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PERFORMANCE WITH  
HETEROGENEOUS PAYOUT  
RESPONSES**

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JEL Classification: H32, H25, G32, G11

Keywords: investment

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# Dividend Taxation and Firm Performance with Heterogeneous Payout Responses

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December 20, 2022

## Abstract

We analyze the short and long-run performance of firms that were differentially affected by a new tax on dividends in the lead-up to the Global Financial Crisis. We use exogenous policy variation for firms with different legal statuses and financial year-end dates to causally identify the policy impact. Consistent with intertemporal tax arbitrage, immediately-affected firms significantly reduce payouts. At a time of severe liquidity shortage, the average firm uses the undistributed cash to pay back debt. In the long run, the allocation of undistributed cash to investment, retained earnings, and debt repayment predicts growth and the likelihood of bankruptcy.<sup>1</sup>

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Keywords: Dividend tax, firm survival, investment, intertemporal tax arbitrage

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# 1 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; Bach et al., 2019; Boissel and Matray, 2022; Moon, 2022; Yagan, 2015). In the United States, Yagan (2015) found that the 2003 dividend tax cut induced companies to increase payouts, but had no effect on investment and employee compensation. In France, Boissel and Matray (2022) and Bach et al. (2019) found that companies reduced dividend distributions in response to an increase in the dividend tax rate. Boissel and Matray's results suggest that tax-induced cash retention lead to higher investment for firms that have better investment opportunities. Evidence from a tax cut in Sweden shows that closely-held, cash-strapped firms increase investment. There is also growing evidence that points 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. (2019)). Taken together, these results suggest heterogeneous and asymmetric real effects in response to reductions and increases in dividend taxes.

We build on these recent findings and ask new questions about the timing, size, and long-run effects of the introduction of a new dividend tax. Do firms immediately change their payout decisions following the announcement of a future dividend tax? Can the introduction of a dividend tax dampen inefficient payouts, and if so, could a tax incentivize companies to keep funds within the firm and use them as a lifeline when faced with an adverse liquidity shock? 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 follow our firms in the aftermath of the Global Financial Crisis (GFC) to evaluate the relationship between responses to dividend taxation and company survival after a major adverse liquidity shock.

We leverage the population of company tax returns matched with company accounts at the micro level in Greece over the period 2003 - 2018. 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 introduction of the dividend tax in Greece followed a 2007 decision 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 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, rendering them to be a suitable control group for our analysis.

In the first part of the paper, we present three sets of findings regarding dividend payouts. First, we show that privately-owned treated firms immediately and significantly reduce distributions.<sup>2</sup> Our result is driven by the extensive margin response, where we show that 7.9% of companies on which the new dividend tax is levied stop paying dividends right after the introduction of the new tax. Second, we find that even firms that tend to distribute dividends frequently relative to their peers respond to the policy by reducing their regular dividend payments (Michaely and Roberts, 2011). This, again, manifests more as a complete interruption of dividend payments (extensive margin) rather than a reduction in average distributions (intensive margin).

Third, 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).<sup>3</sup> In particular, the negative immediate reaction to the reform is driven by firms with December year-ends, while June year-end firms substantially increase the amount of dividends that they distribute in the tax-free year. June year-end firms become 5.7% more likely to distribute dividends in the reform year, relative to LLCs. 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

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<sup>2</sup>We find no significant effect of the new tax on distributions for publicly traded firms, see 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).

<sup>3</sup>This experiment exploits the requirement that a company must declare dividend distributions not more than six months after the closing date of its financial year. With three months between the September announcement of the policy and its January implementation, companies with October-to-December year-ends were affected straight away. However, any company with mid-year end-dates could declare tax-free dividends for the most recent financial period as soon as the policy was announced in September. In this setting, both groups are actually treated by the reform in different ways. One group has an incentive to front-load some of its future dividend payments, and the other group is incentivized to reduce dividend payments.

in [Bach et al. \(2019\)](#); [Boissel and Matray \(2022\)](#); [Yagan \(2015\)](#), but larger in magnitude than [Boissel and Matray \(2022\)](#); [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 4](#).

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 money that they do not distribute. First, we consider the overall investment response without any breakdown into different investment categories 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 ([Boissel and Matray, 2022](#)). We find significant investment adjustments are made using land and buildings and/or intangibles ([Love, 2020](#)), but not equipment ([Yagan, 2015](#)). We find that the reform induced firms to reduce their leverage and locate their money in tax-free reserve accounts or just hold cash, likely to avoid paying the tax altogether. We find no robustly significant average effect of the reform on profitability or revenues.

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 *excess* dividends, i.e., diverge from optimal dividend smoothing policies ([Lintner, 1956](#); [Michaely and Roberts, 2011](#)). We complement our results on real responses by analyzing the heterogeneity of these responses depending on whether firms excessively distributed dividends before the reform. We find a strong positive effect on investment for the group that we identify as excess-distributors, again driven by land and buildings and intangibles. These results suggest that the excess-distributors may have favored personal benefit over the company's debt repayment, investment, and savings and dividend taxes may correct for this inefficient behavior.<sup>4</sup>

In the last part of the paper, we examine whether the heterogeneous responses to the

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<sup>4</sup>Note that having 'excessive' retained earnings, reserves, leverage or cash does not generate similar heterogeneity.

dividend tax introduction can predict the long-run resilience of firms to the financial crisis. We utilize the bankruptcy data, which provides information on all firms that have gone bankrupt in Greece after 2010. We show that firms that reduced their dividend payouts increased average investment and retained earnings significantly and paid back their debt. These firms are precisely the ones that *later* have a lower probability of going bankrupt after the Global Financial Crisis (GFC) and the Greek sovereign debt crisis when liquidity was significantly stretched. For the surviving firms, the growth performance was much stronger only for firms that responded to the policy by increasing investment. Surviving firms that used the funds kept in the firm to reduce leverage did not experience a significant growth boost from reducing their stock of debt. Firms that put the funds into a reserve account, trying to avoid paying the tax, experienced lower growth. We interpret these findings as evidence for dividend tax inducing long-run benefits if firms use the funds kept in the firm in a productive way.

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 Bach et al. (2019) and Boissel and Matray (2022) who show a reduction in dividend payments in response to tax increases. Our setting is different from the studies in France in three 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); (ii) we examine changes in different investment types (as in Love (2020)); and (iii) we leverage detailed data on bankruptcies in the period following the GFC and the Greek sovereign debt crisis to assess the impact of the tax-induced liquidity buffer on company exits and sales growth. This final point highlights the uniqueness of the setting that we study; we posit that an exogenous reform changes behavior in ways that impact the resilience of firms in the face of a liquidity crisis. We study this period as a laboratory to evaluate the policy effect on performance in a prolonged period of stretched liquidity. The drawback of evaluating outcomes during a downturn arises from multiple changes that may differentially affect treated and control firms for reasons unrelated to the reform. In a similar spirit to the study of investment in



Guceri and Albinowski (2021), we establish comparability across different groups using a variety of performance measures over time. In Section 2.3, we discuss the Greek experience with the crisis, and in Appendix E, we show the trajectory of revenues and profits across treated and control groups, and demonstrate the effect of a later reform on control group firms. The response of these firms to the later introduction of the dividend tax is remarkably similar to that of treated firms.

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 21<sup>st</sup> century and Chetty and Saez (2005) document extensive margin responses in a before/after study of the US 2003 tax cut. 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. More recent evidence suggests that dividend taxes have a limited impact on overall firm outcomes such as investment in physical capital (Alstadsæter et al., 2017; Auerbach, 2002; Yagan, 2015). This has been challenged by Boissel and Matray (2022). We contribute to this literature in two ways. First, we show that the average investment response is tied to the initial payout response. In our context, only 27% of firms actually cut dividends and for these responders, we observe a significant change in investment. We examine in detail the types of investment in which affected firms may potentially allocate cash and show novel evidence for how intangibles, land, buildings, and equipment are differentially affected. This detailed investment analysis contributes to the recent findings on the effects of dividend taxes on intangible investment (Love, 2020).

Further, we show that the re-allocation of funds within a firm in response to the intro-

duction of dividend tax may have a beneficial effect on company performance (Boissel and Matray, 2022). Differently from Boissel and Matray (2022), we study the period after the GFC and use bankruptcy data at the firm level to study whether companies’ use of retained funds affects the probability of bankruptcy in the post-GFC era. We show that the use of funds retained in the firm after the introduction of the dividend tax is informative about survival and growth in the aftermath of the liquidity shock. These findings are consistent with the empirical patterns of liquidity management behavior during GFC identified in Campello et al. (2011); the new tax, by inducing the firms to keep the cash within the firm to invest or to reduce leverage, led to higher survival and growth.

The remainder of the paper is organized as follows. We describe the policy context in Section 2. We present our datasets and descriptive characteristics of the data in Section 3. We discuss our empirical approach in Section 3. We present our baseline results in Section 4, followed by our analysis of the reform on real outcomes in Section 5 and then on long-run outcomes in Section 6. We conclude in Section 7.

## 2 Policy context

### 2.1 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.<sup>5</sup> 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.

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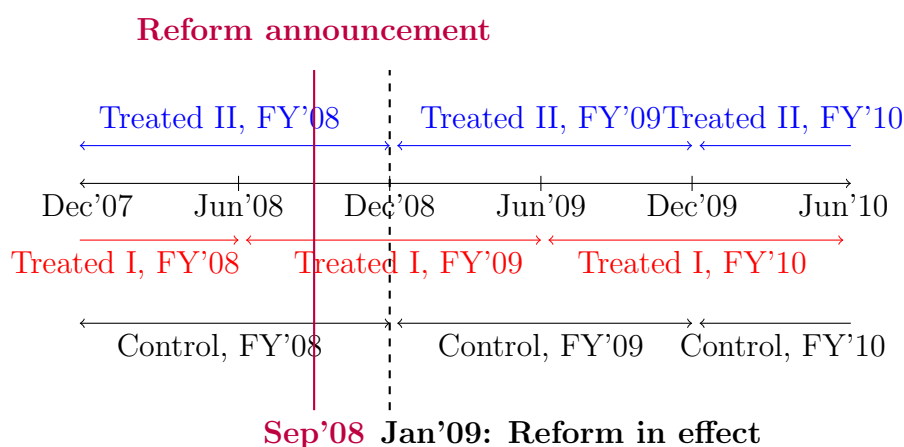
<sup>5</sup>Corporations with smaller size in terms of sales/assets/number of employees can opt for publication of shorter financial statements.

## 2.2 The process of corporate payouts and the introduction of dividend taxation

In general, 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 6 months after their financial statements' closing date. This allowance is useful for our identification strategy when we exploit announcement effects 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.

The new dividend tax was introduced in Greece by tax law 3697/2008, which was a response to the infringement procedure of the European Commission against Greece in 2007 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.

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.<sup>6</sup>



Note: LLCs are treated in 2010 at the same rate as SAs.

<sup>6</sup>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.

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. 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.

The introduction of dividend taxation for SAs was followed by numerous reforms that expanded the dividend tax net. In 2010, Greece introduced another dividend tax that replaced the flat tax with a withholding dividend tax on LLCs and SAs at a higher rate of 21%. Figure 1 demonstrates that LLCs do not show any anticipatory reactions in dividend payments before 2010. Because this second reform then equalizes the tax treatment of distributions by LLCs and SAs, our quasi-experimental identification is only valid until the introduction of this second reform.<sup>7</sup>

## 2.3 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 first safeguard against any confounding effects of the Global Financial Crisis (GFC), before moving on to study the liquidity shortage arising from the Greek sovereign debt crisis as one of the main objects of interest in this paper.

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 2.2.<sup>8</sup> 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.

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<sup>7</sup>In Figure F3 we plot the evolution on dividend payouts after 2010. We can see that the dividend distributions of LLCs dropped substantially below those of SAs in 2010.

<sup>8</sup>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’.

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 [F1a](#), 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. 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 [F2](#), we show that revenues and profits of SAs (both June and December) and LLCs evolved similarly between 2007 and 2011.

Finally, we consider the Greek sovereign debt crisis as a large adverse liquidity shock to firms. Over the period 2001-2008, the Greek banking system expanded, with a rise in loans extended to the private sector largely thanks to Greece’s adoption of the common currency. According to [European Commission \(2020\)](#), “Greek bank [deposits] had grown strongly during the pre-crisis years, peaking at about EUR 238 bln in September 2009. However, from October 2009, Greek banks experienced a steady outflow of deposits. (p.29)”, and Greek banks eventually lost access to international capital markets at the end of 2009. These observations lead us to conclude that the period starting in 2010 presents an unprecedented shock to liquidity provision for privately-held domestic businesses operating in Greece, that is, the sample of interest for our study of the long-run implications of the reform.

## 3 Data and estimation

### 3.1 Data, sample construction and variable definitions

In this paper, we use the universe of Greek corporate tax returns matched with financial data from ICAP, the leading private data source in Greece<sup>9</sup>. We match these two datasets

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<sup>9</sup>ICAP provides source data for Orbis Bureau van Dijk for Greece.

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.

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.

**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 represent a share of after-tax profits that is subsequently added to shareholder's funds. Reserves are different from retained earnings, as they cannot be used for investment for a year and unlike retained earnings in the Greek context, they are not subject to a tax.

Leverage is defined as long-term liabilities scaled by total assets in 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 intangible assets, land and buildings, and equipment. 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.

### 3.2 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:

$$Y_{i,t} = \alpha + \beta \times SA_i \times post_t + \delta \times X'_{it} + \eta_t + \psi_i + \mu_{jt} + \epsilon_{i,t} \quad (1)$$

where,  $i$  is firm,  $t$  is year and  $j$  is sector.  $Y_{i,t}$  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;  $X'_{it}$  is a set of firm-level control variables, namely, lagged revenue, revenue percentile bins;  $\eta_t$  is the year fixed effect,  $\psi_i$  is the firm-specific fixed effect,  $\mu_{jt}$  are sector-year fixed effects and  $\epsilon_{i,t}$  is the error term. The parameter of interest is  $\beta$ , which captures the effect of the dividend tax introduction on a firm's behavior.

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  $SA_{June_i}$  and  $SA_{Dec_i}$ . 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 2, which is a dynamic version of equation 1. 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:

$$Y_{i,t} = \alpha + \sum_{\kappa=2004}^{2009} \delta_{\kappa} 1[t = \kappa] + \sum_{\kappa=2004}^{2009} \gamma_{\kappa} 1[t = \kappa] \times SA_i + \delta \times X'_{it} + \eta_t + \psi_i + \mu_{jt} + \epsilon_{i,t} \quad (2)$$

where  $Y_{i,t}$  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  $\kappa$  years, with the dummy variable corresponding to  $\kappa = 2007$  as the omitted category. All the other variables are defined as for equation 1. The coefficients of interest are the  $\gamma_t$ , as they measure the average change in the outcome variable for SAs relative LLCs and relative to the  $\kappa$  year before or after the reform.

## 4 The effects on dividend distributions

### 4.1 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 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.<sup>10</sup> On the extensive margin, we find that the proportion of SAs that distribute dividends declined by 7.3% 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 1, we show that dividends scaled by total assets (Figure 1a) as well as proportion of firms distributing dividends (Figure 1b) 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 1, 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 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 F3 we plot the equivalent of Figure 1 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

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<sup>10</sup>This response is concentrated amongst firms that report profits, while we see a substantially smaller response for firms making losses, see Table D6 in the Appendix.

dividend distributions by more than SAs following that reform, which is precisely what we observe in Figure F3.

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 Appendix D. 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 ‘excess-payers’. We find that excess-payers are more responsive to the reform, both at the extensive and intensive margins, but the response is particularly stark on the extensive margin. The difference in dividend distribution responses across excess-payers and others is not statistically significant. 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.

## 4.2 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 of 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.

## 4.3 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<sup>11</sup>:  $elasticity_{\tau_{div}} = \Delta Y_i / [(\tau_{newdiv} - \tau_{olddiv}) / (1 - \tau_{olddiv})]$ , where  $\Delta Y_i$  is a change in payouts in response to the tax introduction,  $\tau_{newdiv}$  is the 10% flat tax rate and  $\tau_{olddiv}$  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 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 Boissel and Matray (2022) 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 the US and France. 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 0.001 relative to the pre-reform years. Combined with the initial response, we estimate the average of the two years to be a 0.0029 reduction. This 7.12% reduction in payouts translates into a much smaller elasticity of 0.7. 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 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

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<sup>11</sup>Boissel and Matray (2022); Yagan (2015)

these firms may have different incentives than the private firms we consider here.<sup>12</sup>

## 5 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 is 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, profitability, leverage, and revenue responses.

### 5.1 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 2-4 we split fixed assets into land and buildings, equipment and intangibles (R&D). We find that, on average, the reform did not significantly affect investment. In Figure 2, 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 land and buildings increases significantly after the introduction of the reform. The magnitude of the coefficient in column 2 suggests that in 2008 investment in land and buildings increased by 14.9% relative to the mean investment in this asset class. We find no statistically significant effect for equipment in column 3, consistent with Yagan (2015). Results in column 4 suggest that there is also a significant increase in investment in intangibles for treated firms. The magnitude of the coefficient

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<sup>12</sup>We consider the differential response of listed firms separately in Appendix B.

suggests that investment in intangibles increased by 19% for treated firms relative to the mean investment in this class of assets. Those effects are not only statistically significant but also economically large and meaningful.<sup>13</sup> Calculating the elasticity of investment types with respect to 1 minus tax rate, we obtain elasticities of 1.5 for land and buildings and 1.9 for intangibles. These are quite large relative to [Boissel and Matray \(2022\)](#), who estimates the tangible investment elasticity to be 0.38. Given that our dividend elasticities are about 3 times the size of [Boissel and Matray \(2022\)](#), it is entirely plausible that the short-run immediate investment response would also be about 3 times their size.

How should we interpret these findings? On one hand, investment in land in buildings may 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. Investment in intangibles encompasses productive R&D investment as well as marketing and other commercial activities. We remain agnostic about the relative productivity of these two asset types.

An alternative potential explanation for the positive response of land and buildings is the personal use of funds within the firm after the introduction of the dividend tax ([Alstadsaeter et al., 2014](#)). We expect this behavior to be more prevalent for single-owner or closely-held companies. In [Appendix C](#), we replicate our results using single-owner SAs and LLCs and do not find evidence consistent with such activities. We further consider the heterogeneity of the response according to the number of shareholders that a firm has and do not detect any significant differences across this margin either. Hence, we conclude that in our sample, the use of funds for personal investment purposes may not be as prevalent as in other settings. Another possibility is that the owner-managers in our context use the reserve account within the Greek system to offer a funding pot out of which they can make personal expenses. Our results in [Section 6](#) support this view.

## 5.2 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 this money goes to certain types of investment. If firms do not invest all of the money that they save on dividend distributions, they could potentially locate it in reserves, retained earnings, or cash accounts to avoid paying the

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<sup>13</sup>Consistent with the intertemporal tax arbitrage theory we also find a large and significant reduction in investment for June firms in 2008, see [Table F2](#) in the Appendix.

dividend tax at all. They could also use it to repay their debts. In Table 4, we provide evidence on these and other margins of response.

We find that treated firms significantly increase their reserve accounts and cash in response to the reform. We also find that treated firms substantially reduce their debt stock. 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 debt, as we discuss in more detail in Section 6.<sup>14</sup> On average, we do not find a significant response in retained earnings, but this is compensated by the large rise in reserve holdings.<sup>15</sup> 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 effect on retained earnings (see Table D7 in the Appendix). These results suggest that affected firms may 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.

**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.

As such, we design the following event study: we divide all firms in our sample into those that reduced their dividends in the reform year and those that did not. 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 control variables that we use in the specification in Equation 1.

We plot the regression coefficients for  $Year = T$ , which is 2008, in Figure 3 and report them in Table F1 in the Appendix. Red hollow diamonds represent the reaction of firms that reduced their dividend payouts, while blue full circles represent the reaction of firms that either increased or did not change their dividend payouts. We find that firms that responded to the reform by sharply decreasing their dividends, also significantly increased investment,

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<sup>14</sup>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.

<sup>15</sup>Corporation tax may apply on retained earnings whereas reserves are not taxable.

in particular in land and buildings and intangibles. We find no effect for equipment in either of the sub-samples. In turn, for firms that did not decrease their dividend payouts, we find no such responses. Importantly, we find the same effects on the sub-sample of profitable firms (see Figure F4 in the Appendix). Further, we find a positive retained earnings response and a much larger negative leverage response in the sub-sample of firms that reduced their dividends, relative to those that did not.

**Excess payers** The split between the firms that reduce dividend distributions and the firms that increase or do not change distributions does not form exogenously. We therefore supplement these results based on our subsample of *excess* dividend distributors in the pre-reform period. 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 ‘excess payers’.<sup>16</sup> These split-sample analyses provide us with a test of how the policy response may generate the second-order outcomes of interest such as investment or reserves, cash, retained earnings, and leverage for firms that had a particularly high dividend distribution in the pre-reform period. Specifically, our difference-in-differences specification, when applied to a subsample of firms that formerly had very high average distribution ratios, shows the difference between firms that reduced distributions *in response to the reform* relative to comparable firms for which the dividend tax reform triggered a significantly smaller response.

We summarize the results in Figure 4 following the exposition from Figure 3. The results suggest that the dividend tax reform generates larger real responses for the excess payers. The positive average investment responses for land and buildings and intangibles are entirely driven by firms that excessively paid dividends out before the reform. A potential explanation is that the excessive dividend distributors have a preference to over-distribute and the dividend tax reform corrects this behavior. A preference to over-distribute serves the interests of investors, while the dividend tax reform, by imposing a large cost on those firms that over-distribute, allows the firms to focus on actions that could benefit these firms in the longer run. We find no such results for non-excess payers, for which no correction is necessary or required.

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

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<sup>16</sup>For a Table that summarizes the heterogeneous effects of the reform on payouts see Appendix D.2.

tax-free way to keep the money in the firm. A reduction in cash, though insignificant, is consistent with those two responses. A significant reduction in leverage suggests that these firms use the portion of the money to pay off their debts. As such, we find that excessive payers value their investors highly and respond in a way that will increase their investors' benefit and avoid paying taxes altogether.

Crucially, this particular heterogeneity in real responses is only present when we consider excess *payers*. We do not find similar differential responses for investment, retained earnings, leverage or reserves when we look at firms that have 'excess' leverage, retained earnings, cash, or reserves. We provide these results in Figure F5 where we define 'excess' in each category as above median for each sector in the last year before the reform. This rules out a possibility of an alternative mechanism, in which our excess payers are also inefficient across other margins of operation.

**The role of financial constraints** A potential concern is that our results could be driven by financial constraints. 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 F6 in the 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. Then we take the average level of investment, reserves, cash, retained earnings, and leverage for SAs in 2007 and multiply them by the percent change. 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, 46% of the reallocated funds went to investment, 12% to reserves, 3% to retained earnings, 33% to leverage, and 6% cash. We then do the same calculation, but only for the subsample of firms that reduced their dividends. We find that 49% of the reallocated funds went to investment and 24% was used to repay debt. The remaining 27% was kept in different forms of easily-accessible cash



holdings (2% as cash, 7% as reserves, or 11% as retained earnings).

## 6 Long-run implications of reform responses

### 6.1 Survival and growth

In this section, 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 2010-2014. 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 2008 to create a dummy variable for firm status by the end of 2014. 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, (ii) reserves increase, (iii) cash holdings increase, (iv) retained earnings increase, (v) decrease in debt stock. In Panel A in Figure 5, we show the relationship between each margin of response and the probability of bankruptcy during the 2010-2014 period.

We find that firms that increased investment and retained earnings, and/or reduced their debt stock have a lower likelihood of bankruptcy during the liquidity crunch of 2010-2014. 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 5, 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 and retained earnings accounts, see lower sales growth between 2008 and 2013 than those that did not increase these margins. While repaying debt reduces the risk of bankruptcy in a liquidity crisis, it does not affect the overall

firm growth significantly relative to treated firms that did not reduce debt.

## 6.2 Conceptual framework

Our results support a conceptual framework that stems from the intertemporal tax arbitrage view of [Korinek and Stiglitz \(2009\)](#) and builds on this framework to additionally: (i) establish large and immediate extensive margin responses to the introduction of a dividend tax; (ii) feature unobserved heterogeneity in whether or not a firm responds to the dividend tax by reducing (or completely ceasing) distributions; (iii) examine long-run outcomes for companies that use the funds remaining in the company for productive investment or as a liquidity buffer to support cash flow in hard times.

We propose the following mechanism that is akin to a mediation framework after the introduction of a new dividend tax.<sup>17</sup> We consider the dividend response to be a *mediator* in causing a variety of possible responses in three steps:

1. Firms respond to the new dividend tax by:
  - (a) Reducing or stopping dividend distributions, or
  - (b) Not changing or increasing distributions;
2. Companies that respond by reducing dividends (relative to the counterfactual scenario without a tax on dividends) use the funds that remain in the firm in the following ways:
  - (a) Pay off debt,
  - (b) Retain earnings (likely in the tax-free reserves account) for investment,
  - (c) Keep as free cash flow,
  - (d) Use for various sub-categories of productive investment immediately;
3. In the long run:
  - (a) For surviving companies, those that use funds for productive investment are more likely to report a higher growth rate than firms that use funds in other ways.

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<sup>17</sup>Formal mediation analyses are not new in social sciences. Tests of average controlled direct effects are available by, among others, [Acharya et al. \(2016\)](#); [Judd and Kenny \(1981\)](#) and [Celli \(2022\)](#) reviews applications in Economics. Our analyses of investment and other margins of response in Section 5 are qualitatively similar to this approach.

- (b) To determine survival, companies that use funds as a liquidity buffer or for productive investment are less likely to go bankrupt than firms that use funds in other ways.

In Step 1, part of the response can be attributed to the fact that in the absence of the reform, some firms had a high propensity to distribute (Appendix D.2). Alternatively, some firms can reduce distributions simply because they are no longer profitable. We explore this possibility in light of our quasi-experimental setup in Table D6 in the Appendix where we compare responses of profitable and loss-making firms. We rule out that the effects we find are related to a differential rise in treatment group firms’ propensity to report losses. Each of the possibilities in Step 2 may improve efficiency in the dividend distribution decision, if there is a tendency to *over-distribute* – a phenomenon that is supported by our ‘excess payers analysis’.

Our findings are also consistent with the ‘New View’ of dividend taxation (Auerbach, 1979; Bradford, 1981; King, 1974), that builds on marginal investment being financed by retained earnings and therefore remaining unaffected by the tax treatment of alternative forms of finance. Our findings suggest that the New View holds for investment in new equipment, and we do not observe a negative effect on other investment categories either. An alternative mechanism that our analysis rejects is the ‘Old View’ of dividend taxation (Poterba and Summers, 1984), which argues that there should be negative real effects of dividend taxation. We compare our setting and results with the existing literature further in Appendix A.

## 7 Conclusion

In this paper, we show, in a quasi-experimental setting, that the introduction of a dividend tax has immediate and large effects on the payout decisions of firms. The effect is overwhelmingly driven by the extensive margin, that is, by 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 ending in June could distribute tax-free dividends one more year before the tax applied on their dividends. These *June year-end* firms sharply increased their payouts before reducing them in the following year when they were liable to pay the tax. This behavior supports the view that firms engage in inter-temporal tax arbitrage to minimize the tax burden on investors. The group of firms

with the financial year ending in December had to pay tax on their dividends right after the policy was announced.

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 3.8 billion Euros. Absent any behavioral response, the government was anticipating to collect annually about 380 million in additional revenues with the 10% flat tax on dividend distributions. The total tax revenues from taxes on income, profits, and capital gains in Greece in 2007 were 17.2 billion Euros (with 10 billion from individuals), which means that this reform was likely projected to bring in an additional 2.2% ( $0.38/17.2$ ) 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 in uncollected revenues annually.

We then quantify the overall size of the response to the policy change and, using dividend distributions as a mediating factor, assess companies' uses of the funds retained in the firm on different categories of investment and company financials such as reserves, cash holdings, and the company's debt stock. We find evidence that supports the existing findings in the literature, such as a lack of an effect on equipment purchases (Yagan, 2015) as well as an improvement in the efficiency of capital allocation (Boissel and Matray, 2022).

We take these results further and link the dividend response to longer-term company outcomes of growth and survival. We identify substantial heterogeneity in the way the companies subject to the new dividend tax allocate the funds now retained in the firm. Companies that use the funds efficiently either as a liquidity buffer or for productive investment have a higher chance of survival when faced with a liquidity shock. We find that the liquidity buffer only helps with the probability of survival but not for the growth of surviving firms. On the other hand, companies that use the funds for productive investment have both a higher chance of survival and experience stronger growth during periods of hardship.

Quantitatively, the companies that stopped paying dividends (from a positive dividend position) responded with an allocation that favors investment and debt repayments: 49% of the reallocated funds went to investment and 24% was used to repay debt. The remaining 27% was kept in different forms of easily-accessible cash holdings (either as cash, reserves, or retained earnings).

Our findings have broad implications for the role of dividend taxes in the economy. If dividend taxes curb inefficient distributions effectively, they have the potential to allow firms to distribute the additional cash within the firm efficiently. Our results on *ex-ante excess* dividend payers support our baseline finding that these types predominantly start using the

tax-induced fund retention in the firm to reduce leverage, increase investment, or allocate them into retained earnings or reserve accounts in which they could hold the cash without paying the new tax. Taken together, these findings support the view that dividend taxes can improve the efficiency of firms.

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## Tables and figures

Table 1: Descriptive statistics: mean comparisons.

<b>Panel A : SAs vs LLCs</b>				
	(1)	(2)	(3)	(4)
	SAs	LLCs	diff	t-test
Divid/ capital	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 capital	14.142	13.282	-0.860***	-28.261
tax prof/ capitals	-0.068	0.017	0.085***	9.130
acc prof/ capital	0.020	0.090	0.070***	14.489
% firms with tax loss	0.448	0.253	-0.195***	-19.870
% firms with acc loss	0.363	0.195	-0.168***	-18.668
inv rate	0.108	0.119	0.011	0.992
inv/ capital	0.014	0.007	-0.007***	-4.927
% firms investing	0.406	0.385	-0.021*	-1.928
Leverage	0.504	0.806	0.301***	23.442
Observations	23260	2205	25465	
<b>Panel B : June vs December SAs</b>				
	(1)	(2)	(3)	(4)
	June SAs	December SAs	diff	t-test
Divid/ capital	0.018	0.018	0.000	0.119
% firms paying dividends	0.321	0.278	-0.043***	-2.715
log revenue	12.866	12.182	-0.685***	-5.051
log capital	14.170	14.141	-0.030	-0.607
tax prof/ capital	-0.101	-0.067	0.034**	2.284
acc prof/ capital	0.011	0.020	0.009	1.595
% firms with tax loss	0.422	0.449	0.027	1.574
% firms with acc loss	0.328	0.365	0.037**	2.277
inv rate	0.100	0.108	0.008	0.554
inv/ capital	0.009	0.014	0.005*	1.821
% firms investing	0.381	0.406	0.026	1.555
Leverage	0.570	0.502	-0.068***	-3.850
Observations	893	22367	23260	

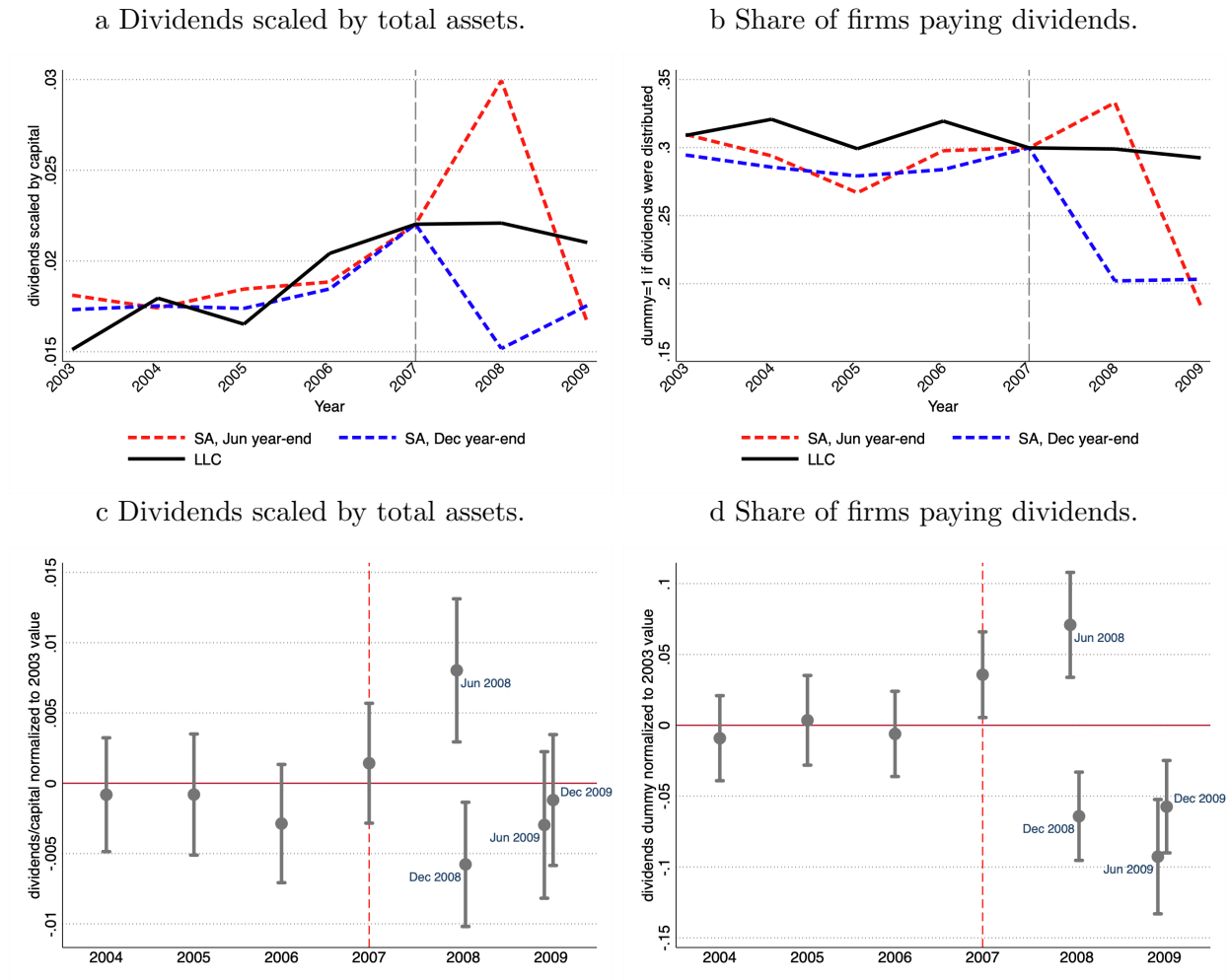
Note: This table summarizes average firm characteristics in 2007, the year before the reform. Panel A compares SAs and LLCs, Panel B compares June and December SAs.

Table 2: Dividend distributions: baseline results.

	(1) Div/ta	(2) Div/ta	(3) Div/ta	(4) $1_{(\text{Div}>0)}$	(5) $1_{(\text{Div}>0)}$	(6) $1_{(\text{Div}>0)}$
Treated x [Year = $T$ ]	-0.005*** (0.001)			-0.073*** (0.010)		
Tr. (Jun) x [Year = $T$ ]		0.008*** (0.002)	0.009*** (0.002)		0.059*** (0.015)	0.057*** (0.015)
Tr. (Dec) x [Year = $T$ ]		-0.005*** (0.001)	-0.005*** (0.001)		-0.079*** (0.010)	-0.079*** (0.010)
Tr. (Jun) x [Year = $T+1$ ]			-0.002 (0.002)			-0.107*** (0.019)
Tr. (Dec) x [Year = $T+1$ ]			-0.001 (0.002)			-0.072*** (0.012)
Observations	93270	93270	120192	93270	93270	120192
# firms	25,642	25,642	27,468	25,642	25,642	27,468
# June firms	979	979	1053	979	979	1053
De. var. mean	0.020	0.020	0.020	0.289	0.289	0.288

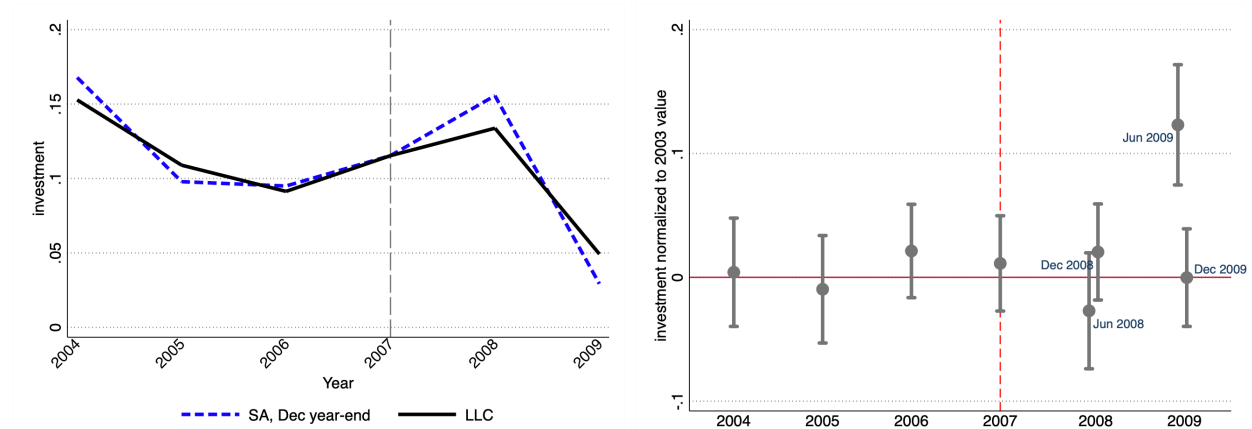
Note: This table summarizes baseline results on dividend distributions. The dependent variable is dividends scaled by total capital (asset value fixed in 2007) in columns 1 - 3. In columns 4 - 6, the dependent variable is a dummy equal to 1 when a firm distributed dividends in a given year. In columns 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 1: Dynamic effects of the reform dividend distributions.



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 difference 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 the panel, the post coefficient in 2008 is the average of June and December firms, while in the right-side of the panel, we split the effect.

Figure 2: 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 difference 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. In the left-side of the panel, the post coefficient in 2008 is the average of June and December firms, while in the right-side of the panel, we split the effect.

Table 3: Investment responses.

	(1) investment	(2) land and buildings	(3) equipment	(4) intangibles
Treated x [Year = $T$ ]	0.006 (0.015)	0.018* (0.009)	0.003 (0.004)	0.021* (0.012)
Observations	91718	73104	91908	90539
# firms	25,257	25,387	25,465	25,501
Mean	0.109	0.121	0.014	0.110

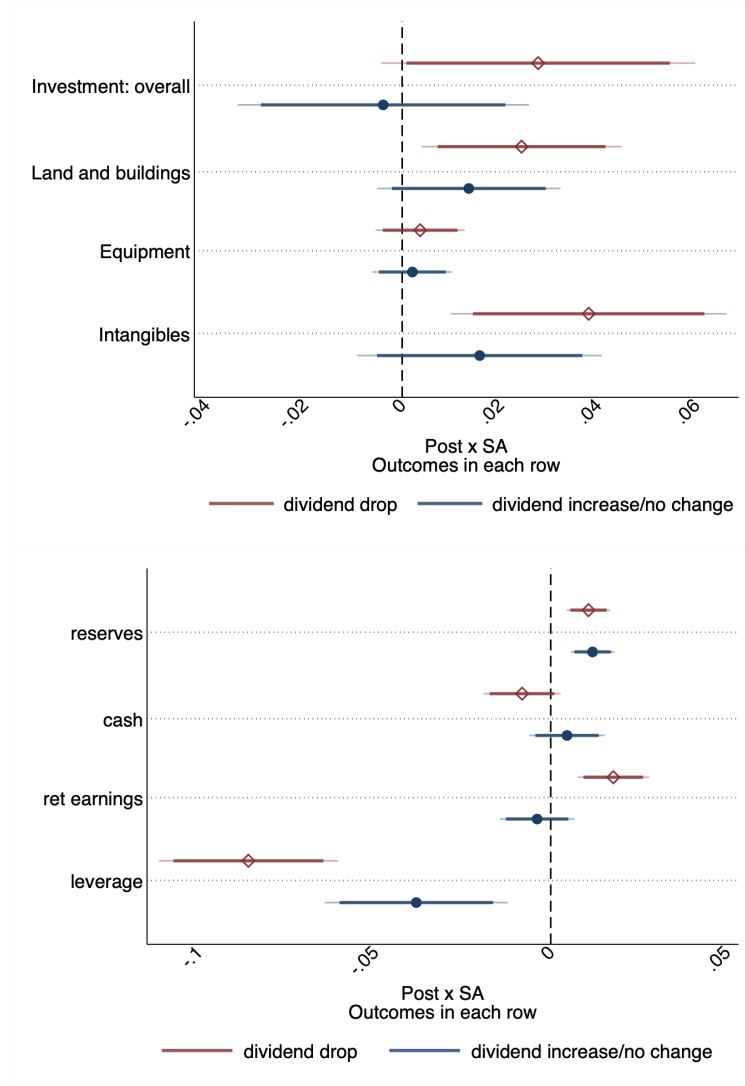
Note: This table summarizes baseline results for investment responses. In column 1, the dependent variable is the overall investment calculated as the growth rate of fixed assets. In column 2, it is the investment in land and buildings assets; in column 3 it is investment in equipment, and in column 4 it is the investment in intangible assets. 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)	(2)	(3)	(4)	(5)	(6)	(7)
	reserves	cash	ret. earn.	ret. earn. dummy	leverage	pos. profit	log rev.
Treated x [Year = $T$ ]	0.012*** (0.004)	0.013* (0.006)	0.005 (0.007)	0.012 (0.009)	-0.048*** (0.016)	-0.011 (0.009)	0.019 (0.070)
Observations	80696	80696	80696	80696	80696	80696	80696
# firms	22,651	22,651	22,651	22,651	22,651	22,651	22,651
Mean	0.120	0.154	-0.179	0.430	0.522	0.529	12.127

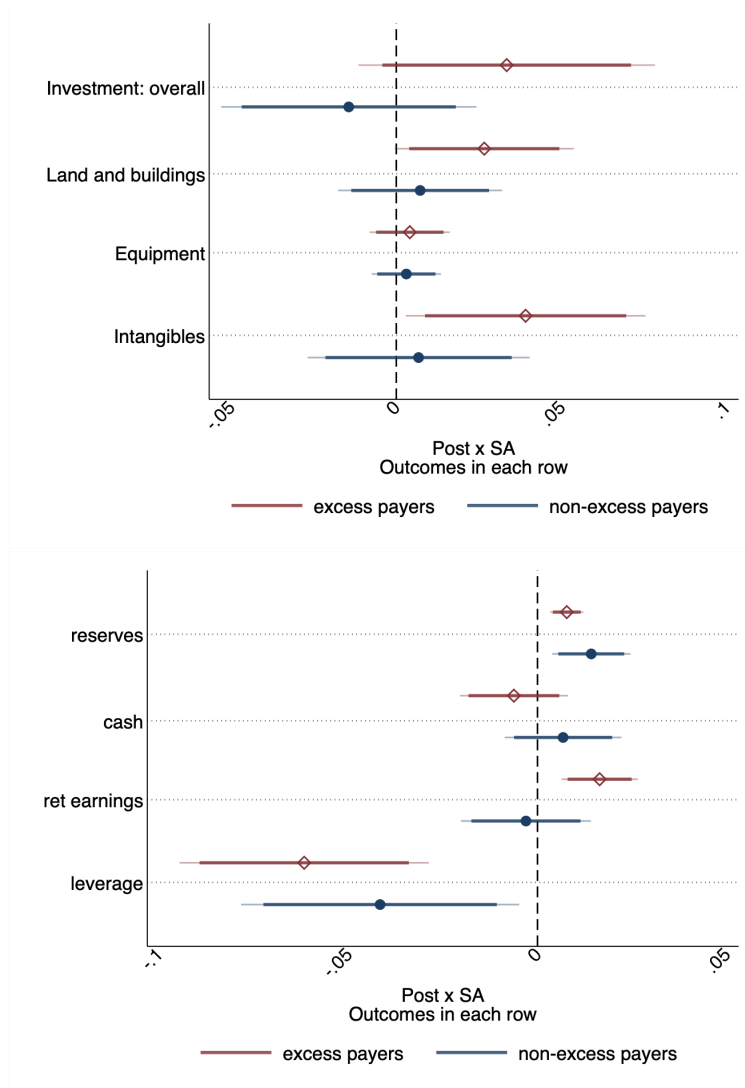
Note: This table summarizes results on reserve, cash, retained earnings, leverage, profits and revenue responses. The dependent variable is reserves divided by total assets in 2007 in column 1, cash scaled by total assets in 2007 in column 2, retained earnings scaled by total assets in 2007 in column 3, retained earnings dummy, which is equal to 1 if a firm has any retained earnings in column 4, 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. We exclude June firms in this table and only present the effect for December-year end firms.

Figure 3: 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 buildings is growth rate of assets held in land and buildings, similar for equipment and intangibles (R&D). 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. Corresponding coefficient estimates are in Table F1 in the Appendix.

Figure 4: Heterogeneity by excess 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 - excess payers - and those that paid below 50% of their profits before the reform - non-excess 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 excess payers. Blue full circles correspond to coefficient estimates for non-excess 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 buildings is growth rate of assets held in land and buildings, similar for equipment and intangibles (R&D). 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. Corresponding coefficient estimates are in Table D5 in the Appendix.

Table 5: Quantifying different margins of response.

<b>Panel A: All firms</b>					
variable	(1) coeff	(2) mean outcome	(3) level outcome	(4) change in outcome	(5) relative importance
dividends	0.005	0.016	70006	21877	
investment	0.006	0.095	3056469	193040	46%
reserves	0.012	0.119	498405	50259	12%
ret earnings	0.005	-0.154	-355614	11546	3%
leverage	0.048	0.488	1432641	140916	33%
cash	0.013	0.146	292495	26044	6%

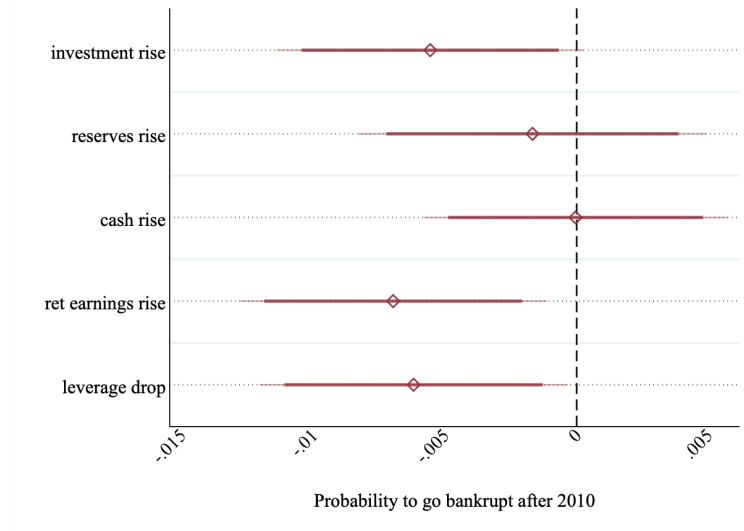
<b>Panel B: Dividend drop firms</b>					
variable	coeff	mean outcome	level outcome	change in outcome	relative importance
dividends	0.005	0.041	164798	20097	
investment	0.030	0.116	1670099	431922	49%
reserves	0.012	0.094	517691	66088	7%
ret earnings	0.017	0.021	189279	153226	17%
leverage	0.075	0.512	1456212	213312	24%
cash	0.008	0.140	351615	20092	2%

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 4 and 5. 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  $= (\text{col } 1)/(\text{col } 2) \times (\text{col } 3)$ . 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, we only look at responses of firms that reduced their dividends, as analysed in Figure 3.

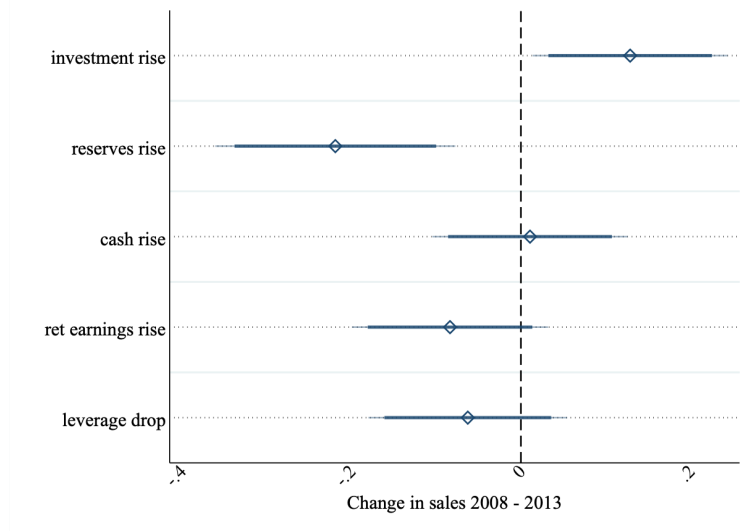


Figure 5: Long-run responses: likelihood of bankruptcy and sales growth.

**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. 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. 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 growth coefficient estimates are in Tables F4 in the Appendix.

## 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 [Boissel and 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 buildings and intangibles, 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, [Boissel and 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 [Boissel and 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 distribute excessively prior to the reform, increase their investment, which is also consistent with results from [Boissel and Matray \(2022\)](#). The lack of average investment effect that we find may be driven by relatively fewer

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
<a href="#">Poterba (1987)</a>	Dividend	Cut	Dynamic model, US (1986)	Aggregate NIPA, US	(+)	1.57	(+)	n.a
<a href="#">Chetty and Saez (2005)</a>	Dividend	Cut	Before/After Owner taxable status	Listed firms, CRSP (US)	(+), ext.margin	0.5	n.a	Repurchases
<a href="#">Yagan (2015)</a>	Dividend	Cut	US S-Corps vs C-Corps	Tax returns, US	(+)	0.5	Zero	Compensation
<a href="#">Alstadsæter et al. (2017)</a>	Dividend	Cut	Closely- vs widely-held	Tax returns, Sweden	(+)	n.a	(+) for cash-constrained	Equity
<a href="#">Jacob and Michaely (2017)</a>	Dividend	Cut	High-vs low-tax owners of closely-held	Tax returns, Sweden	(+)	[0, 5.3]	(+)	Wages
<a href="#">Moon (2022)</a>	Capital gains	Cut	Small vs Large (Eligibility)	Tax returns, Korea	n.a	n.a	(+)	Various
<a href="#">Boissel and Matray (2022)</a>	Dividend	Rise	France SA vs Sarl	Tax returns, France	(-)	0.43	(+)	Interm.goods, value-added, wages, survival, productivity
Bozio et al. (WP)	Dividend	Rise, then Cut	Two reforms in France	Tax returns, France	(-), then (+)	n.a.	Zero	Various
<b>Our paper</b>	<b>Dividend</b>	<b>Introduction</b>	<b>SA vs LLC year-end date</b>	<b>Tax returns, financials, Greece</b>	<b>(-), ext.margin</b>	<b>1.25</b>	<b>Zero or positive</b>	<b>Survival, growth, wages</b>

firms for which this reform is binding.

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 earnings, 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. This reduction in investment in response to a new tax is consistent with old view and the agency view of dividend taxation ([Chetty and Saez, 2010](#)). As such, these results suggest that listed firms' responses to dividend taxation may be more consistent with the agency view.

Table B1: Listed firms responses.

	(1) Div/ta	(2) $1_{(Div>0)}$	(3) investment	(4) land & build.	(5) equipment	(6) intangibles	(7) reserves	(8) cash	(9) ret.earn.	(10) leverage
Treated x [Year = $T$ ]	-0.005*** (0.001)	-0.073*** (0.010)	0.006 (0.015)	0.018* (0.009)	0.002 (0.004)	0.020 (0.012)	0.012*** (0.003)	0.001 (0.005)	0.003 (0.005)	-0.051*** (0.013)
Treated x [Year = $T$ ] × listed=1	0.003*** (0.001)	0.089*** (0.006)	-0.097*** (0.034)	-0.028 (0.032)	-0.004 (0.027)	0.212*** (0.045)	-0.022* (0.013)	-0.000 (0.010)	0.000 (0.018)	-0.066*** (0.022)
Observations	93975	93975	92422	73633	92530	91213	93975	93975	93975	93975
# firms	25822	25822	25437	25567	25645	25680	25822	25822	25822	25822
Mean	0.020	0.287	0.109	0.121	0.014	0.110	0.119	0.155	-0.161	0.530

Note: This table summarizes results on dividend distributions for listed and unlisted firms. The dependent variable is dividends scaled by total capital (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 buildings assets in column 4, investment in equipment in column 5, investment in intangible assets in column 6. In column 7, 8, 9 and 10 we consider reserves, cash, retained earnings and leverage. 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 Number of owners heterogeneity.

In the paper, we explicitly exclude single owner firms. Here, we consider them explicitly and separately. This is because another margin that firms could potentially explore to avoid paying dividend taxes would be to use the funds in the firm for personal purposes, either paying themselves a salary or purchasing assets for personal use. This is especially true, since the annual tax-free threshold was approx. €10,000 for salaries. In Table C1, we report results using just a sub-sample of single owner LLCs and SAs. Since there are no single-owner SAs with June end date, we only use December end-year firms. We find that, single owner firms also reduced their dividend distributions in 2008. The magnitude of this effect is much larger than in the case of multiple owner firms and again driven by the extensive margin response. We also find a reduction in investment (column 3), albeit not a statistically significant one. It appears that the positive investment result for land and buildings is driven by multiple owner firms, as we see negative and not significant responses for single-owner firms. This suggests that the personal purchases argument to explain our results does not hold in this sub-sample.

An alternative way to test the hypothesis about personal use of funds within the firm is to consider the heterogeneity of our results with respect to the number of firm owners. For a small sub-sample of larger firms, we obtain the number of shareholders from Orbis dataset. The variation is between 2 and 33 shareholders, with most firms reporting to have between 2-5 shareholders. We interact this variable with the treated dummy to consider the heterogeneity of responses within this sub-sample. We find no differential response for dividends and investment across number of shareholders. Firms with more owners reacted to the reform by increasing their cash and retained earnings by more than firms with fewer owners. As such, even in this sub-sample we do not find that personal use of assets explains our investment results.

Table C1: Number of owners heterogeneity.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Div/ta	$1_{(Div>0)}$	investment	land & build.	equipment	intangibles	reserves	cash	ret.earn.	leverage
<b>Panel A: Single owner firms only</b>										
Treated x [Year = T]	-0.021** (0.010)	-0.158*** (0.058)	-0.119 (0.099)	-0.037 (0.088)	-0.013 (0.018)	0.044 (0.156)	0.013 (0.032)	0.071 (0.070)	0.085 (0.103)	-0.050 (0.151)
Observations	4455	4455	4303	3984	4414	4334	4455	4455	4455	4455
Mean	0.037	0.357	0.130	0.163	0.012	0.076	0.071	0.199	-0.144	0.833
<b>Panel B: Multiple owner firms: number of shareholders heterogeneity</b>										
Treated x [Year = T] x nb shareholders	-0.001 (0.001)	-0.007 (0.006)	-0.003 (0.008)	-0.003 (0.006)	0.001 (0.002)	-0.002 (0.010)	0.002 (0.002)	0.004* (0.003)	0.006** (0.003)	-0.008 (0.008)
Observations	4516	4516	4412	3780	4395	4390	4516	4516	4516	4516
Mean	0.030	0.388	0.250	0.282	0.032	0.235	0.069	0.163	-0.045	0.625

Note: Panel A of this table summarizes results for single owner firms, while Panel B shows heterogeneity across the number of shareholders. The dependent variable is dividends scaled by total capital (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 buildings assets in column 4, investment in equipment in column 5, investment in intangible assets in column 6. In column 7, 8, 9 and 10 we consider reserves, cash, retained earnings and leverage. 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. In Panel A, we only include single owner firms. In Panel B, we include only multiple-owner firms for which we have data on the number of owners available from Orbis. Number of owners varies between 2 and 33.

## D Payout policy heterogeneity

### D.1 Heterogeneity of response by payout policy preferences

Figure D1 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 D1 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 D2, 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 D1: Descriptive statistics for firms with different payout policies.

	Never payer	Sometime payer	diff	t-test
Divid/ total ass	0.000	0.044	0.044***	65.916
% firms paying dividends	0.000	0.658	0.658***	140.086
log revenue	11.320	13.980	2.660***	50.590
log assets	13.910	14.410	0.500***	25.701
tax prof/ total ass	-0.151	0.068	0.219***	51.235
acc prof/ total ass	-0.015	0.083	0.098***	48.924
% firms with tax loss	0.630	0.144	-0.486***	-87.425
% firms with acc loss	0.503	0.119	-0.384***	-69.586
inv rate	0.087	0.124	0.037***	6.387
inv/ total ass	0.011	0.014	0.003***	2.959
% firms investing	0.374	0.436	0.062***	9.449
Leverage	0.494	0.568	0.074***	12.265
Observations	12389	10189	22578	

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



Figure D1: Dividend distribution patterns before the reform.

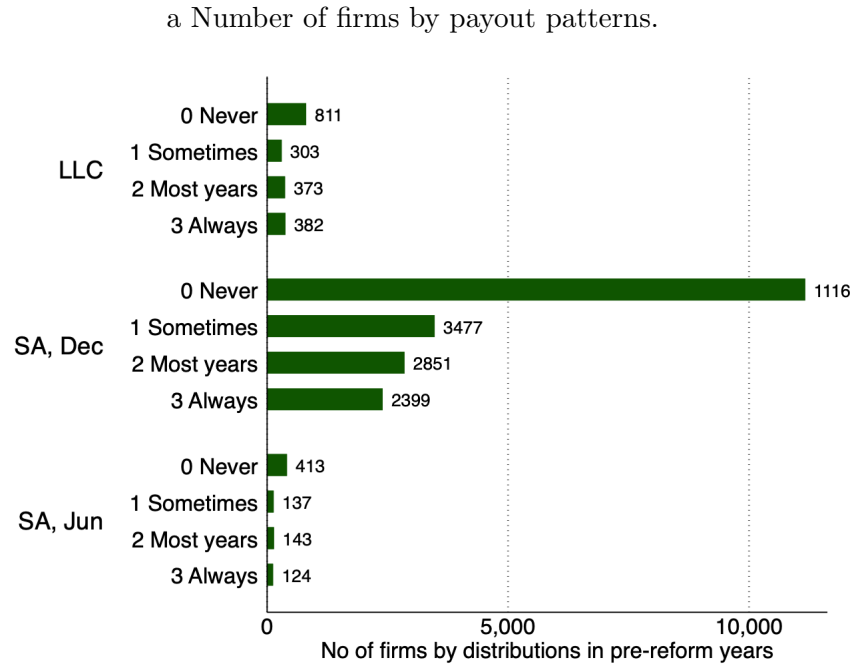
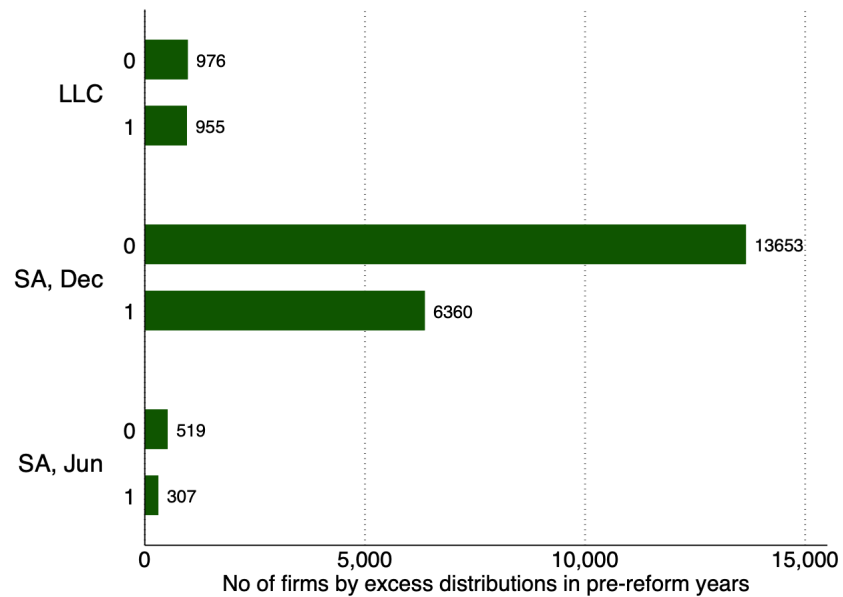


Figure D2: Number of firms by excess distribution patterns.



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 - excess payers, value 1 - and those that paid below 50% of their profits before the reform - non-excess payers, value 0.

Table D2: Dividend distributions: payout heterogeneity.

	(1)	(2)	(3)	(4)	(5)	(6)
	Div/ta	Div/ta	Div/ta	$1_{(\text{Div}>0)}$	$1_{(\text{Div}>0)}$	$1_{(\text{Div}>0)}$
<b>Panel A: Always distributors</b>						
Treated x [Year = $T$ ]	-0.005 (0.005)			-0.125*** (0.025)		
Tr. (Jun) x [Year = $T$ ]		0.032*** (0.007)	0.036*** (0.007)		0.116*** (0.033)	0.119*** (0.034)
Tr. (Dec) x [Year = $T$ ]		-0.008* (0.005)	-0.007 (0.004)		-0.140*** (0.025)	-0.138*** (0.025)
Tr. (Jun) x [Year = $T+1$ ]			0.005 (0.007)			-0.180*** (0.051)
Tr. (Dec) x [Year = $T+1$ ]			0.005 (0.005)			-0.117*** (0.029)
Observations	10776	10776	13912	10776	10776	13912
Dep. var. mean	0.081	0.081	0.081	1.000	1.000	1.000
<b>Panel B: Often and sometimes distributors</b>						
Treated x [Year = $T$ ]	-0.007** (0.003)			-0.125*** (0.021)		
Tr. (Jun) x [Year = $T$ ]		0.007* (0.004)	0.007* (0.004)		0.096*** (0.035)	0.092*** (0.035)
Tr. (Dec) x [Year = $T$ ]		-0.007** (0.003)	-0.007** (0.003)		-0.136*** (0.021)	-0.134*** (0.021)
Tr. (Jun) x [Year = $T+1$ ]			-0.004 (0.005)			-0.181*** (0.038)
Tr. (Dec) x [Year = $T+1$ ]			-0.002 (0.004)			-0.140*** (0.024)
Observations	27888	27888	34781	27888	27888	34781
Dep. var. Mean	0.030	0.030	0.030	0.522	0.522	0.522

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  $T+1$ .

## D.2 Heterogeneity of response by payout policy types: excess 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 ‘excess payers’.<sup>18</sup> 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 D4 we test the responsiveness of these two types of firms. In Panel A, we focus on the effect for excess payers, while in Panel B on non-excess payers. The format of this Table follows the exposure in Table 2, 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 excess payers. Excess 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-excess payers, we find a much smaller response, at around half the magnitude (7 percentage points) of the coefficient for excess payers. In Column 3, we show that the December year-end firms that paid excess dividends prior to the reform have a large, *knee-jerk*-type short-lived overall response to the introduction of the dividend tax. Non-excess 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 excess 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 excess payers increased the likelihood of distributing by 9.4 percentage points. At the same time, non-excess payer June firms did not see a significant response to the announcement of the reform.

In Table D3 and Figure D3 we show descriptive statistics that compare excess and non-

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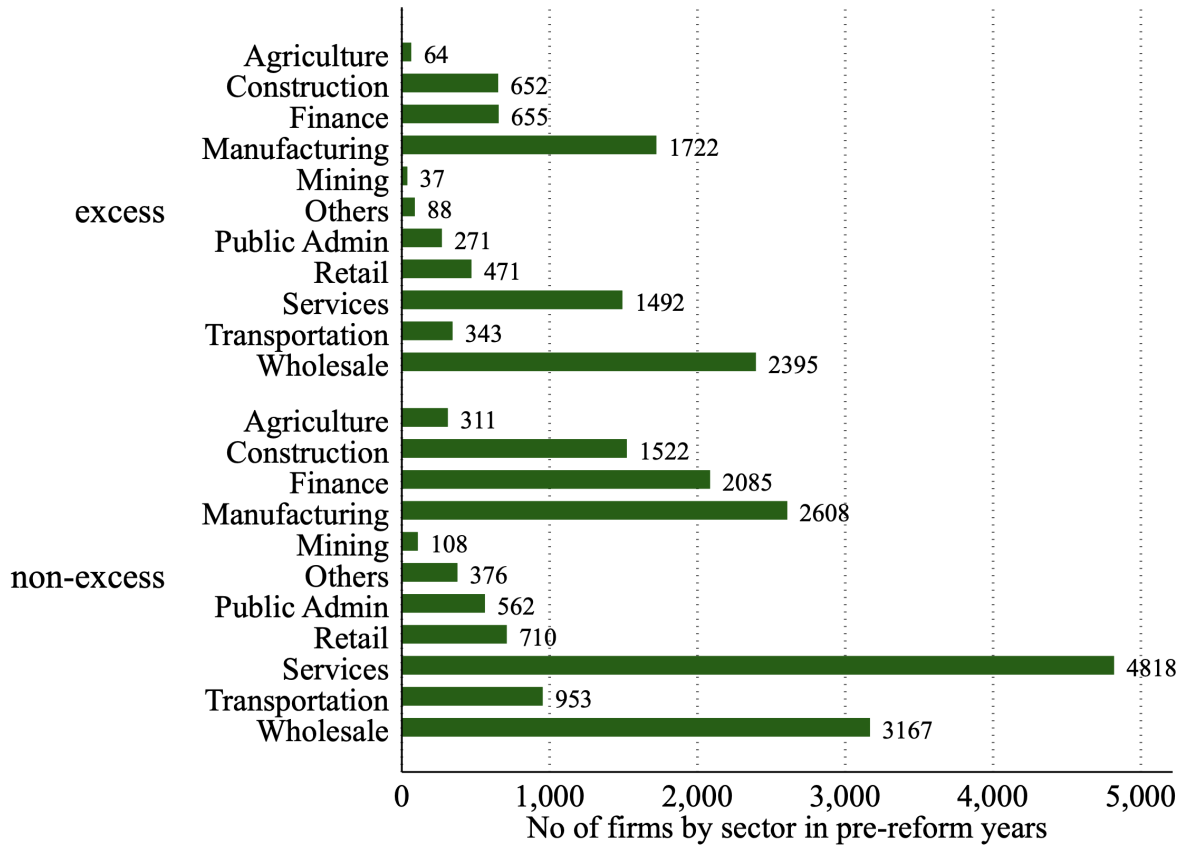
<sup>18</sup>Changes to this threshold, or using the median value for positive dividend distributions lead to similar results and conclusions to the analysis that we present here.

excess 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-excess 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 D6 to show that the payout response is mainly driven by profitable firms, especially with regard to June dividend payout increases.<sup>19</sup> 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.

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<sup>19</sup>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.

Figure D3: 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 excess dividends before the reform in years 2005 - 2007. We define excess 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 D3: Descriptive statistics: excess vs non-excess payers.

Panel A: All firms				
	(1)	(2)	(3)	(4)
	non-excess	excess	diff	t-test
Divid/ total ass	0.001	0.059	-0.058***	-68.944
% firms paying dividends	0.052	0.787	-0.735***	-152.257
log revenue	11.486	13.966	-2.480***	-53.404
log assets	13.968	14.286	-0.318***	-16.949
tax prof/ total ass	-0.134	0.095	-0.229***	-62.450
acc prof/ total ass	-0.009	0.100	-0.109***	-53.778
% firms with tax loss	0.594	0.084	0.509***	105.175
% firms with acc loss	0.478	0.073	0.404***	84.701
inv rate	0.098	0.132	-0.033***	-5.511
inv/ total ass	0.013	0.014	-0.001	-0.781
% firms investing	0.392	0.431	-0.039***	-5.905
Leverage	0.506	0.582	-0.075***	-14.239
Revenue growth rate	0.067	0.061	0.006	0.276
Sales growth rate	0.087	0.082	0.005	0.705
Age	30.104	31.658	-1.554***	-8.848
Observations	17220	8190	25410	
Panel A: 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	13.642	14.179	-0.537***	-11.920
log assets	14.343	14.342	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
inv/ total ass	0.020	0.014	0.006***	4.578
% firms investing	0.477	0.439	0.038***	4.144
Leverage	0.510	0.592	-0.081***	-14.403
Revenue growth rate	0.088	0.089	-0.000	-0.011
Sales growth rate	0.105	0.095	0.011	1.571
Age	31.283	31.895	-0.612**	-2.552
Observations	5044	6920	11964	

Note: This table summarizes the average firm characteristics for excess and non-excess paying firms in 2007, the last year before the reform. We define excess 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 D4: Dividend distributions: excess payout heterogeneity.

	(1)	(2)	(3)	(4)	(5)	(6)
	Div/ta	Div/ta	Div/ta	$1_{(\text{Div}>0)}$	$1_{(\text{Div}>0)}$	$1_{(\text{Div}>0)}$
<b>Panel A: Excess-payers</b>						
Treated x [Year = $T$ ]	-0.009*** (0.003)			-0.156*** (0.018)		
Tr. (Jun) x [Year = $T$ ]		0.015*** (0.004)	0.017*** (0.004)		0.094*** (0.030)	0.096*** (0.030)
Tr. (Dec) x [Year = $T$ ]		-0.011*** (0.003)	-0.010*** (0.003)		-0.170*** (0.018)	-0.168*** (0.018)
Tr. (Jun) x [Year = $T+1$ ]			-0.004 (0.004)			-0.215*** (0.035)
Tr. (Dec) x [Year = $T+1$ ]			-0.001 (0.003)			-0.167*** (0.020)
Observations	28672	28672	36316	28672	28672	36316
Dep. var. mean	0.058	0.058	0.058	0.787	0.787	0.787
<b>Panel B: Non-excess payers</b>						
Treated x [Year = $T$ ]	-0.005*** (0.001)			-0.058*** (0.010)		
Tr. (Jun) x [Year = $T$ ]		0.001 (0.002)	0.001 (0.002)		0.015 (0.016)	0.015 (0.016)
Tr. (Dec) x [Year = $T$ ]		-0.005*** (0.001)	-0.005*** (0.001)		-0.062*** (0.010)	-0.063*** (0.010)
Tr. (Jun) x [Year = $T+1$ ]			-0.007*** (0.002)			-0.064*** (0.018)
Tr. (Dec) x [Year = $T+1$ ]			-0.007*** (0.002)			-0.062*** (0.012)
Observations	56280	56280	71581	56280	56280	71581
Dep. var. Mean	0.001	0.001	0.001	0.055	0.055	0.055

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 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 D5: Heterogeneity by excess payers.

<b>Panel A: Excess payers</b>											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	investment	land and buildings	equipment	intangibles	reserves	cash	ret. earn.	ret. earn. dummy	leverage	pos.profit	log rev.
Treated x [Year = $T$ ]	0.033 (0.023)	0.027* (0.014)	0.004 (0.006)	0.039** (0.019)	0.008*** (0.002)	-0.006 (0.007)	0.016*** (0.005)	0.005 (0.018)	-0.062*** (0.017)	-0.019* (0.010)	-0.004 (0.053)
Observations	30237	23785	30252	29532	30477	30477	30477	23268	30477	30477	30477
Dep. var. mean	0.132	0.144	0.023	0.136	0.086	0.158	0.015	0.859	0.582	0.916	13.966
<b>Panel B: Non-Excess payers</b>											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	investment	land and buildings	equipment	intangibles	reserves	cash	ret. earn.	ret. earn. dummy	leverage	pos.profit	log rev.
Treated x [Year = $T$ ]	-0.014 (0.020)	0.007 (0.013)	0.003 (0.005)	0.007 (0.017)	0.014*** (0.005)	0.007 (0.008)	-0.003 (0.009)	0.015 (0.011)	-0.042** (0.019)	-0.003 (0.011)	0.002 (0.081)
Observations	61372	49203	61540	60885	62668	62668	62668	60229	62668	62668	62668
Dep. var. mean	0.098	0.110	0.010	0.097	0.132	0.154	-0.245	0.272	0.506	0.407	11.493

Note: This table summarizes results for investment responses for excess (Panel A) and non-excess dividend payers (Panel B). Excess payers are we firms that paid more than 50% of their profits out in years 2005 - 2007 before the reform, and non-excess 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 and buildings assets; in column 3 it is growth rate of equipment assets, and in column 4 it is the growth rate of intangible assets. In column 5 we have reserves, in column 6 cash, in column 7 retained earnings, in column 8 retained earnings dummy, in column 9 leverage, in column 10 a positive profit dummy, in column 11, logarithm of revenue. 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 D6: Dividend distributions: profit- vs loss-makers.

	(1)	(2)	(3)	(4)	(5)	(6)
	Div/ta	Div/ta	Div/ta	$1_{(Div>0)}$	$1_{(Div>0)}$	$1_{(Div>0)}$
<b>Panel A: Profitable firms</b>						
Treated x [Year = $T$ ]	-0.008*** (0.002)			-0.125*** (0.014)		
Tr. (Jun) x [Year = $T$ ]		0.013*** (0.003)	0.015*** (0.003)		0.101*** (0.024)	0.100*** (0.024)
Tr. (Dec) x [Year = $T$ ]		-0.009*** (0.002)	-0.009*** (0.002)		-0.136*** (0.014)	-0.135*** (0.014)
Tr. (Jun) x [Year = $T+1$ ]			-0.003 (0.004)			-0.176*** (0.030)
Tr. (Dec) x [Year = $T+1$ ]			-0.001 (0.002)			-0.127*** (0.016)
Observations	41919	41919	53545	41919	41919	53545
Dep. var. mean	0.037	0.037	0.037	0.545	0.545	0.545
<b>Panel B: Loss-making firms</b>						
Treated x [Year = $T$ ]	-0.002 (0.002)			-0.028** (0.014)		
Tr. (Jun) x [Year = $T$ ]		0.001 (0.002)	0.001 (0.002)		0.003 (0.019)	0.007 (0.019)
Tr. (Dec) x [Year = $T$ ]		-0.002 (0.002)	-0.002 (0.002)		-0.029** (0.014)	-0.027** (0.014)
Tr. (Jun) x [Year = $T+1$ ]			-0.009*** (0.003)			-0.058*** (0.022)
Tr. (Dec) x [Year = $T+1$ ]			-0.006** (0.002)			-0.037** (0.018)
Observations	43128	43128	54453	43128	43128	54453
Dep. var. mean	0.004	0.004	0.004	0.064	0.064	0.064

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 D7: Other margins of responses: profit- vs loss-makers.

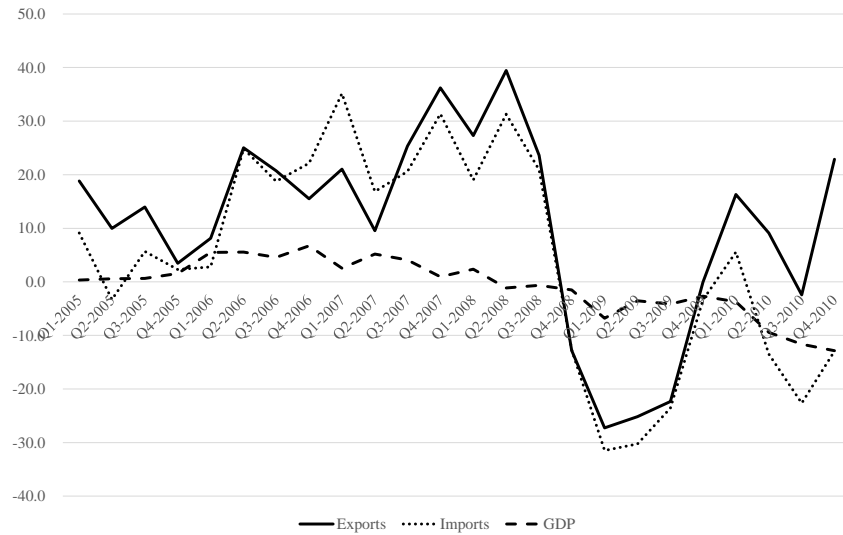
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	reserves	cash	ret. earn.	ret. earn. dummy	leverage	pos. profit	log rev.
<b>Panel A: Profitable firms</b>							
Treated x [Year = $T$ ]	0.015 (0.009)	0.025** (0.012)	0.023 (0.015)	0.032** (0.013)	-0.039 (0.030)	-0.006 (0.018)	0.104 (0.145)
Observations	45714	45714	45714	45714	45714	45714	45714
Dep.var mean	0.139	0.157	-0.334	0.145	0.503	0.186	10.693
<b>Panel B: Loss-making firms</b>							
Treated x [Year = $T$ ]	0.010*** (0.003)	0.003 (0.007)	-0.002 (0.005)	-0.011 (0.013)	-0.055*** (0.016)	-0.039*** (0.009)	-0.044 (0.052)
Observations	34957	34957	34957	34957	34957	34957	34957
Dep. var. mean	0.093	0.149	0.030	0.815	0.547	0.993	14.061

Note: This table summarizes results on reserve, cash, retained earnings, leverage, profits and revenue responses. We divide 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 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. We exclude June firms in this table and only present the effect for December-year end firms.

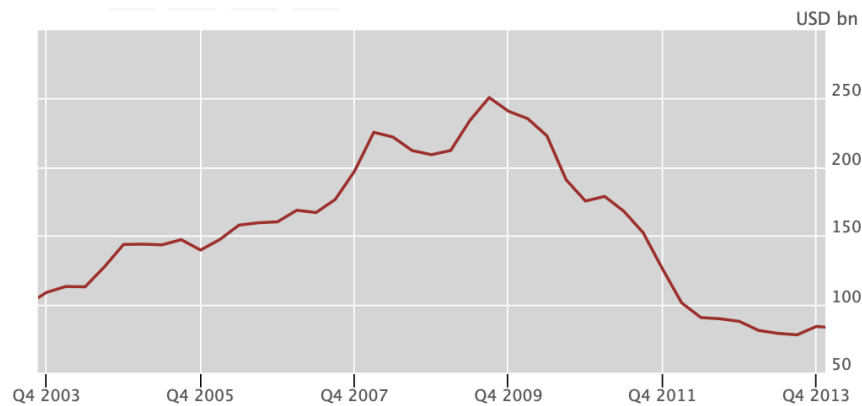
## E Additional figures and tables

Figure F1: Financial Crisis evolution: Greece.

a Evolution of GDP, exports and imports.

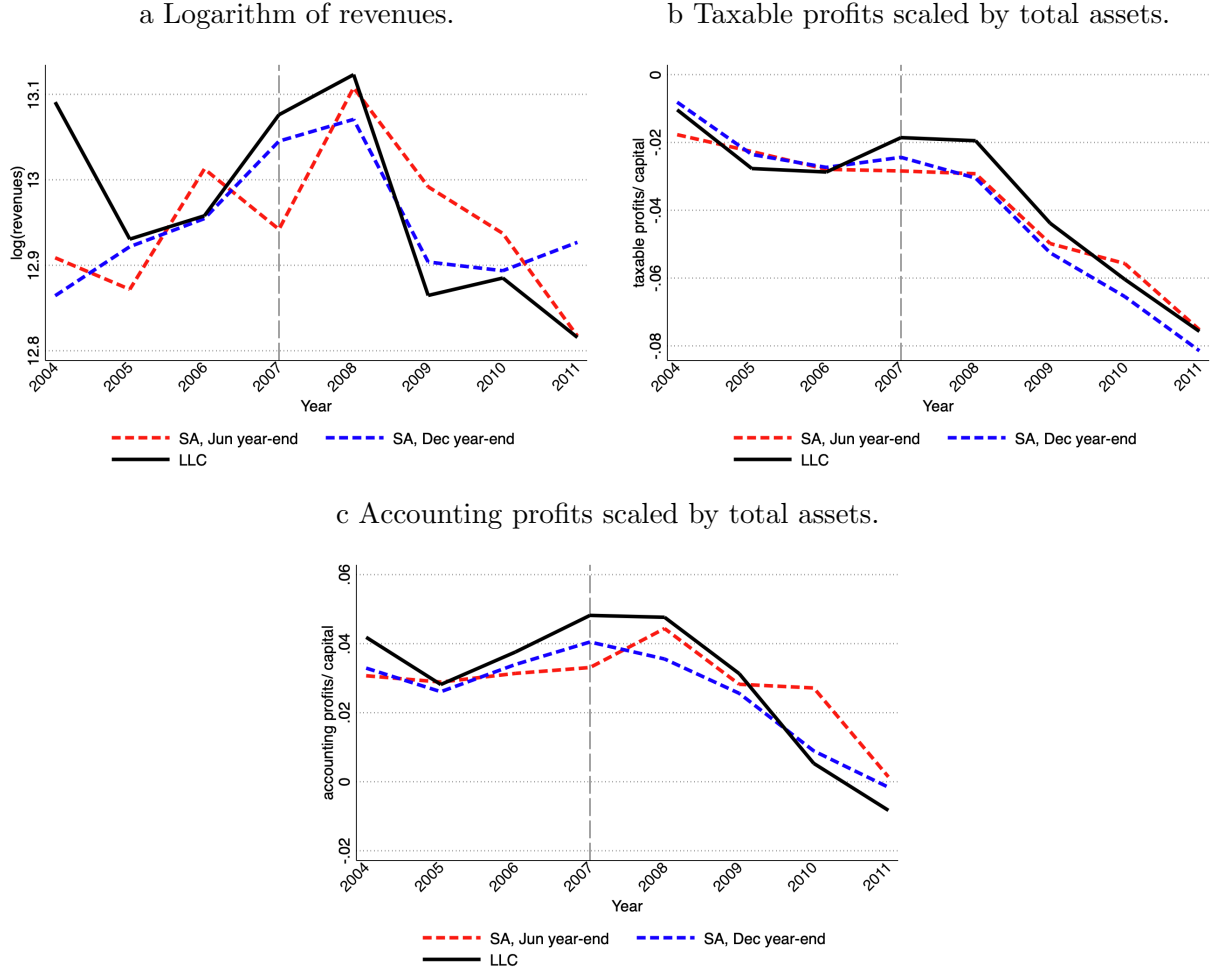


b Evolution of international claims on all Greek counterparts.



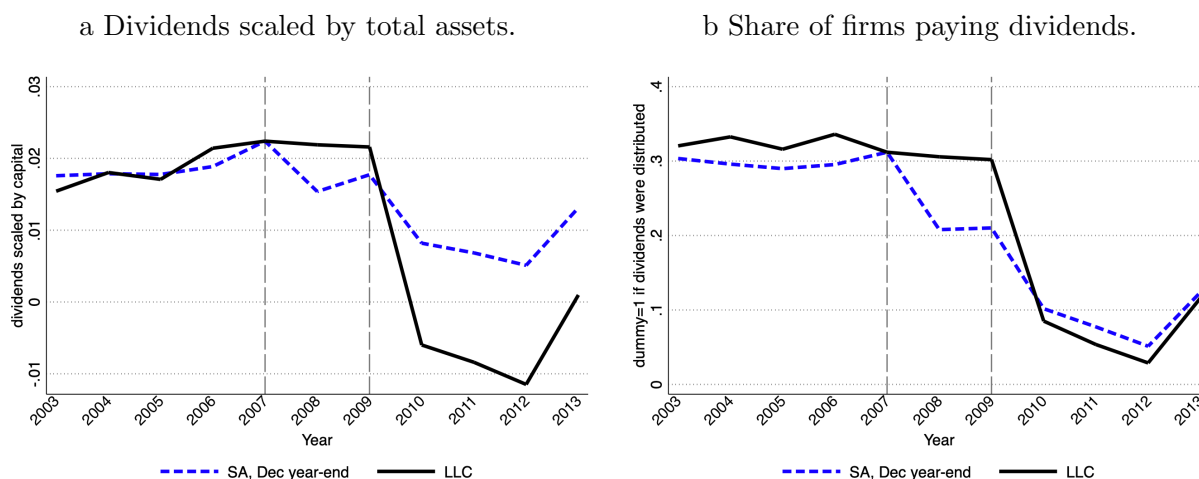
Note: In Panel A, we plot the quarterly evolution of GDP, imports and exports in Greece between 2005 and 2010. Each variable is a growth rate relative to the same period in the previous year. Source: OECD Quarterly statistics. In Panel B, we plot the quarterly evolution of banks' cross-border positions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

Figure F2: Financial crisis: revenues and profits.



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 F3: Dividend distributions in the long-run: SAs vs LLCs.



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.

Table F1: Heterogeneity by dividend responses.

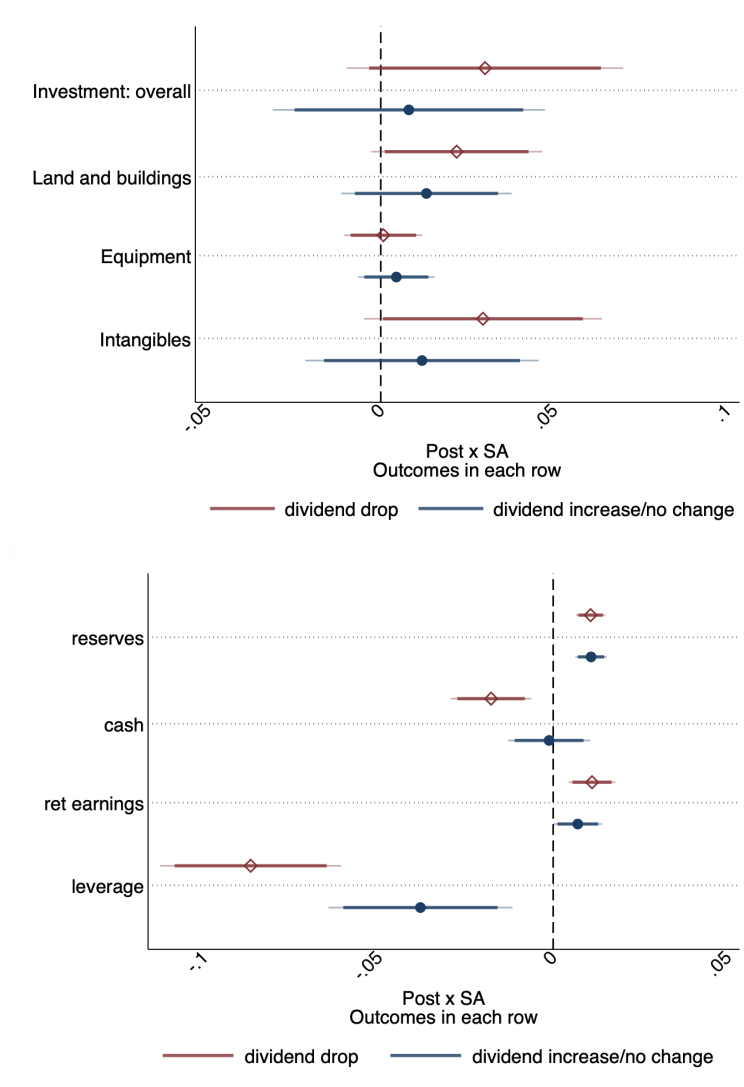
<b>Panel A: Firms that reduced dividends</b>											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	investment	land and buildings	equipment	intangibles	reserves	cash	ret. earn.	ret. earn. dummy	leverage	pos.profit	log rev.
Treated x [Year = $T$ ]	0.028* (0.016)	0.024** (0.010)	0.004 (0.005)	0.038** (0.014)	0.011*** (0.003)	-0.008 (0.006)	0.018*** (0.005)	-0.091*** (0.011)	-0.086*** (0.013)	-0.081*** (0.009)	-0.123** (0.053)
Observations	29710	23743	29829	29118	30061	30061	30061	23912	30061	30061	30061
Dep. var. mean	0.130	0.142	0.022	0.133	0.091	0.158	-0.015	0.774	0.615	0.851	13.746

<b>Panel B: Firms that did not reduce dividends</b>											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	investment	land and buildings	equipment	intangibles	reserves	cash	ret. earn.	ret. earn. dummy	leverage	pos.profit	log rev.
Treated x [Year = $T$ ]	-0.004 (0.015)	0.014 (0.010)	0.002 (0.004)	0.016 (0.013)	0.012*** (0.003)	0.005 (0.005)	-0.004 (0.005)	0.052*** (0.009)	-0.038*** (0.013)	0.030*** (0.008)	0.041 (0.052)
Observations	67176	54135	67383	66563	68503	68503	68503	62763	68503	68503	68503
Dep. var. mean	0.103	0.116	0.011	0.100	0.123	0.159	-0.211	0.319	0.523	0.475	11.788

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 buildings assets; in column 3 it is growth rate of equipment assets, and in column 4 it is the growth rate of intangible assets. In column 5 we have reserves, in column 6 cash, in column 7 retained earnings, in column 8 retained earnings dummy, in column 9 leverage, in column 10 a positive profit dummy, in column 11, logarithm of revenue. 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.

Figure F4: 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 buildings is growth rate of assets held in land and buildings, similar for equipment and intangibles (R&D). 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. Corresponding coefficient estimates are in Table F1 in the Appendix.

Table F2: Investment responses: June vs December firms.

	(1) investment	(2) land and buildings	(3) equipment	(4) intangibles
Tr. (Jun) x [Year = $T$ ]	-0.059*** (0.022)	-0.042*** (0.014)	0.006 (0.007)	0.033 (0.020)
Tr. (Dec) x [Year = $T$ ]	0.011 (0.015)	0.023** (0.009)	0.002 (0.004)	0.020 (0.012)
Tr. (Jun) x [Year = $T+1$ ]	0.089*** (0.024)	0.097*** (0.016)	-0.008 (0.008)	0.058*** (0.023)
Tr. (Dec) x [Year = $T+1$ ]	-0.009 (0.016)	0.000 (0.009)	0.003 (0.003)	0.001 (0.013)
Observations	118091	99943	118532	116911
# firms	27,042	27,308	27,290	27,337
# June firms	1,041	1,032	1,049	1,050
De. var. mean	0.109	0.121	0.014	0.109

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 land and buildings assets; in column 3 it is investment in equipment, and in column 4 it is the investment in intangible assets. 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  $T+1$ .

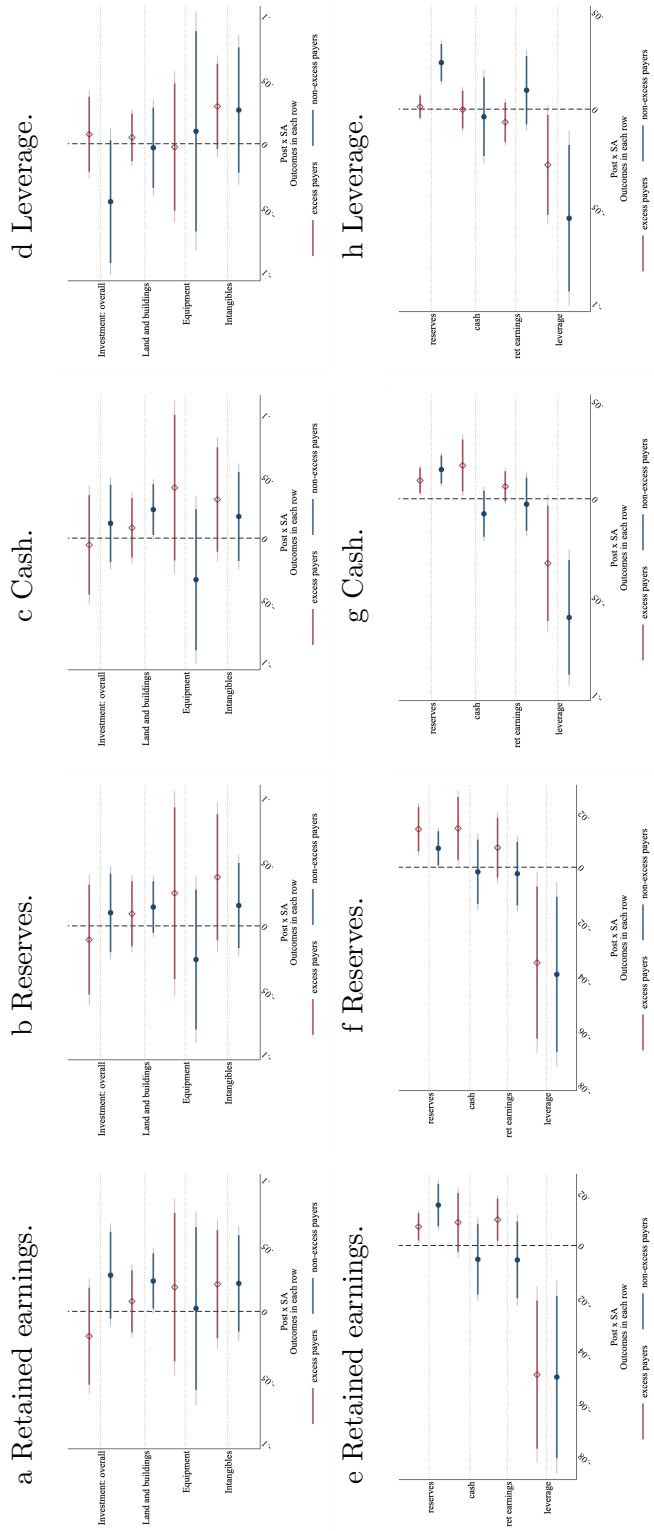


Table F3: Other margins of responses: June vs December firms.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	reserves	cash	ret. earn.	ret. earn. dummy	leverage	pos tax profits	log revenue
Tr. (Jun) x [Year = $T$ ]	-0.015*** (0.006)	-0.001 (0.008)	-0.007 (0.009)	0.023 (0.015)	-0.025 (0.023)	-0.002 (0.014)	0.022 (0.078)
Tr. (Dec) x [Year = $T$ ]	0.012*** (0.003)	0.001 (0.005)	0.004 (0.005)	0.013 (0.009)	-0.044*** (0.013)	-0.001 (0.008)	0.004 (0.049)
Tr. (Jun) x [Year = $T+1$ ]	0.014* (0.008)	0.000 (0.010)	-0.010 (0.012)	0.003 (0.018)	-0.034 (0.028)	0.016 (0.017)	0.060 (0.103)
Tr. (Dec) x [Year = $T+1$ ]	0.014*** (0.004)	-0.007 (0.007)	0.006 (0.007)	0.007 (0.012)	-0.091*** (0.018)	-0.011 (0.010)	0.060 (0.064)
Observations	120,192	120,192	120,192	120,192	120,192	120,192	120,192
# firms	27,468	27,468	27,468	27,468	27,468	27,468	27,468
# June firms	1,053	1,053	1,053	1,053	1,053	1,053	1,053
Dep. var. mean	0.117	0.156	-0.162	0.431	0.531	0.569	12.271

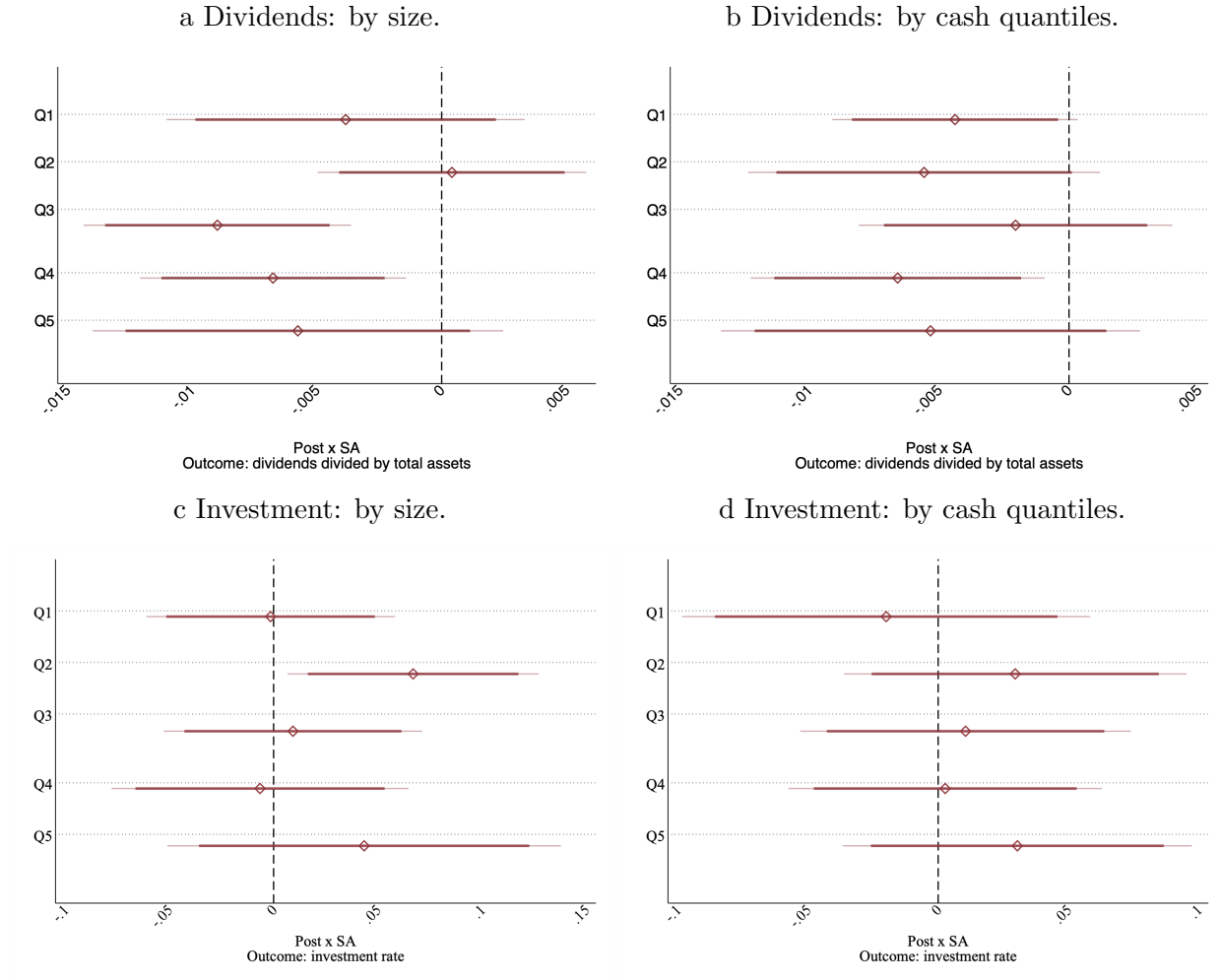
Note: This table summarizes results on reserve, cash, retained earnings, leverage, profits and revenue responses. In all columns, we split the treated dummy into treated June and treated December firms, but only in post periods. The dependent variable is reserves divided by total assets in 2007 in column 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 F5: Heterogeneities by ‘excess’ 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 ‘excess’ retained earnings (panels A, E), ‘excess’ reserves (Panels B, F), ‘excess’ cash (Panels C, G), ‘excess’ leverage (Panels D, H). ‘Excess’ is defined as above median in each sector in the last year before the reform, 2007. Red hollow diamonds correspond to coefficient estimates for excess firms. Blue full circles correspond to coefficient estimates for non-excess 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 buildings is growth rate of assets held in land and buildings, similar for equipment and intangibles (R&D). 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 F6: Heterogeneities by size and cash holdings.



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.

Table F4: Long-run responses: bankruptcy coefficients.

<b>Panel A: Reform response and the likelihood of going bankrupt</b>					
	(1)	(2)	(3)	(4)	(5)
	bankrupt	bankrupt	bankrupt	bankrupt	bankrupt
investment increase	-0.007** (0.003)				
cash increase		0.001 (0.003)			
reserves increase			0.002 (0.003)		
ret earn. increase				-0.004 (0.003)	
leverage drop					-0.008*** (0.003)
Observations	8099	8099	8099	8099	8099
<b>Panel B: Reform response and sales growth</b>					
	(1)	(2)	(3)	(4)	(5)
	log(sales)	log(sales)	log(sales)	log(sales)	log(sales)
investment increase	0.145** (0.059)				
cash increase		-0.016 (0.059)			
reserves increase			-0.224*** (0.072)		
ret earn. increase				-0.121** (0.059)	
leverage drop					0.002 (0.059)
Observations	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. 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. 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.