***	-0.005
	(0.023)	(0.016)	(0.009)	(0.014)	(0.008)
Tr. (Dec) x [Year = *T+1*]	-0.011	0.005	-0.016***	0.001	0.004
	(0.015)	(0.009)	(0.003)	(0.009)	(0.003)
Observations	136,085	137,276	134,418	137,515	136,499
# firms	27,112	27,358	27,316	27,398	27,326
# June firms	1,046	1,050	1,052	1,050	1,052
Mean	0.109	0.129	-0.012	0.122	0.014

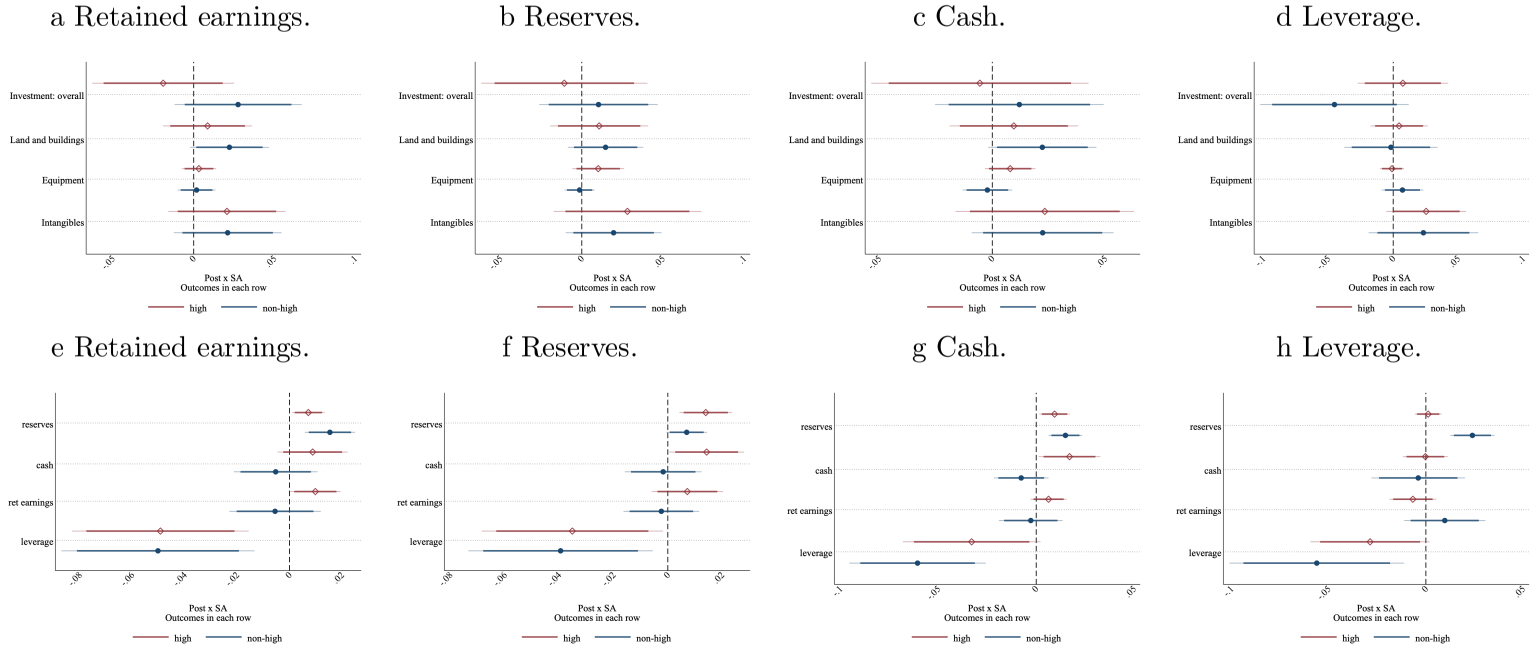
Note: This table summarizes results for investment responses. In all columns, we split the treated dummy into treated June and treated December firms, but only in post periods. In column 1, the dependent variable is the overall investment calculated as the growth rate of fixed assets. In column 2, it is the investment in buildings, vehicles and furniture (BVF), in column 3 investment in land, in column 4 sum of investment in land and BVF, and in column 5 investment in equipment. In each column we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. Year *T* refers to the reform year, and Year *T+1* is the year following the reform. In Year *T*, December year-end firms are directly affected by the reform, while June year-end firms are not taxed, but anticipate the tax in year *T+1*.

Table E2: Other margins of responses: June vs December firms.

	(1) reserves	(2) cash	(3) ret. earn.	(4) ret. earn. dummy	(5) short t leverage	(6) long t. leverage
Tr. (Jun) x [Year = *T*]	-0.012*	0.019**	-0.005	0.021	-0.034*	-0.005
	(0.007)	(0.009)	(0.011)	(0.015)	(0.020)	(0.005)
Tr. (Dec) x [Year = *T*]	0.012***	0.014**	0.005	0.013	-0.045***	-0.004
	(0.004)	(0.006)	(0.007)	(0.009)	(0.014)	(0.003)
Tr. (Jun) x [Year = *T+1*]	0.012	0.014	-0.007	0.002	-0.026	-0.002
	(0.009)	(0.011)	(0.015)	(0.019)	(0.025)	(0.006)
Tr. (Dec) x [Year = *T+1*]	0.014***	0.003	0.013	0.006	-0.072***	-0.009**
	(0.005)	(0.008)	(0.009)	(0.012)	(0.018)	(0.004)
Observations	108,526	108,526	108,526	108,526	108,526	108,526
# firms	25,580	25,580	25,580	25,580	25,580	25,580
# June firms	976	976	976	976	976	976
Mean	0.120	0.153	-0.181	0.431	0.470	0.047

Note: This table summarizes results on reserve, cash, retained earnings, leverage, profits and revenue responses. In all columns, we split the treated dummy into treated June and treated December firms, but only in post periods. The dependent variable is reserves divided by total assets in 2007 in column 1, cash scaled by total assets in 2007 in column 2, retained earnings scaled by total assets in 2007 in column 3, retained earnings dummy, which is equal to 1 if a firm has any retained earnings in column 4, leverage in column 5, dummy equal to 1 if a firm has positive profits in column 6, and logarithm of revenues in column 7. In each column we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level. Year *T* refers to the reform year, and Year *T+1* is the year following the reform. In Year *T*, December year-end firms are directly affected by the reform, while June year-end firms are not taxed, but anticipate the tax in year *T+1*.

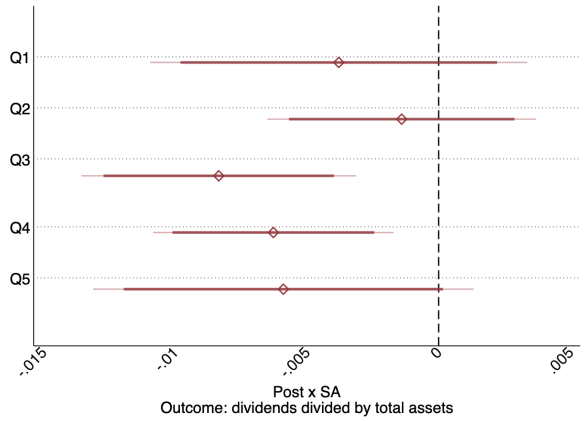
Figure E5: Heterogeneities by 'high' reserves, leverage, cash and retained earnings.



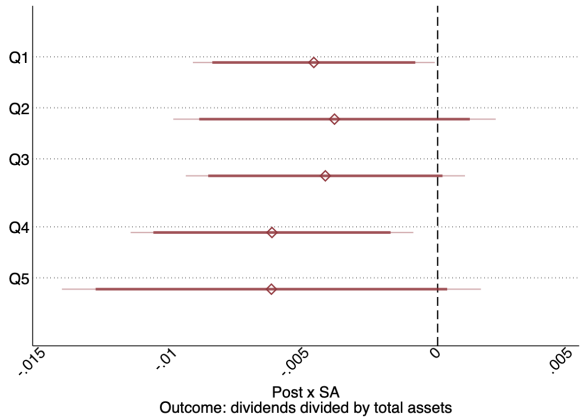
Note: This Figure plots the coefficients on $[Year = T] \times SA$, i.e. the response of SAs in 2008. Each panel considers a heterogeneous response across firm-level outcomes depending on whether a firm had 'high' retained earnings (panels A, E), 'high' reserves (Panels B, F), 'high' cash (Panels C, G), 'excess' leverage (Panels D, H). 'High' is defined as above median is each sector in the last year before the reform, 2007. Red hollow diamonds correspond to coefficient estimates for 'high' firms. Blue full circles correspond to coefficient estimates for non-high firms. Lines are confidence intervals, where the darker ones are 90% and lighter ones are 95%. A dependent variable in each specification is listed on the left of the panel. Investment is growth rate of fixed assets. Land and BVF (buildings, vehicles and furniture) is growth rate of assets held in land and BVF, similar for equipment. Reserves, cash and retained earnings are all scaled by total assets in 2007. In each regression we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level.

Figure E6: Heterogeneities by size and cash holdings.

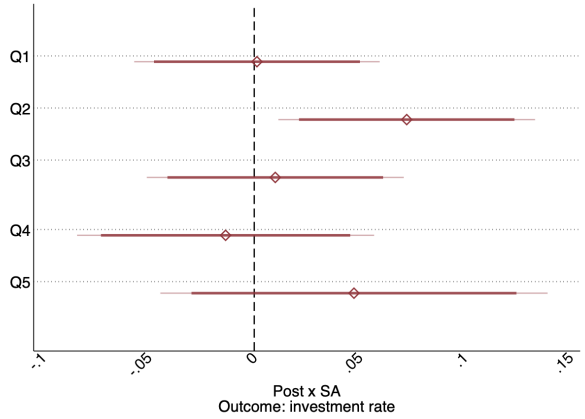
a Dividends: by size.



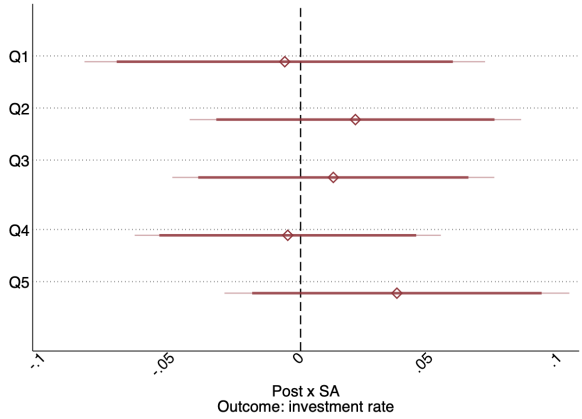
b Dividends: by cash quantiles.



c Investment: by size.



d Investment: by cash quantiles.



Note: This Figure plots the coefficients on $[Year = T] \times SA$, i.e. the response of SAs in 2008. Each coefficient is estimated separately within each quantile of size or cash distribution. In Panel A, we plot coefficients of dividends response by quantiles of total assets distribution in 2007. In Panel B, we plot coefficients of dividends response by quantiles of cash holdings in 2007. In Panel C, we plot coefficients of investment response by quantiles of total assets n 2007. In Panel D, we plot coefficients of investment response by quantiles of cash holdings in 2007. Lines are confidence intervals, where the darker ones are 90% and lighted ones are 95%. Investment is growth rate of fixed assets, while dividends are scaled by total assets in 2007. In each regression we include year, firm and sector-year fixed effects. Standard errors are clustered at the firm level.