

**Shareholder illiquidity and firm behavior:  
Financial and real effects of the personal wealth tax in private firms**

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**Abstract**

We examine how negative liquidity shocks to households propagate to firms. We show that higher taxes on the home of private firms' controlling shareholders are associated with higher dividend and salary payments from firms to shareholders and with lower cash holdings, investments, sales, and performance in firms. A one percentage-point increase in the shareholder's wealth-tax-to-liquid-assets ratio is on average followed by a half percentage-point increase in the dividends-to-earnings ratio, a one third percentage-point decrease in investment, and a half percentage-point decrease in sales growth and profitability. These findings suggest that shareholder illiquidity has causal effects on firm behavior.

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## 1. Introduction

We show how personal liquidity shocks to a private firm's controlling shareholder change the firm's behavior. Private firms are often unknown to new investors and may face higher costs of external finance than public firms do. This situation makes the firm unusually dependent on internal funds to finance growth (Gilchrist and Himmelberg 1995; Khwaja and Mian 2008; Hadlock and Pierce 2010). Private firms also have less diversified owners and less liquid shares (Edmans and Holderness 2017), making their shareholders' personal finance unusually reliant on the firm's payout. Consequently, private firms may have to pay out more and abandon profitable projects when their shareholders need additional liquidity for personal reasons. If this happens, shareholder illiquidity has financial and real effects on the firm. To the best of our knowledge, our paper is the first to investigate this role of the equity channel.

We find that when the controlling shareholder experiences a negative liquidity shock, the firm's subsequent dividend and salary payments to the shareholder increase, while its cash holdings, investment, sales growth, and performance decrease. This finding suggests that household finance shocks propagate to corporate finance. We estimate the relationships using proprietary tax returns data from Norway for the population of private, family-controlled firms and their shareholders from 2000 to 2010.

To identify the relationship between personal illiquidity and firm behavior, we use a shock to shareholder liquidity that is independent of the firm's situation and also of the shareholder's income and preexisting liquidity. Specifically, we exploit regulatory shocks to the tax value of the shareholder's personal home (i.e., residential real estate). This tax value was increased annually by a fixed percentage per year across the board for four years, producing a cumulated increase of 67%. Because about nine out of ten controlling families in our sample own a home, representing on average about one third of the family's taxable wealth, the increased tax value of the home produced a large shock to the tax base for many households. Because the increased tax value is unrelated to the market value, there is no effect on collateral value, which could have influenced the firm's financing capacity (Chaney, Sraer, and Thesmar 2012). Because the tax change applies only to non-firm assets and is paid by the shareholder, the firm can only be affected indirectly, and only if the personal liquidity shock induces the controlling shareholder to take out larger dividends or salary from the firm. This increased payout would reduce the firm's liquidity, which may in turn reduce investment, growth and performance if the firm is financially constrained.

Using the controlling shareholder's wealth-tax-to-liquid-assets ratio (wealth tax payment per unit of liquid assets) as our main independent variable, we have two main results. First, the increased tax value of the controlling shareholder's personal home, which produces higher wealth tax payments, is associated with higher dividend and salary payments to the shareholder and with lower cash holdings in the firm. On average, when the controlling shareholder's wealth-tax-to-liquid-assets ratio increases by 1 percentage point, the firm's payout ratio (dividends plus salary paid to the controlling shareholder per unit of firm earnings before salary) increases by 0.84 percentage points, and the firm's cash ratio (cash holding per unit of assets) decreases by 1.09 percentage points. Also, firms are more likely to pay dividends even in loss-making years after a wealth tax shock. Thus, the shock to personal liquidity propagates to the firm's liquidity because the shareholder withdraws cash to cover larger personal tax payments.

Our second main result is that the larger payout to shareholders has real effects on the firm through lower investment, growth, and performance. A 1 percentage-point increase in the shareholder's wealth-tax-to-liquid-assets ratio is on average associated with a 0.30 percentage-points decrease in next year's investments and a 0.45 percentage-points decrease in next year's sales growth. The effect on employment is also negative, but usually not statistically significant, perhaps because employment tends to be quite stable in family-controlled firms (Sraer and Thesmar 2007). We also find a negative and significant effect on firm performance, as a 1 percentage point increase in the wealth-tax-to-liquid-assets ratio is followed by a 0.49 percentage-points decrease in returns on assets.

Our baseline sample of about 33,000 firms on average per year is from the population of active, non-financial, private firms with limited liability. We restrict the attention to firms controlled by a family, defining control as the ultimate ownership of more than 50% of the firm's equity. We use this definition to ensure the household experiencing the liquidity shock can single-handedly make the firm's financial and real decisions. We match firm data with personal tax returns data for the household's capital income, labor income, assets, liabilities, and wealth tax payments. The sample period is 2000–2010, while the tax shocks occur annually from 2006 to 2010. Our sample has the advantage of reflecting a tax system with uniform, flat personal taxation of dividends and other capital income. Also, the tax on capital income is aligned with the tax on labor income. Thus, every shareholder is subject to the same dividend tax rate, and nobody has tax reasons for shifting income between dividends and salary.

We take two actions to ensure the tax shock is due only to the change in the tax value of the same home from one year to the next rather than to quality improvements, transactions, and

market value changes of the home, or to personal assets other than the family's home. First, our main sample includes only firms where the tax value of the controlling shareholder's home changes by exactly the standard change implied by the tax rule. Second, we instrument the family's wealth-tax-to-liquid-assets ratio, which may be high for reasons related to the firm, which we want to avoid. For instance, more profitable firms may have wealthier owners who pay higher taxes. Further, the ratio reflects the wealth tax paid on all taxable assets rather than just the tax on the personal home. To reduce these sources of bias, we instrument the wealth-tax-to-liquid-assets ratio by the change in the tax value of the family's home and by the home's proportion of the family's assets.

We account for firm-specific determinants of financial and real effects, such as age, size, risk, and leverage. Moreover, we account for personal wealth and personal debt, and we include firm and year fixed effects, the latter being particularly important because the sample period includes the recent financial crisis.

We run difference-in-difference regressions as an alternative to the instrumental variables specification, using firms controlled by wealth-tax paying families with a personal home as the treatment group. Consistent with the baseline model, we find that after a personal wealth tax shock, the firms in the treated group decrease investment, growth, and profitability compared to what happens in the control group. Finally, our findings are robust to how we construct the sample, account for heterogeneity among firms and shareholders, measure the personal liquidity shock, account for the market value of the family's personal home, measure debt capacity, and to possible structural shifts in family and firm characteristics that are either observable or unobservable and time-invariant.

We extend the existing literature in five ways. First, we provide direct evidence that household finance may interact with corporate finance through shareholder illiquidity. While the literature on corporate debt financing documents the importance of the collateral channel (Chaney, Sraer, and Thesmar 2012; Kerr, Kerr, and Nanda 2015; Schmalz, Sraer, and Thesmar 2017), we study equity financing and document the importance of shareholder illiquidity. Unlike new debt, retained earnings may be the most valuable funding source, particularly for smaller private firms with severe adverse selection problems (Leland and Pyle 1977; Myers and Majluf 1984). Thus, personal liquidity shocks to the controlling shareholder may hurt the firm's cheapest funding by forcing retained earnings out of the firm.

The entrepreneurship literature suggests that bequests increase entrepreneurship (Hurst and Lusardi 2004), that the quality of such entrepreneurship is low (Andersen and Nielsen 2012),

and that higher market value of residential real estate increases entrepreneurship and growth (Schmalz, Sraer and Thesmar 2017). However, while this literature studies the birth of firms and new financing, we examine existing firms with a given financing. This approach allows us to analyze how shocks to shareholders influence firm behavior when ownership and managerial talent remain unchanged. While the entrepreneurship literature studies shocks to shareholder wealth, which may also involve shocks to shareholder liquidity, we zoom in on shocks to shareholder liquidity. Both properties of our approach allow for a cleaner test of how shareholder liquidity per se might influence the firm. Also, while the entrepreneurship literature studies shocks to the firm's local economy, we measure the liquidity shock at the individual shareholder level. This approach allows for a more precise measurement of the shock and richer controls for other personal characteristics that may matter for the shareholder's response, such as personal wealth, liquid assets, and debt.

Our second contribution is to show that even taxes that are strictly personal may matter for firm behavior. This relationship is underexplored in the literature, which has only studied the how personal capital income taxes relate to the firm's capital structure, dividends, and investment (Graham 1999, Chetty and Saez 2006, 2010; Desai and Jin 2011; Becker, Jacob, and Jacob 2013; Colombo and Caldeira 2018). While these taxes depend directly on the firm's decisions, we analyze a tax payment the firm cannot influence. Thus, we study how the firm responds to taxation that is independent of the firm's cash flow and value.

The existing paper closest to ours is by Tsoutsoura (2015), who shows that succession taxes have real effects. However, succession happens only to a few owners, happens at their own discretion, and changes the firm's ownership. In contrast, the event we analyze affects most owners, happens at a time they cannot decide, and leaves ownership unchanged. Moreover, while succession taxes depend on the value of the firm, the wealth tax shock we study does not. Thus, unlike the succession tax, the tax on residential real estate is strictly personal.

Third, we contribute to the recent academic literature on the merits of wealth taxation (Piketty 2013, Fagereng et al. 2016, Fisman et al. 2017, Guvenen et al. 2019, Zucman 2019, Saez and Zucman 2019, Jakobsen et al. 2020) and the political debate on a possible wealth tax system in the United States and elsewhere (Financial Times 2019). Our results suggest that any wealth tax system should carefully consider the implicit link between the owner's non-firm assets and the firm's financial constraints. A recent report from the OECD (2018) shows that this link is often ignored in analyses of optimal tax policy. Our results also suggest that restricting the wealth tax base to just real estate, as recently done in France (Financial Times

2017), does not avoid the negative side effects on the firm. We confirm that a wealth tax with a low exemption threshold can generate “liquidity problems for some moderately wealthy taxpayers with few liquid assets and limited cash incomes” (Saez and Zucman 2019). These liquidity effects of the wealth tax have received very little attention in the literature (Bastani and Waldenström 2018).

While rare globally, the personal wealth tax we study is not the only tax that must be paid regardless of the taxpayer’s personal income and liquidity.<sup>1</sup> This principle also applies to property taxes, which are widespread and an important source of tax revenue (OECD 2019).<sup>2</sup> Recent policy recommendations propose an increased use of property taxes due to their moderate distortionary effects and “potential gains to inclusive growth” (OECD 2018). The Norwegian wealth tax system provides a quasi-natural experiment needed to assess this idea. The results, which are likely to be valid in any country with property taxes, suggest that the side effects on firm liquidity, investment, growth, and performance should be carefully assessed.

Our fourth contribution is to identify shareholder liquidity needs as a new determinant of firm payout, and we offer a novel explanation of why loss-making firms still pay dividends (DeAngelo, DeAngelo, and Skinner 1992). There is evidence from public firms that reduced share liquidity is associated with increased dividends (Banerjee, Gatchev, and Spindt 2007; Griffin 2010). These studies implicitly assume, however, that shareholders can easily construct their home-made dividend policy by trading the firm’s shares, and that control over the firm does not affect the shareholder’s trading decision (Miller and Modigliani 1961). In contrast, all shares in our sample firms are illiquid, and the controlling shareholder may want to keep the stake to preserve private benefits. This situation means the cost of not receiving dividends is higher in nonlisted firms than elsewhere. This property of our sample firms allows for a more powerful test of how shareholder liquidity interacts with dividend policy.

Finally, we uncover a new determinant of cash holdings in private firms, where the lack of a liquid equity market may make cash particularly important (Gao, Harford, and Li 2013). We show that the controlling shareholder’s personal liquidity need spills over to the firm’s cash

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<sup>1</sup> France, Iceland, Lichtenstein, Norway, Luxembourg, and Switzerland (at the cantonal level) have a personal wealth tax system, while the system was recently abolished in Denmark, Finland, Germany, Netherlands, and Sweden. The Norwegian wealth tax revenue in 2017 was NOK 15 billion, which was 4.3% of the total tax revenue from persons.

<sup>2</sup> Property taxes are on average 1.94% of GDP in OECD countries in 2017, up from 1.75% in 2000. The proportion is higher in the United Kingdom, France, and the United States, and lower in Norway (1.27% in 2017).

holdings. Because most private firms are majority owned (Berzins, Bøhren, and Stacescu 2018), the new cash determinant we find may apply to most firms in the economy.

We describe the Norwegian wealth tax system in Section 2, present the data in Section 3, and show summary statistics for the controlling shareholder's tax payments and the tax value of residential real estate in Section 4. We examine the relationship between wealth tax shocks and the firm's payout and cash holdings in Section 5, analyze how wealth tax payments interact with the firm's growth and performance in Section 6, and make robustness tests in Section 7. We conclude in Section 8.

## 2. The Norwegian wealth tax system

The tax base for the wealth tax is the person's net assets (i.e., personal assets less personal debt) above a standard exemption threshold. The assets include shares, bonds, bank savings, residential real estate, and other physical assets. Bank savings, listed shares, and other traded securities are valued at their year-end market value. The tax base for nonlisted shares in year  $t$  is based on the book value of the firm's assets and liabilities at the end of accounting year  $t-1$ .<sup>3</sup> Until 2009, residential real estate had a conventional value set by local authorities based on the historic construction cost. The system was changed in 2010 to one where the tax base is based on transaction prices in the local area. Because the tax rate was 1.1% during the entire sample period, the tax shocks worked exclusively through the changes in the tax value rules.

While the tax value of a personal home has historically been far below the market value, two of the three changes in tax value rules in our sample period reduced the gap. First, starting in 2006, successive upwards adjustments were applied to existing tax values across the board. Specifically, the tax value was increased by 25% in 2006 and by 10% annually in 2007, 2008 and 2009, producing a cumulated increase of 67%. Second, the tax value based on historic cost was replaced by a value based on local market prices for transactions of similar homes in 2010. As we show below, this switch to market-based valuation produced, once again, a large increase in tax value. We also show that the tax value grew faster than the market value from 2006 on, and that the increased tax value was unrelated to economic growth. Thus, the wealth tax shock was not just independent of wealth shocks coming from the person's ownership in the firm, but also of the overall economy and the market value of the person's home.

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<sup>3</sup> Because we study nonlisted firms where a family owns more than 50% of the equity, the firm's net assets are included in the family's tax base at their book value. The controlling owner may also own shares in listed firms, which we count at market value as part of the family's liquid wealth.

The third significant change in the wealth tax system was a gradual increase in the standard deduction from NOK 120,000 in 2000 to NOK 700,000 in 2010.<sup>4</sup> As a result, many households that used to pay a small wealth tax paid no wealth tax by the end of the sample period. However, the change mattered more for the number of households paying than for the tax paid per household. Therefore, the overall effect of the three changes in the tax code was that wealthier households, which are more likely to own firms and more likely to own valuable homes, paid increasing amounts of wealth tax.

The increases in tax value were announced in advance. For instance, the increase for 2006 was announced after the general elections in September 2005, and the wealth tax rules for 2009 were announced in October 2008. Despite the resulting opportunity to respond to the tax shock before it became effective, however, the incentives to respond may be weak. First, because residential real estate is among the most tax-advantaged assets, selling the home and replacing it by another asset type will likely increase the tax base. Second, because the shareholder needs a place to live, selling the home and instead rent generates transaction costs. Nevertheless, we account for the family's possible response by carving out a main sample where we know for sure that the family remains in the same home and has not remodeled it.

Tax evasion through underreporting may be a concern for wealth taxes (Saez and Zucman 2019; Durán-Cabré et al. 2019), but is unlikely to be important for our study. First, the Norwegian wealth tax system relies mostly on third-party reporting (Fagereng et al. 2020). Residential real estate values are assessed by local tax authorities, while financial intermediaries report liquid assets, such as bank savings and marketable securities. Also, because all limited-liability firms must submit audited accounts during our sample period, the reported equity holdings in private firms are unusually reliable. Second, tax evasion primarily happens at the top of the wealth distribution (Alstadsæter et al. 2019). Unlike other wealth tax systems, however, such as the Danish (Jakobsen et al. 2020), the Norwegian wealth tax affects not just the very rich, but a large proportion of the households. Our sample covers every controlling owner of private firms, including owners with very moderate wealth and small firms. We show that almost half the owners pay wealth tax even after the exemption threshold was increased.

A new system for capital income taxation implemented in 2006 increased the tax rate on dividends received by personal shareholders from 0% to 28%. Dividends decreased strongly, the average payout ratio in our sample firms dropping from 49% before 2006 to 13% after. This dramatic dividend tax effect makes it difficult to run meaningful difference-in-difference tests

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<sup>4</sup> The average exchange rate in 2010 was 1 USD = 6.04 NOK and 1 EUR = 8.01 NOK (Source: Norges Bank).



for wealth tax effects with dividends as the dependent variable for the period before vs. after the first wealth tax shock in 2006. This is also why we use only the period after the dividend tax reform in our main statistical tests of the payout effect. Therefore, all dividends we analyze are taxed at the same rate for all investors and all years.<sup>5</sup> Because dividend taxes make it costlier to mitigate shareholder illiquidity problems with payout from the firm, the personal dividend tax in our sample period increases the power of our test.

Overall, the tax regulations in our sample period imply that the wealth tax shocks we study are unrelated to the firm, unrelated to the shareholder's personal liquidity, and difficult to avoid. Because the tax changes have not been reversed, the increased tax values are also persistent, generating higher wealth tax payments every year once installed.

### 3. Data

The data set covers the period 2000–2010.<sup>6</sup> Our dating system uses the accounting year rather than the payment year, which is the year after. Thus, the wealth tax for year  $t$  is paid in year  $t+1$  based on assets and debt at the end of year  $t$ .<sup>7</sup> Moreover, the dividends we report for year  $t$  are paid out in year  $t+1$ . We apply several filters to build the sample of economically active firms from the population of all firm with limited liability:

1. We exclude financial firms in order to avoid the impact of special accounting rules, capital requirements, and caps on ownership concentration.
2. We require positive sales, assets, and employment to avoid inactive firms. We ignore the smallest 5% of firms by assets, sales, and employment to avoid firms with unusually low activity.
3. We exclude subsidiaries in business groups to avoid dividends distorted by special tax rules for cash transfers between group members. The only exception is subsidiaries owned through a single holding company with no significant economic activity.
4. We only include firms where a wide family (persons related up to the 4<sup>th</sup> degree of kinship) owns more than 50% of the shares measured by ultimate (i.e., direct plus

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<sup>5</sup> Capital gains were taxed at the same rate as dividends both under the old and new dividend tax system. Capital gains taxes are largely irrelevant for our study, however, because share repurchases are very rare in private firms. We find evidence of repurchase activity in less than 1% of the firm years.

<sup>6</sup> Accounting, ownership, and board data are delivered by Experian ([www.experian.com](http://www.experian.com)). The data on family relationships are from Skattedirektoratet ([www.skatteetaten.no](http://www.skatteetaten.no)), and the personal tax returns data are from Statistics Norway (<https://www.ssb.no/>), both of which are state agencies. All data items were received electronically and stored by the Centre for Corporate Governance Research ([www.bi.edu/ccgr](http://www.bi.edu/ccgr)).

<sup>7</sup> If the asset is shares in a private firm, the tax value is based on the net asset value at the end of year  $t-1$ .

indirect) ownership. We restrict the attention to firms with a controlling family in order to ensure one household can single-handedly make the financing and investment decisions. The family's gross assets must be positive.

We match firm data with data on the firm's largest nuclear family (parents and underage children) by ownership and its tax returns data, which contains details about the family's capital and labor income, assets, liabilities, and wealth tax payments. We measure the annual change in the tax value of the family's home over the period 2006–2010. Because our tax data reflects all residential real estate items in the family rather than each separate item, the observed change could come from a change in the tax value of items held last year, from current improvements, or from current transactions. We want to pick up the former, but not the two latter. We ensure this happens by using one particular sampling procedure for 2006–2009 and one for 2010.

The annual tax rule shocks in 2006–2009 involve a standard percentage increase in book valuation of 25% in 2006 and 10% in each of the three subsequent years. As we show below, the observed percentage change in the family's tax value of its home equals the standard percentage in about three of four cases. Therefore, we ensure our sample has no cases of transactions or improvements by using only observations where the change in tax value exactly equals the change implied by the new tax rule.<sup>8</sup> Thus, the tax payer we observe lives in the same house with the same characteristics before and after the tax shock.

The final sample year in 2010 involves a change in valuation principle from book value to market value. To ensure we exclude improvements and transactions, we only include owners for whom the change in tax value is between NOK -100,000 and NOK +500,000. This narrow change is likely to reflect only the change in valuation.

These sampling criteria produce the sample for our instrumental-variable (IV) regressions, which we use to analyze both financial effects and real effects in the period 2006–2010. Because our cleaning procedure for 2010 only approximates a perfect cleaning, we also show the results when 2010 is excluded. Our alternative estimation technique is the difference-in-difference (DiD) approach, which we do not use to explore financial effects because of the dividend tax increase in 2006. The sample period for the DiD is 2001–2010. We define the treatment group as the firms where the controlling family owns a home and is a wealth-tax payer, which means the personal liquidity is likely to be affected by the tax changes in 2006–2010. The control group includes the remaining firms, which are controlled by a family that either rents its home

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<sup>8</sup> To allow for possible rounding, we allow for a deviation of +/- 1%.

or owns it, but does not pay wealth tax. We compare the period when the treatment group is affected by the tax changes (2006–2010) to the prior period (2001–2005).

Finally, our sample period overlaps with the global financial crisis. However, the effect of the crisis on the Norwegian economy was small due to high oil prices. The dip in GDP was just -1.0% in the last quarter of 2008 and -0.8% in the first quarter of 2009, and payout ratios remained quite stable. Nevertheless, we use year fixed effects to account for the economic cycle.

#### **4. Summary statistics**

Our first step in documenting the importance of the personal wealth tax for the firm's controlling shareholder is to measure the wealth tax amount due and relate it to the ability to pay. Along these lines, Table 1 shows annual descriptive statistics for all controlling families selected by the sampling criteria specified in Section 3. Panel A shows that these families are the majority shareholder in 32,563 firms on average per year.

Table 1

The average wealth tax paid per family increases from NOK 35,284 in year 2000 through NOK 57,004 in 2006 to NOK 66,245 in 2010, representing an 87.7% nominal growth over a decade (53.9% real growth). The amounts and the growth are much larger for wealth-tax-paying families owning their home than for families without: The average amounts are NOK 92,347 and 44,140, while the growth rates are 137.8% and 96.3%, respectively.<sup>9</sup> The proportion of controlling shareholders owning a home remains high and stable, being 85.5% on average.<sup>10</sup>

The threshold triggering wealth tax payments was gradually increased over the sample period. Panel B shows that, as expected, the increasing threshold is accompanied by a decreasing proportion of families paying wealth tax. For instance, while 63.4% of those owning their home pay wealth tax in 2000, only 49.4% do so in 2010.

Panel C measures the wealth tax burden by relating the wealth tax payment to the controlling family's liquid assets (cash, bank accounts, and listed securities). The change in this wealth-tax-to-liquid-assets ratio is our main proxy of the shareholder's wealth tax shock. The

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<sup>9</sup> The atypically low mean wealth tax payment for families with residential real estate in 2005 may be due to missing observations for a few families with unusually high wealth.

<sup>10</sup> Norway has a high proportion of home ownership. For instance, the ownership rate was 83% in 2010, while it was 71% in the EU (Source: Eurostat).

ratio is on average 3.6% for families owning a home in 2010, 2.9% for families without, and 7.4% for home-owning families who also pay wealth tax.

Table 2 shows that the tax value of residential real estate increases every year after 2005 to a median of NOK 787,586 in 2010. The nominal (real) growth rate in 2000–2010 is 157.6% (111.8%). The median annual growth in any year during 2001–2009 is exactly equal to the standard change in tax value given by the tax rules: An increase of 15% in 2001, a decrease of 5% in 2003, and increases of 25%, 10%, 10%, and 10% in 2006, 2007, 2008, and 2009, respectively. In fact, a change in tax value exactly equal to the standard change represents about three quarters of the cases. This pattern reflects that most families own just one home and remain there rather than move to another.

Table 2

Figure 1 shows indexes for the tax value of residential real estate, the market value, and the standard tax value change.<sup>11</sup> The figure shows that while market values have grown steadily, the tax value has grown even more after 2005, when the regulator started increasing the tax value every year. This pattern suggests that the evolution of tax values is largely unrelated to market values, and that the tax value grows faster than the collateral value.

Figure 1

The magnitude of the personal tax shock and its impact at the personal and corporate level may depend on the characteristics of families and firms. Table 3 shows the mean and median value of family and firm characteristics for the clean sample described in Section 3 which is used in our instrumental variable regressions.<sup>12</sup> In the following, we compare mean characteristics for controlling shareholders with and without residential real estate.

Table 3

Controlling families with residential real estate own more much assets (gross wealth) than those without (mean of NOK 5.33 vs. 3.23 mill.). Their net wealth is twice as large (NOK 3.61

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<sup>11</sup> We measure market value as market price per square meter for residential real estate (Source: Statistics Norway).

<sup>12</sup> The sample for 2006–2009 includes only firms controlled by a family that either has no residential real estate or experiences a standard change in its tax value. For 2010, when no standard change was made, we restrict the sample of shareholders with residential real estate to those with a change in tax value in the narrow range of NOK -100,000 to NOK +500,000.

vs 1.80 mill.), their assets are less liquid (liquid assets to gross assets is 0.26 vs. 0.38), while their wealth tax payment requires more of their liquid assets (3% vs. 2%).<sup>13</sup>

As we will discuss in Sections 5–7, the firm’s financing and investment behavior may depend on not just the controlling owner’s liquidity, but also on the firm’s size, age, risk, growth opportunities, leverage, profitability, asset tangibility, and aggregate retained earnings. Table 3 shows that firms controlled by families who own their home are larger (mean sales of 9.11 vs. 7.92 mill. NOK), older (14.5 vs. 13 years), slightly less levered (total liabilities to assets ratios of 0.70 vs. 0.75), and more profitable (return on assets of 9% vs. 7%), while the assets are less tangible (tangible assets to gross assets of 0.20 vs. 0.25). The ratio of sales to assets, which is our proxy for future growth opportunities, is very similar (2.4 vs. 2.5).<sup>14</sup> This is also the case for the ratio of retained earnings to equity (0.61 for both) and for risk, which we measure as the coefficient of variation of sales over the past three years (0.32 vs. 0.35).

The summary statistics for financial and real effects of shareholder illiquidity on the firm are shown in the lower part of the table. Although the median firm pays no dividends regardless of whether the controlling family owns its home, the mean dividends to earnings ratio is higher for home owners (0.16 vs. 0.10). This tendency is also reflected in the sum of dividends and salary paid to the family: Measured as a fraction of earnings plus salary, the mean of this ratio is higher when the family owns its home (0.65 vs. 0.59).

We measure real effects as the impact of the owner’s personal liquidity shock on the firm’s investment, sales growth, employment growth, and performance. The summary statistics show that mean investment, measured as the annual increase in real assets, is independent of whether the firm’s controlling shareholder owns a home (7%). Mean sales growth is slightly lower for home owners (7% vs 8%), while employment growth is independent of home ownership (2%). The median firm has the same number of employees in two subsequent years regardless of home ownership (0% growth). This stable employment is similar to earlier findings in French family firms (Sraer and Thesmar 2007). Finally, as mentioned above, mean performance is higher when the controlling family owns its home (9% vs. 7% mean return on assets).

Table A1 in the Appendix shows the equivalent of Table 3 when we include all family-controlled firms, i.e., also those where the family does not experience a standard change in the tax value of its home. The table shows that the family characteristics, firm characteristics, and

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<sup>13</sup> Mean family leverage exceeds 100% because some assets, such as real estate and shares in private firms, have tax value below the market value, while debt is normally closer to market value.

<sup>14</sup> Firms generating high sales with their existing assets may need to invest to support their growth. Therefore, a higher sales-to-assets ratio may reflect lower slack and hence a stronger need to invest.

firm behavior variables in this extended sample are quite close to those in in Table 3, although some shareholders are wealthier than in the restricted sample.

Summarizing this section, we find that fewer controlling owners of family firms pay wealth tax over time, that those who do pay increasingly more relative to their liquid wealth, and that this effect is strongest for families owning their home. The tax value of the home increases by exactly the standard rate in three out of four cases, producing a particularly clean sample for our statistical tests. Compared to controlling families that do not own their home, those that do have on average more assets, more net wealth, pay more wealth tax relative to their liquid assets, and the firms they control are on average larger, more profitable, less liquid, pay higher dividends, and grow slightly more slowly. Thus, both owner and firm characteristics correlate with whether the controlling family owns its home. We will account for these characteristics in Section 5–7, where we analyze how the liquidity shocks to the controlling family change the firm’s behavior.

## 5. Shareholder illiquidity and financial effects on the firm

The personal liquidity may be insufficient to finance the family’s cash outflow after a liquidity shock. Therefore, the family may choose to withdraw cash from the firm, transforming the personal liquidity shock into a liquidity shock for the firm, with financial and possibly also real effects. We use this model to analyze the financial effects, where  $i$  is the firm and  $t$  is time:

$$\begin{aligned} \text{Financial effect}_{it} = & \alpha + \beta_1 \text{Personal liquidity shock}_{it} + \beta_2 \text{Family characteristics}_{it} \\ & + \beta_3 \text{Firm characteristics}_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

We regress several dependent variables reflecting financial effects in the firm on measures of the personal liquidity shock, accounting for family and firm characteristics. We use panel regressions with firm fixed effects to account for unobserved, time-invariant firm and family characteristics, and we use year fixed effects to control for the business cycle. We cluster the standard errors at the firm level to account for dependent observations.

We use four alternative dependent variables. The first is the classic *Dividends to earnings* (the dividends ratio), which we measure as dividends to operating earnings.<sup>15</sup> We test whether the personal liquidity shock for the shareholder is followed by abnormally high dividends.

The dividend literature shows that although some firms pay dividends even when they make a loss, the reason for this strategy is unclear (DeAngelo, DeAngelo, and Skinner, 1992). A possible reason is that dividends may need to be paid even in bad times because shareholders are illiquid. In our case, the controlling shareholder may need the dividends to pay increased wealth taxes. We capture this situation by our second dependent variable, *Distressed dividends*, which is 1 if the firm pays dividends in a year with negative earnings, and 0 otherwise.

The firm may have a controlling owner who receives salary from the firm. What matters for this owner may be the sum of dividends and salary rather than each component. Our third dependent variable is *Dividends and salary to earnings before salary*. We measure this variable as the sum of the dividends and salary the controlling shareholder receives from the firm divided by the shareholder's part of the firm's operating earnings plus the salary.

Finally, the increased cash flow from the firm to shareholders facing a liquidity shock may reduce the firm's optimal cash holdings. We capture this possibility by our fourth dependent variable, *Change in cash to assets*, which we measure as the change in the firm's cash to assets ratio from the previous year.

Our main independent variable is the *Family wealth-tax-to-liquid-assets* ratio. The higher it is, the heavier burden the wealth tax puts on the family's liquidity, and the stronger the need for liquidity from other sources, such as the family firm. However, running an OLS regression of financial effects in the firm on this ratio may create endogeneity bias. First, there may be characteristics that influence both sides of the equation. For instance, successful firms may pay larger dividends, and their owners may be wealthier and hence pay larger wealth tax. Second, the wealth tax payment is based on all personal assets the shareholder owns, including the shares in the firm. Third, the shareholder's personal liquidity may depend on firm characteristics.

For these reasons, there may be omitted variables correlated with both the wealth-tax-to-liquid-assets ratio and the firm's payout and liquidity. This is why we instrument the wealth-tax-to-liquid-assets ratio by the change in the tax value of the home and by the home's tax value as a proportion of the family's gross assets. The larger these two variables, the stronger the

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<sup>15</sup> We ignore repurchases because fewer than 1% of our sample firms buy back their shares. This very low propensity is not surprising, because the sample firms are private and have illiquid shares. Also, because the tax rate is the same for dividends and capital gains, there is no tax advantage for repurchases,

family's tax shock (the relevance criterion). Neither variable is likely to influence the firm's payout, growth, or profitability except indirectly through their impact on the family's need to finance its wealth tax payments (the exclusion criterion).

The owner's wealth tax payment and liquid assets are not the only characteristics that may influence the cash flow from the firm to its owners. Therefore, we include additional variables in the regression that reflect family and firm characteristics. Regarding family characteristics, we account for the family's gross assets because wealthier families may need less cash from the firm. A high pre-shock leverage for the family may also increase the need for cash from the firm if a large part of the family's liquidity is already used to cover debt payments. We account for this possibility by personal indebtedness measured as the ratio of debt to gross assets.

Regarding firm characteristics, firms with larger liquidity reserves (measured as the cash to assets ratio) and higher profitability (measured as return on assets) are more likely to pay higher dividends (DeAngelo, DeAngelo, and Stulz 2006). Conversely, firms with higher growth opportunities and higher risk tend to pay less (Grullon, Michaely, and Swaminathan 2002). We measure growth opportunities by the sales-to-assets ratio and risk by the coefficient of variation of sales over the past three years, respectively.

Larger and older firms are more likely to pay dividends (Fama and French 2001). Therefore, we include the firm's sales and age, taking logs in both cases to reduce skewness. Firms with higher leverage may find it difficult to pay their owners large amounts because of contractual obligations to creditors (Jensen 1988). Because mature firms are more likely to pay dividends (Grullon, Michaely, and Swaminathan 2002), we include the ratio of retained earnings to equity as a proxy for firm maturity (DeAngelo, DeAngelo, and Stulz 2006).

The results are presented in Table 4. The estimates show that, regardless of how we measure payout (as dividends to earnings, distressed dividends, or dividends plus salary to earnings before salary), a higher liquidity drain on the controlling family is associated with a higher cash flow paid from the firm to the family. The regression using the change in cash to assets as the dependent variable shows that a larger liquidity drain on the family is associated with lower cash holdings in the firm.

Table 4

The payout effect and the cash holding effect on the firm are the two main results in this section. They support the hypothesis that liquidity shocks for the owners induce the firm to pay out more in order to mitigate the effect of the shock, which in turn reduces the firm's liquid



position. The effects are economically large. A one percentage-point increase in the ratio of personal wealth tax to personal liquid assets increases the expected dividend payout ratio by 0.49 percentage points, total cash payments to shareholders per unit firm earnings before salary by 0.84 percentage points, and decreases the firm's cash to assets ratio by 1.09 percentage points. The sample means for the dividend payout ratio, total cash payout ratio, and firm cash to assets ratio are 16%, 66%, and 30%, respectively.

The coefficients of the control variables for family and firm characteristics have the expected signs: Families with low gross assets and high debt more often receive cash after a tax shock unrelated to the firm. Higher payout also associates positively with more liquid, more profitable, larger, less risky, less levered, older, and slow-growth firms.

Summing up this section, we find that a higher wealth tax payment for the firm's controlling shareholder due to higher tax value of the owner's personal home is associated with higher dividends and salaries paid from the firm to the shareholder, more frequent dividends even in loss-making years, and with reduced cash holdings in the firm. These findings suggest a causal effect from the owners' personal liquidity position to the firm's payout and liquidity.

## 6. Real effects of shareholder illiquidity

The results in Section 5 identify an effect going from the owner's personal liquidity to the firm's liquidity. In the absence of financing frictions in the firm, however, sudden cash drains on the firm should not have real effects. New funding for profitable projects would be raised at no extra cost from investors unaffected by the liquidity shock. If raising finance from other investors is costly due to market frictions such as information asymmetry, however, profitable projects may be lost. This lost value would be a cost due to financial constraints for the firm.

Our sample consists of private firms with concentrated ownership that are less known to investors and generally thought to be financially constrained compared to public firms. Therefore, we hypothesize that the controlling owner's personal tax shock, which generates higher payout and lower cash holdings in the firm, will slow down the firm's growth and reduce its profitability, which are the real effects we consider. Our first model for real effects has the following structure:

$$\begin{aligned} \text{Real effect}_{it} = & \alpha + \beta_1 \text{Personal liquidity shock}_{it} + \beta_2 \text{Family characteristics}_{it} \\ & + \beta_3 \text{Firm characteristics}_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

We first measure the real effect by the firm's investment. The second measure is growth, alternatively considering the growth rate of sales and of employment. We use the investment and the growth in year  $t+1$  in order to capture the effect of the increased wealth tax payment in year  $t$ . The negative liquidity shock on the firm may not just affect its investment and growth, but also its earnings. Therefore, our third measure of real effects is profitability, which we measure as return on assets in year  $t+1$ .

Like in Section 5, we measure the personal liquidity drain as the wealth tax levied on the family divided by the family's liquid assets. We again use an IV approach to reduce endogeneity bias, instrumenting the wealth-tax-to-liquid-assets ratio by the change in the tax value of the home and by the home's tax value as a proportion of the family's gross assets.<sup>16</sup>

We use a similar set of family and firm characteristics as in Section 5, expecting that wealthier families find it easier to support firm growth, while more levered families find it harder. Larger, more mature, and more levered firms may grow more slowly, while cash-rich firms may find it easier to support growth. Higher risk may hinder the financing of growth. We expect that family and firm characteristics fostering growth will be positively associated with profitability. We use the clean sample for 2006–2010 in order to avoid effects of transactions or improvements in the home, and we include firm and year fixed effects to account for effects of unobservable firm characteristics and the business cycle, respectively. Finally, we cluster standard errors at the firm level to account for dependent observations.

Panel A of Table 5 shows the results of the IV estimation. The estimates show that higher wealth tax payments for the shareholder are associated with lower investment and lower sales growth. The coefficient on employment has the expected negative sign, but is not statistically significant at conventional levels.

Table 5

The estimates also show that a stronger wealth tax shock is followed by lower returns on assets.<sup>17</sup> Thus, the drain on the firm's liquidity, the lower investment, and slower growth after the personal liquidity shock are also followed by decreased profitability.

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<sup>16</sup> Endogeneity bias may for instance occur if the firm is downsizing, selling assets above the book value used for wealth tax purposes, and paying its shareholders proceeds from the sale and dividends that will increase the wealth tax. In such a case, we would observe both slower growth for the firm and higher wealth tax payment for the owner, but causality would go from firm behavior to the owner's tax payments rather than the opposite way. Our instruments ensure that we capture only the exogenous part of the tax payment coming from the change in the tax value of the controlling shareholder's home.

<sup>17</sup> The results when we also use lagged performance as an independent variable are quite similar and are available upon request.

Some controlling shareholders own their home, while others do not. Also, some have net wealth above the deduction threshold at the time of the shock, while others do not. Thus, home owners with net wealth above the threshold are likely to face higher wealth tax payments than the others after 2005. Accordingly, an alternative way of analyzing how shareholder illiquidity can have real effects on the firm is to compare firms where the controlling owner does vs. does not experience a wealth tax shock after 2005. We use the DiD approach to make this comparison. The treatment group is the firms where the controlling family owns its home and pays wealth tax in 2005, while the remaining firms are the control group.<sup>18</sup> We compare the pre-tax-increase period (2001–2005) to the tax-increase period (2006–2010), using the same dependent variables as in Panel A:

$$\begin{aligned}
 \text{Real effect}_{it} = & \alpha + \beta_1 \text{Home owner}_{it} + \beta_2 \text{After tax shock}_{it} \\
 & + \beta_3 \text{Home owner}_{it} \cdot \text{After tax shock}_{it} \\
 & + \beta_4 \text{Family characteristics}_{it} + \beta_5 \text{Firm characteristics}_{it} + \varepsilon_{it}
 \end{aligned} \tag{3}$$

*Home owner* equals 1 if the controlling shareholder owns residential real estate and pays wealth tax in 2006, and 0 otherwise. *After tax shock* equals 1 in year 2006 or later, and 0 otherwise. We account for family and firm characteristics and include industry fixed effects. Figure A1 in the Appendix shows the evolution of the investment, the two growth rates, and of performance in the treatment group and the control group. The trends of the four proxies for real effects appear parallel in both groups.

The estimates from the DiD approach in Panel B of Table 5 are consistent with those from the IV approach in Panel A. The negative interaction term shows that the firm’s sales growth is lower after 2005 if its majority shareholder owns a home and pays wealth tax. The effect is statistically significant and also economically large, because the expected annual growth rate of sales slows down by one percentage point more in treated firms than in control firms. The result for investment is slightly weaker economically, but still statistically significant. Like in Panel A, the coefficient for employment growth is insignificant. Finally, the estimates show that profitability is reduced in the wealth tax shock period if the family owns its home and pays wealth tax. Thus, like earlier, the effects on investment, growth and profitability go in the same, negative direction. Overall, the DiD results confirm our findings from the IV estimation.

Summarizing this section, we have shown that the liquidity shock propagating from the controlling owner to the firm does not only affect the firm’s payout policy and cash balance as

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<sup>18</sup> Because the large dividend tax reform in 2006 makes the pre-reform payout data very noisy, we cannot do a corresponding DiD test for financial effects. This is why we only use the IV approach in Section 5.

documented in Section 5. There are real effects on top of these financial effects, because firms with a controlling family owner subject to wealth tax shocks on the personal home experience reduced investment, lower sales growth, and reduced profitability. This evidence suggests that at least in private firms with concentrated ownership, shocks to personal liquidity for the shareholder produce shocks to liquidity, investment, growth, and performance for the firm. These effects are consistent with the notion that financial dependence between the owner and the firm may be costly.

## **7. Robustness**

In this section we address six potential concerns about our main results. These concerns are how we construct the sample, how we account for heterogeneity among firms and shareholders, how we measure the personal liquidity shock, how we account for the market value of the family's personal home, how we measure debt capacity, and how we set up the DiD regression.

### *7.1. The sample*

We constructed the sample in year 2010 for the IV regressions in Table 4 and Table 5 by imposing a rather narrow window of acceptable changes in tax value (between NOK -100,000 and +500,000). We did this in order to minimize noise and bias by excluding cases where the family's home was improved or traded during the year. Because Table 2 shows that this window represents less than the typical tax value of a house, we think this approximation is reasonable. Unlike the DiD setup, however, the IV regressions use the (instrumented) actual tax shock. Therefore, the measurement of the tax shock could therefore be an issue, and the window remains discretionary regardless of what threshold we choose.

To address this concern, we rerun the IV regressions using a sample that excludes 2010 altogether. The results are reported in Appendix Table A2, which shows financial effects in Panel A and real effects in Panel B. The estimates show that, compared to the baseline results, the estimates are insensitive to whether we include the year where we cannot precisely identify whether the change in wealth tax is due only to the new valuation rule in the wealth tax code.

### *7.2. Propensity score matching*

The summary statistics in Table 3 show that controlling families who own their home differ from other controlling families in the sample on several dimensions. This is why we account for family characteristics other than the wealth-tax-to-liquid-assets ratio in our regressions. For the same reason, we include firm characteristics that may matter for financial and real effects, such as size and age. An alternative strategy is to account for such heterogeneous characteristics by propensity-score matching, where we use these characteristics to match homogenous observations and measure the difference between them regarding financial and real effects.

Table A3 presents the results. Panel A uses the 2006–2010 period, where the treatment group consists of firms majority-held by families that owned their home and paid wealth tax in 2005, while the remaining family-controlled firms constitute the control group. We match observations using the family and firm characteristics described in Table 3, and also year and industry. Because we only analyze 2006–2010, we can meaningfully consider both financial and real effects. Panel A shows the average treatment effect across the eight dependent variables.<sup>19</sup> Like for the baseline model in Panel A of Table 5, we find that increased wealth tax for the treatment group produces higher dividends and salaries from the firm to the family as well as lower cash holdings, growth, and profitability in the firm.

We can also combine propensity matching and DiD in order to account for differences in observed characteristics and in unobserved, time-invariant characteristics. We match treatment and control firms during the pre-treatment period (2000–2005) using the average value of the family’s gross assets and leverage as well as the firm’s cash to assets ratio, return on assets, risk, size, growth, and industry. We run DiD regressions on this sample for the period 2000–2010, producing the coefficients for real effects shown in Panel B. Once again, we find that firms controlled by a wealth-tax paying, home-owning family have lower investment, sales growth, and profitability when the wealth tax increases.

### *7.3. The household’s liquidity shock*

Our main independent variable in the IV regressions is the household’s wealth-tax-to-liquid-assets ratio. The liquid assets in this ratio include listed securities, which may be a source of noise because our sample period includes the financial crisis in 2008–2009. In particular, controlling shareholders who own a home, and who we are generally wealthier than other controlling shareholders according to Table 3, may have had higher exposure to the stock

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<sup>19</sup> We use nearest-neighbor matching. Caliper matching produces very similar results that are available upon request.

market decline. Thus, their wealth-tax-to-liquid-assets ratio may have increased not because of increasing tax payments, but because of decreasing liquid assets. Although Panel A of Table 1 documents that tax payments do increase more when the shareholder owns a home, there may still be an effect through a decreasing value of listed securities.

To address this possible measurement error of the liquidity shock from a wealth tax shock, we construct a revised ratio where we divide the wealth tax payments by just the bank savings. This ratio is not affected by stock market fluctuations. We rerun the IV regressions using this new measure and show the results in Table A4, where the financial effects are in Panel A and the real effects are in Panel B. The findings using the alternative liquidity shock measure are consistent with those using the broader measure used in Tables 4 and 5. The only exception is the regression for dividend payments in loss-making companies (distressed dividends) in Panel A, where the coefficient has the expected positive sign, but the coefficient insignificant.

#### *7.4. The market value of residential real estate*

The literature on the collateral channel finds a positive relationship between changes in the market value of commercial real estate and firm growth (Chaney, Sraer, and Thesmar 2012; Kerr, Kerr, and Nanda 2015; Schmalz, Sraer, and Thesmar 2017). This result suggests that higher market value of real estate provides more collateral that can be pledged to raise more debt financing in the firm, which may reduce the firm's financial constraints.

Unlike the literature on the collateral channel, we consider the shareholder illiquidity channel. Our concern is not with the role of real estate as collateral, but with real estate as a source of personal liquidity shocks through a change in the conventional tax base. Figure 1 shows that market values and tax values evolve in separate ways. Although the new tax system introduced in 2010 was supposed to synchronize the two, this event is after our sample period. Accordingly, changes in tax value should not reflect changes in the collateral value of the controlling family's personal home, and hence not influence the controlled firm's ability to raise additional finance.

To nevertheless alleviate remaining concerns about a possible correlation between changes in tax value and market value, we account for the average price change per square meter residential real estate in the local county in a given year, which we match with the home owner's

address.<sup>20</sup> We rerun the baseline models augmented by the change in local market prices, which we call *Change in local home prices*.

Table A5 shows the results for financial effects in Panel A, while real effects are in Panel B (IV regressions) and Panel C (DiD regressions), respectively. The estimates show that the results from the baseline model remain unchanged. We also find evidence in Panel C that changes in the market price of residential real estate correlate positively with investment, growth, and profitability in Panel C. This result is consistent with earlier findings on commercial real estate and the collateral channel (Chaney, Sraer, and Thesmar 2012, Schmalz, Sraer, and Thesmar 2017).

### 7.5. Debt capacity

We have so far used leverage to capture the idea that the higher the existing debt, the smaller the capacity for more debt and the resulting possibility to use new debt to mitigate the liquidity problem after a wealth tax shock. An alternative approach is to measure debt capacity by asset tangibility, which is a deeper determinant of capital structure than leverage and arguably more costly to adjust (Frank and Goyal 1992). Firms with more tangible assets, such as manufacturing firms, have higher debt capacity and may find it easier to raise new debt than firms with less tangible assets, such as software firms. Unlike leverage, asset tangibility also reflects the ability to borrow rather than the decision to do so. Moreover, asset tangibility can be considered a proxy for the strength of the collateral channel (Chaney, Sraer, and Thesmar 2012).

We modify the baseline model by excluding personal and corporate leverage and instead use *Asset tangibility*, which we measure as the ratio between the firm's fixed and total assets. Using this revised model, Table A6 reports financial effects in Panel A, while real effects are in Panel B (IV regressions) and Panel C (DiD regressions), respectively. The results are very close to those from the main specification using leverage.

### 7.6. Fixed effects and interaction terms

In our DiD regressions in Table 5 we use a single dummy variable for the shock period, which starts in 2006 and ends in 2010. As a robustness test, we use dummy variables for each separate

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<sup>20</sup> The data source is Statistics Norway.

year in the tax shock period to account for the possibility that certain years, such as the financial crisis in 2007 and 2008, have different effects than other years on the main relationships.

The impact of our control variables on growth and profitability may be different in the tax-shock period than in previous years. For instance, because the financial crisis generally reduced firm size, the relationship between size and performance may shift during the tax shock period. Therefore, we add interaction terms between the tax shock dummy and the control variables for family and firm characteristics. Finally, we add firm fixed effects to account for possible time-invariant firm characteristics that are not weeded out by the DiD approach.

The new estimates in Table A7 show that the main, significant relationships from the baseline model in Panel B of Table 5 survive. If anything, this richer specification provides better support for the idea that even employment falls after the tax shock when the firm is controlled by a home-owning family with wealth tax. Thus, our main results do not seem to be driven by structural shifts in the baseline model's family and firm characteristics or by unobservable, time-invariant versions of such characteristics.

Summarizing this section, the robustness tests have shown that the baseline relationship estimated in Sections 5 and 6 between shareholder illiquidity and the firms' financial and real decisions is insensitive to alternative specifications. In particular, the relationship is robust to the way we construct the sample, account for heterogeneity between firms and shareholders, measure the personal liquidity shock, account for the market value of the family's personal home, measure debt capacity, and to possible structural shifts in family and firm characteristics that are observable or unobservable and time-invariant.

## **8. Conclusions**

We examine the causal effect of household finance on corporate finance, which is just starting to get attention in the economics and finance literature. We make this investigation by studying how the firm behaves when its controlling shareholder's wealth becomes more illiquid after a wealth tax shock. Importantly for identification, this wealth tax shock is independent of the shareholder's income and liquidity and also of the firm's situation.

Our first main finding is that negative shocks to the household's liquidity produce negative shocks to the firm's liquidity. Firms controlled by families with higher personal liquidity needs after a tax shock pay higher dividends and salaries to the family, and the firm's cash holdings decrease. Our second main finding is that this drain on the firm's liquidity after the



shareholder's personal tax shock reduces the firm's subsequent investment, growth, and profitability. Both findings suggest that household finance matters for corporate finance.

This evidence suggests that personal liquidity effects for the shareholder and financial and real effects for the firm should be analyzed jointly. This perspective is particularly important in private firms with concentrated ownership and moderate size, where both the owners' liquidity constraints and the firm's financial constraints are likely to be strong. From a policy point of view, our results suggest that even taxes strictly related to the personal sphere can have important spillover effects on the corporate sphere through the equity channel. This happens because the personal tax drains liquidity away from the firm's shareholders, who in turn use their control rights to partially fill the gap with higher payout from the firm, which in turn reduces its investment, growth, and performance. These effects of personal illiquidity on firms should be carefully considered when analyzing the merits of wealth taxation.

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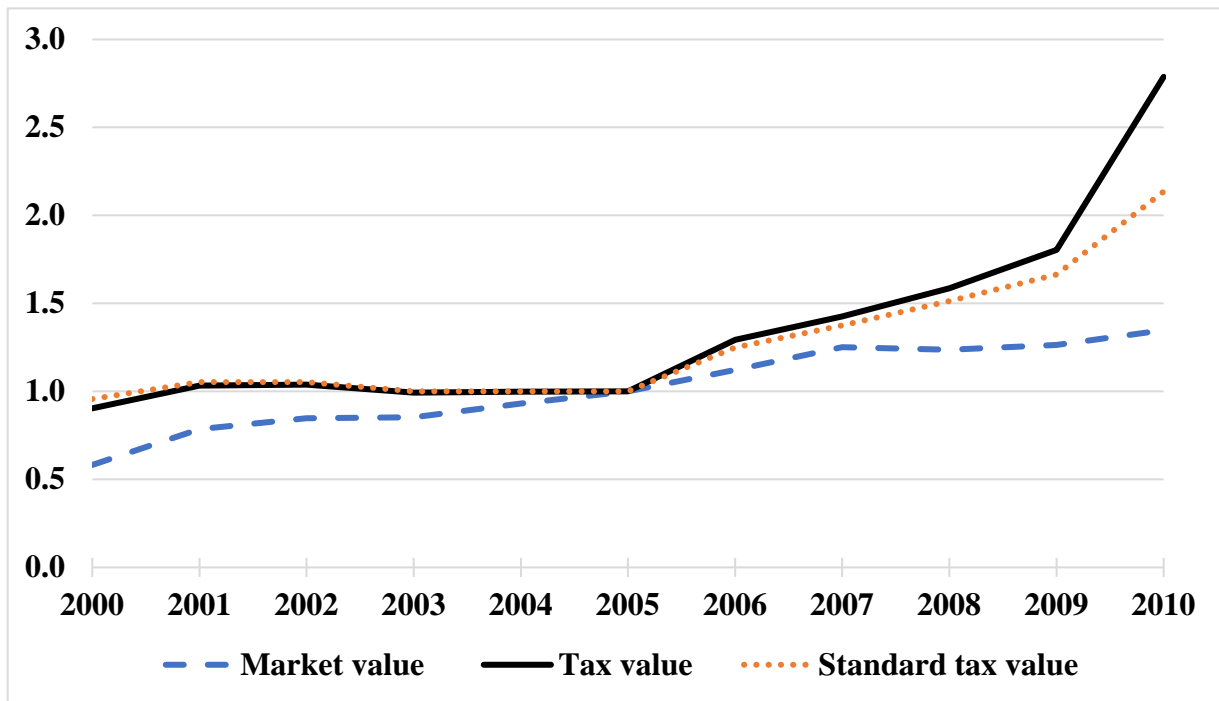
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**Figure 1: The change in the market value and tax value of residential real estate**

This figure shows indexes of the market value and tax value of residential real estate (i.e., personal homes) owned by controlling families in our full sample. The figure also shows the standard change in the tax value according to the tax rule change that year. The base year is 2005 (index value = 1). The year 2010 does not have a standard change and reflects the median change in tax value in our sample. The full sample includes all active limited-liability firms in Norway where a controlling family holds more than 50% of the equity. The controlling family we study is the nuclear family (parents and their underage children). We exclude financials, business groups, holding companies, families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The source of the market values is Statistics Norway.

**Table 1: The controlling family's wealth tax payments***Panel A. Mean wealth tax paid by the controlling family*

Year	All	Home owner	Not home owner	Home owner; wealth tax payer	Not home owner; wealth tax payer	Proportion home owners	Number of firms
2000	35,284	38,418	19,361	60,571	39,166	83.6%	29,528
2001	33,769	36,728	18,813	57,559	37,524	83.5%	30,987
2002	39,123	43,175	17,437	69,044	35,714	84.3%	31,341
2003	40,708	45,416	14,477	74,979	30,001	84.8%	32,400
2004	53,111	59,372	16,875	101,364	35,701	85.3%	33,031
2005	30,308	32,428	18,533	56,746	38,563	84.7%	32,929
2006	57,004	62,131	24,074	111,296	50,465	86.5%	33,630
2007	54,904	60,435	21,319	111,828	45,987	85.9%	33,014
2008	55,693	60,792	24,121	111,505	51,373	86.1%	33,510
2009	57,100	62,660	18,946	116,863	44,152	87.3%	33,437
2010	66,245	71,099	27,571	144,061	76,898	88.8%	34,386
Average	47,568	52,059	20,139	92,347	44,140	85.5%	32,563

*Panel B. Proportion of controlling families paying wealth tax*

Year	All	Home owner	Not home owner
2000	61.1%	63.4%	49.3%
2001	61.6%	63.8%	50.1%
2002	60.4%	62.5%	48.8%
2003	58.7%	60.6%	48.3%
2004	56.9%	58.6%	47.3%
2005	55.8%	57.1%	48.1%
2006	54.7%	55.8%	47.7%
2007	53.0%	54.0%	46.4%
2008	53.5%	54.5%	47.0%
2009	52.3%	53.6%	42.9%
2010	47.8%	49.4%	35.9%
Average	56.0%	57.6%	46.5%

*Panel C. The controlling family's wealth-tax-to-liquid-assets ratio*

Year	All	Home owner	Not home owner	Home owner; wealth tax payer	Not home owner; wealth tax payer
2000	3.6%	3.7%	2.7%	5.9%	5.4%
2001	3.7%	3.8%	2.7%	6.0%	5.4%
2002	2.6%	2.7%	2.1%	4.3%	4.3%
2003	1.9%	2.0%	1.5%	3.3%	3.2%
2004	1.6%	1.6%	1.3%	2.8%	2.8%
2005	1.3%	1.3%	1.1%	2.3%	2.2%
2006	1.5%	1.5%	1.3%	2.7%	2.6%
2007	1.9%	2.0%	1.6%	3.7%	3.4%
2008	3.4%	3.5%	2.8%	6.4%	6.0%
2009	3.8%	4.0%	3.1%	7.4%	7.2%
2010	3.6%	3.6%	2.9%	7.4%	8.1%
Average	2.6%	2.7%	2.1%	4.7%	4.6%

This table shows summary statistics for wealth tax payments made by the full-sample families who control our sample firms. The full sample includes all active limited-liability firms in Norway where a controlling family holds more than 50% of the equity. The controlling family we study is the nuclear family (i.e., parents and their underage children). We exclude financials, business groups, holding companies, families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. Panel A shows the mean wealth tax payments measured in NOK as of 2010 for all controlling families, controlling families that own and do not own their home, controlling families that own and do not own their home and also pay wealth tax, and the proportion of controlling families that are home owners. Panel B shows the proportion paying wealth tax among all controlling families, among controlling families that own their home, and among controlling families that do not own their home. Panel C shows the mean ratio of wealth tax payments to liquid assets (cash, bank deposits, and listed securities) for all controlling families, controlling families that own their home, do not own their home, and for controlling families owning and not owning their home and also pay wealth tax.

**Table 2: The tax value of residential real estate**

Year	Tax value (NOK)				Median change in tax value	Proportion home owners with standard tax value	Number of firms
	5 <sup>th</sup> percentile	Mean	Median	95 <sup>th</sup>			
2000	74,800	352,145	305,700	770,308	9.8%	76.3%	24,673
2001	86,242	402,679	348,508	885,500	15.0 %	76.6%	25,869
2002	85,388	404,612	349,970	890,970	0.0%	77.0%	26,407
2003	81,719	386,632	331,683	856,322	-5.0%	86.2%	27,470
2004	82,920	389,151	330,480	878,478	0.0%	73.7%	28,165
2005	82,920	389,590	328,695	878,846	0.0%	77.5%	27,904
2006	98,356	503,749	422,114	1,177,737	25.0%	72.8%	29,100
2007	109,058	555,664	461,065	1,298,825	10.0%	74.3%	28,346
2008	121,783	618,012	505,540	1,465,315	10.0%	75.5%	28,850
2009	134,505	702,955	575,830	1,674,352	10.0%	68.5%	29,184
2010	208,926	1,085,960	787,586	2,801,992	31.6%	56.8%	30,551

This table shows the evolution of the tax value of the home owned by the full sample families that control our sample firms but in addition also own their homes. "Tax value" is the tax value of homes owned by the controlling family. "Median change in tax value" is the median percentage increase over the year in the tax value of homes owned by the controlling family. "Proportion home owners with standard value change" is the fraction of controlling families whose tax value of their home changes by the percentage specified by the tax rule plus/minus 1% (2000–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). "Number of firms" is the number of firms in the table subsample. The full sample consists of active limited-liability firms in Norway where a controlling family holds more than 50% of the equity. The controlling family we study is the nuclear family (i.e., parents and their underage children). We exclude financials, business groups, holding companies, families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment.

**Table 3: Characteristics of the controlling family and the controlled firm**

Variable	All		Home owner		Not home owner		Number of observations
	Mean	Median	Mean	Median	Mean	Median	
<i>Family characteristics</i>							
Family gross assets	5.02	2.05	5.33	2.17	3.23	1.26	92,204
Family leverage	1.01	0.52	0.97	0.52	1.29	0.52	92,204
Family net wealth	3.35	0.80	3.61	0.89	1.80	0.37	92,204
Family home to gross assets	0.27	0.20	0.32	0.25	0.00	0.00	92,204
Family liquid assets to gross assets	0.27	0.21	0.26	0.19	0.38	0.29	92,204
Family wealth tax to liquid assets	0.03	0.00	0.03	0.01	0.02	0.00	91,970
<i>Firm characteristics</i>							
Cash to assets	0.30	0.24	0.31	0.25	0.25	0.18	92,187
Return on assets	0.09	0.08	0.09	0.08	0.07	0.06	92,187
Sales to assets	2.44	2.04	2.43	2.04	2.50	2.04	92,187
Volatility of sales	0.32	0.22	0.32	0.22	0.35	0.25	83,397
Sales	8.94	3.59	9.11	3.63	7.92	3.31	92,204
Firm age	14.31	12.00	14.53	12.00	13.03	11.00	92,204
Firm leverage	0.70	0.71	0.70	0.71	0.75	0.74	92,187
Asset tangibility	0.21	0.10	0.20	0.09	0.25	0.14	92,187
Retained earnings to equity	0.61	0.71	0.61	0.71	0.61	0.70	92,018
<i>Financial effects</i>							
Dividend payer	0.22	0.00	0.23	0.00	0.15	0.00	92,204
Dividends to earnings	0.15	0.00	0.16	0.00	0.10	0.00	91,361
Dividends and salary to earnings before sa	0.64	0.72	0.65	0.73	0.59	0.67	66,997
Number of employees	5.66	3.00	5.73	3.00	5.20	3.00	92,204
<i>Real effects</i>							
Investment	0.07	0.03	0.07	0.03	0.07	0.03	84,330
Sales growth	0.07	0.03	0.07	0.03	0.08	0.03	84,170
Employment growth	0.02	0.00	0.02	0.00	0.02	0.00	84,347
Performance	0.09	0.08	0.09	0.08	0.07	0.06	92,187

This table shows summary statistics for the clean sample of controlling families and the firms they control. The sample period is 2006–2010. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e. parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. "Family gross assets" is the family's total assets in million NOK as of 2010 from the family's tax returns. "Family leverage" is the family's personal debt to gross wealth. "Family net wealth" is the family's total assets less its liabilities in million NOK as of 2010. "Family home to gross assets" is the tax value of the family's home divided by the family's gross wealth. "Family liquid assets to gross assets" is the family's cash, bank savings, and listed securities divided by gross wealth. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. "Cash to assets" is the firm's cash holdings over the year divided by the firm's assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by its assets. "Sales to assets" is the ratio between the firm's sales and assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Sales" is the firm's revenues in million NOK as of 2010. "Firm age" is the number of years since the firm was founded. "Firm leverage" is the firm's liabilities divided by its assets. "Asset tangibility" is the ratio between the firm's tangible fixed assets and its total assets. "Retained earnings to equity" is the firm's retained earnings divided by its equity. "Dividend payer" is 1 if the firm pays a dividend and 0 otherwise. "Dividends to earnings" is the ratio between the firm's dividends and operating earnings. "Dividends and salary to earnings before salary" is the sum of dividends and salary paid to the controlling family divided by the family's part of the firm's operating earnings plus salary. "Number of employees" is the number of people working in the firm. "Investment" is the percentage change in real assets over the year. "Performance" is return on assets. The growth of sales and employment are annual rates. The ratio of family wealth tax to liquid assets, cash to assets, sales to assets, retained earnings to equity, volatility of sales, investment, sales growth, and employment growth are winsorized at 97.5%. The return on assets is winsorized at 2.5% and 97.5%.



**Table 4: The controlling owner's wealth tax shock and financial effects on the firm**

Independent variable	Dependent variable							
	Dividends to earnings		Distressed dividends		Dividends and salary to earnings before salary		Change in cash to assets	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
Family wealth tax to liquid assets	0.487	0.001	0.119	0.009	0.838	0.000	-1.085	0.000
Family gross assets	-0.003	0.006	-0.005	0.025	-0.001	0.070	0.076	0.000
Family leverage	0.003	0.041	0.001	0.000	0.005	0.089	-0.001	0.567
<i>Firm characteristics</i>								
Cash to assets	0.245	0.000	-0.001	0.998	0.101	0.000	0.968	0.000
Return on assets	0.084	0.000	-0.032	0.000	-0.160	0.000	-0.005	0.321
Sales to assets	-0.005	0.003	0.001	0.298	0.006	0.069	0.000	0.801
Volatility of sales	-0.040	0.001	0.005	0.000	-0.049	0.010	0.006	0.426
Size	0.033	0.000	-0.002	0.003	0.029	0.001	0.021	0.000
Age	-0.012	0.562	0.001	0.326	-0.021	0.496	0.004	0.763
Firm leverage	-0.261	0.000	-0.017	0.018	-0.361	0.000	0.096	0.000
Retained earnings to equity	0.011	0.000	0.002	0.000	0.023	0.000	-0.002	0.001
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.079		0.195		0.100		0.127	
Number of observations	77,545		78,146		56,911		78,263	
Number of firms	31,846		31,491		27,083		31,941	

The models estimated in this table reflect how tax shocks to the controlling family's personal wealth influence the cash flow from the firm to the family and the firm's liquid position. We use the clean sample, which includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. "Dividends to earnings" is the ratio between the firms dividends and operating earnings. "Distressed dividends" equals 1 if the firm has negative operating earnings and positive dividends, and 0 otherwise. "Dividends and salary to earnings before salary" is the sum of dividends and salary paid to the controlling family divided by the family's part of the firm's operating earnings plus salary. "Change in cash to assets" is the change in firm's cash to total assets ratio. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. This variable is instrumented by the change in the tax value of the family's residential real estate and by the ratio between residential real estate and the family's gross assets. "Family gross assets" is the family's assets from the tax returns. "Family leverage" is the lagged family's personal debt to gross wealth. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities divided by its assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Standard errors are clustered at the firm level. All ratios are winsorized at 5% (0% if only positive values are meaningful) and 95%. Dividends to earnings, dividends and salary to earnings, cash to assets, sales to assets, volatility of sales, and retained earnings are winsorized at 97.5%. Return on assets are winsorized at 2.5% and 97.5%.

**Table 5: Shareholder liquidity shocks and the firm's subsequent investment, growth, and profitability***Panel A. Instrumental variables (IV) estimation*

Independent variable	Dependent variable							
	Investment		Sales growth		Employment growth		Profitability	
	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>
<i>Family characteristics</i>								
Family wealth tax to liquid assets	-0.301	0.058	-0.450	0.003	-0.186	0.192	-0.486	0.000
Family gross assets	0.001	0.681	0.001	0.942	0.001	0.944	0.001	0.037
Family leverage	-0.002	0.336	-0.005	0.004	-0.001	0.440	0.002	0.018
<i>Firm characteristics</i>								
Cash to assets	0.024	0.019	-0.205	0.000	0.087	0.000	-0.049	0.000
Return on assets	-0.046	0.000	-0.114	0.000	0.018	0.037		
Sales to assets	0.170	0.000	-0.030	0.000	-0.004	0.020	0.027	0.000
Volatility of sales	0.017	0.191	-0.019	0.131	0.016	0.175	0.001	0.871
Size	-0.414	0.000	-0.533	0.000	-0.063	0.000	-0.076	0.000
Age	0.059	0.006	0.081	0.000	-0.004	0.822	0.009	0.419
Firm leverage	-0.060	0.000	0.061	0.000	-0.038	0.000	0.124	0.000
Retained earnings to equity	0.001	0.717	-0.001	0.533	0.001	0.468	0.001	0.717
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.006		0.005		0.010		0.007	
Number of observations	71,841		71,707		71,841		71,830	
Number of firms	28,594		28,564		28,594		28,592	

The models in this table estimate how the controlling shareholder's personal wealth tax payments relate to the firm's real investment, growth, and profitability, using instrumental variables (IV) for the controlling shareholder's wealth tax shock. We use the clean sample, which includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2006–2010. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "Family wealth tax to liquid assets" is the controlling family's wealth tax payments divided by its liquid assets. This variable is instrumented by the change in the tax value of the family's home and by the home's tax value as a proportion of the family's gross assets. "Family gross assets" is the controlling family's assets from the family's tax returns. "Family leverage" is the controlling family's lagged personal debt to gross wealth. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities to assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Standard errors are clustered at the firm level. Investment, sales growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings to equity are winsorized at 97.5%. Performance is winsorized at 2.5% and 97.5%.

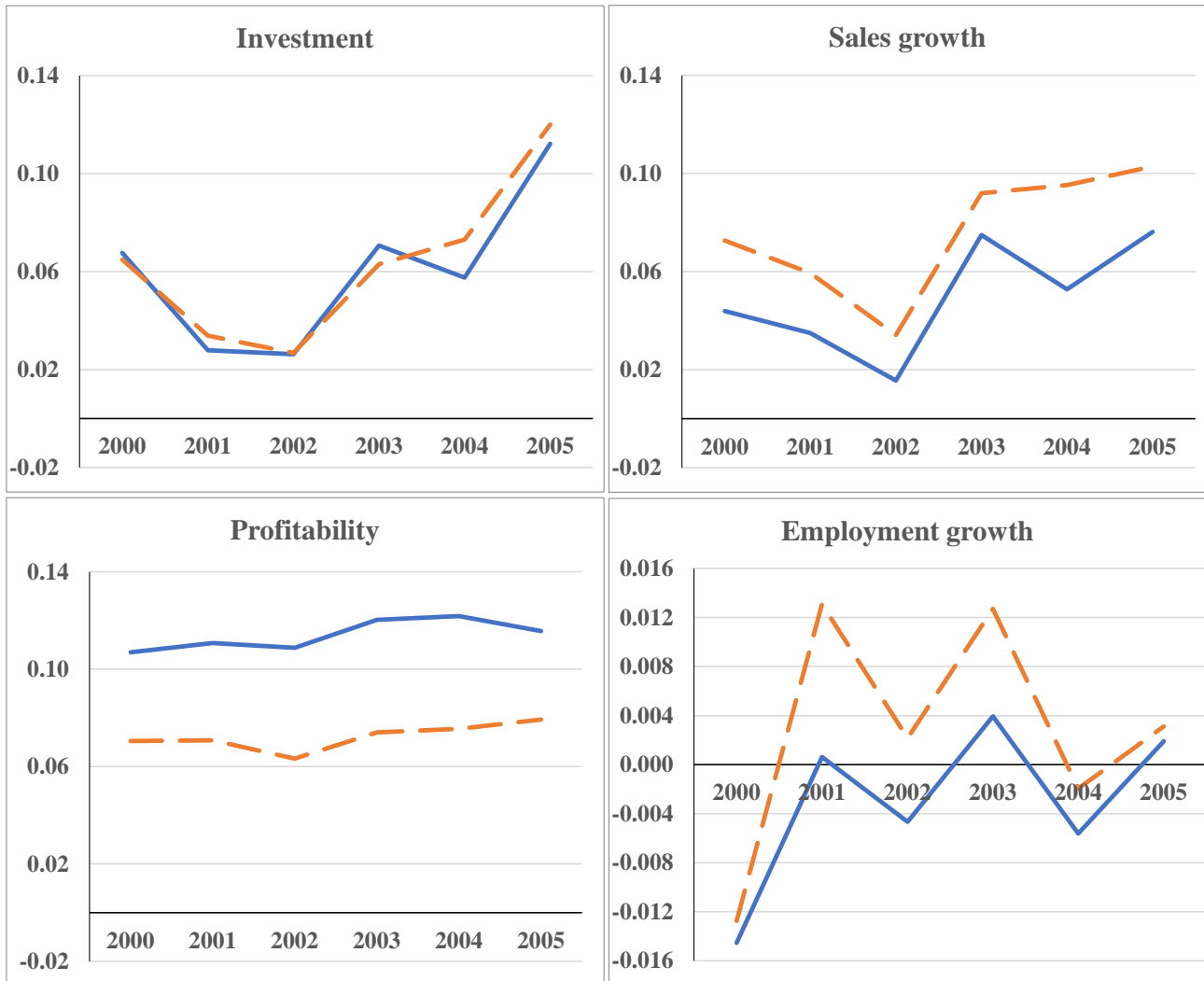
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**Table 5: Shareholder liquidity shocks and the firm's subsequent investment, growth, and profitability** (*continued*)Panel B. *Difference-in-Difference (DiD) estimation*

Independent variable	Dependent variable							
	Investment		Sales growth		Employment growth		Profitability	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
After tax shock	-0.015	0.000	-0.006	0.006	-0.001	0.782	-0.013	0.000
Home owner	0.006	0.005	0.011	0.000	-0.002	0.365	0.018	0.000
Home owner * After tax shock	-0.006	0.011	-0.010	0.001	-0.003	0.165	-0.009	0.000
Family gross assets	0.008	0.000	-0.002	0.015	-0.004	0.000	0.003	0.000
Family leverage	0.002	0.000	0.002	0.008	0.001	0.063	-0.001	0.009
<i>Firm characteristics</i>								
Cash to assets	-0.040	0.000	-0.043	0.000	-0.008	0.003	-0.013	0.001
Return on assets	0.095	0.000	-0.256	0.000	0.078	0.000		
Sales to assets	0.024	0.000	-0.012	0.000	-0.003	0.000	-0.005	0.000
Volatility of sales	0.033	0.000	0.013	0.001	-0.001	0.697	-0.024	0.000
Size	-0.019	0.000	-0.008	0.000	0.009	0.000	0.017	0.000
Age	-0.010	0.000	-0.025	0.000	-0.012	0.000	-0.013	0.000
Firm leverage	-0.044	0.000	0.011	0.008	-0.019	0.000	0.042	0.000
Retained earnings to equity	-0.002	0.093	-0.004	0.000	-0.002	0.007	0.002	0.000
Industry fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.025		0.026		0.010		0.063	
Number of observations	164,271		163,902		164,274		164,249	
Number of firms	26,568		26,557		26,568		26,565	

This table uses a difference-in-difference (DiD) approach to compare the effect on investment, growth, and profitability in the full sample of firms where the controlling family is vs. is not affected by a tax shock on personal residential real estate. The full sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity. We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2001–2010. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment the year after the tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "After tax shock" is 1 for 2006–2010 and 0 otherwise. "Home owner" equals 1 for firms where the controlling family owns residential real estate and pays wealth tax in 2005, and 0 otherwise. "Family gross assets" is the controlling family's assets from the family's tax returns. "Family leverage" is the controlling family's personal debt to gross wealth lagged. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities to assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Investment, sales growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings to equity are winsorized at 97.5%. Performance is winsorized at 2.5% and 97.5%.

## Appendix



**Figure A1: The evolution of growth and performance in the treatment group and the control group**

This figure shows, clockwise from upper left, the evolution of investment, sales growth, employment growth, and profitability for the treatment group (solid line) and control group (dashed line) in the full sample prior to the first wealth tax shock in 2006. The treatment group consists of firms where a family is a majority shareholder, owns a home, and pays wealth tax in 2005. The control group consists of the remaining firms. "Investment" is the log of the percentage change in real assets the year after the tax shock. We measure "Sales growth" and "Employment growth" as the log of the percentage change in level the following year, while "Profitability" is the return on assets the following year. The full sample includes all active limited-liability firms in Norway where a controlling family holds more than 50% of the equity. The controlling family we study is the nuclear family (i.e., parents and underage children). We exclude financials, business groups, holding companies, families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment.

**Table A1: Characteristics of the controlling family and the firm in all family-controlled firms**

Variable	All		Home owner		Not home owner	
	Mean	Median	Mean	Median	Mean	Median
<i>Family characteristics</i>						
Family gross assets	7.52	2.17	8.12	2.31	3.50	1.15
Family leverage	1.09	0.58	1.05	0.58	1.39	0.60
Family net wealth	5.44	0.71	5.96	0.81	1.96	0.25
Family home to gross assets	0.28	0.21	0.32	0.25	0.00	0.00
Family liquid assets to gross assets	0.27	0.20	0.25	0.19	0.39	0.29
Family wealth tax to liquid assets	0.04	0.01	0.04	0.01	0.03	0.01
<i>Firm characteristics</i>						
Cash to assets	0.30	0.24	0.30	0.24	0.25	0.18
Return on assets	0.09	0.08	0.09	0.08	0.07	0.06
Sales to assets	2.39	2.00	2.37	2.00	2.50	2.06
Volatility of sales	0.34	0.23	0.34	0.23	0.36	0.26
Sales	9.65	3.60	9.87	3.65	8.17	3.27
Firm age	13.40	11.00	13.64	11.00	11.78	9.00
Firm leverage	0.71	0.72	0.70	0.72	0.76	0.76
Asset tangibility	0.21	0.10	0.20	0.09	0.24	0.13
Retained earnings to equity	0.60	0.71	0.61	0.72	0.59	0.69
<i>Financial effects</i>						
Dividend payer	0.21	0.00	0.22	0.00	0.15	0.00
Dividends to earnings	0.15	0.00	0.15	0.00	0.10	0.00
Dividends and salary to earnings before salary	0.63	0.71	0.63	0.71	0.58	0.66
Number of employees	5.97	3.00	6.06	3.00	5.35	3.00
<i>Real effects</i>						
Investment	0.08	0.03	0.08	0.03	0.08	0.03
Sales growth	0.09	0.04	0.09	0.04	0.11	0.04
Employment growth	0.02	0.00	0.02	0.00	0.03	0.00
Performance	0.09	0.08	0.09	0.08	0.07	0.06

This table shows summary statistics for the full sample of controlling families and the firms they control during the sample period 2006–2010. Unlike in Table 3, this table also includes firms where the controlling family does not experience a standard change in the tax value of the family home in 2006–2009. The sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity. We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. "Family gross assets" is the family's total assets in million NOK as of 2010 from the family's tax returns. "Family leverage" is the family's personal debt to gross wealth. "Family net wealth" is the family's total assets less its liabilities in million NOK as of 2010 from the family's tax returns. "Family home to gross assets" is the tax value of the family's residential real estate divided by the family's gross wealth. "Family liquid assets to gross assets" is the family's cash, bank savings, and listed securities divided by gross wealth. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. "Cash to assets" is the firm's cash holdings over the year divided by the firm's assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by its assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Sales" is the firm's revenues in million NOK as of 2010. "Age" is the number of years since the firm was founded. "Firm leverage" is the firm's liabilities divided by its assets. "Asset tangibility" is the ratio between the firm's tangible fixed assets and its total assets. "Retained earnings to equity" is the firm's retained earnings divided by its equity. "Dividends to earnings" is the ratio between the firm's dividends and operating earnings. "Dividends and salary to earnings and salary" is the sum of dividends and salary paid to the controlling family divided by the family's part of the firm's operating earnings plus salary. "Number of employees" is the number of people working in the firm. The growth of sales, assets, and employment are annual rates. "Investment" is the percentage change in real assets over the year. "Performance" is return on assets. The growth of sales and employment are annual rates. The ratio of family wealth tax to liquid assets, cash to assets, sales to assets, retained earnings to equity, volatility of sales, investment, sales growth, and employment growth are winsorized at 97.5%. The return on assets is winsorized at 2.5% and 97.5%.

**Table A2: Financial and real effects in 2006–2009**

*Panel A. Financial effects*

Independent variable	Dependent variable							
	Dividends to earnings		Distressed dividends		Dividends and salary to earnings before salary		Change in cash to assets	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
Family wealth tax to liquid assets	0.326	0.058	0.130	0.014	0.561	0.012	-1.176	0.000
Family gross assets	-0.002	0.031	-0.004	0.061	0.001	0.044	0.014	0.039
Family leverage	0.004	0.033	0.001	0.020	0.006	0.034	-0.001	0.382
<i>Firm characteristics</i>								
Cash to assets	0.240	0.000	-0.001	0.378	0.112	0.000	1.030	0.000
Return on assets	0.089	0.000	-0.030	0.000	-0.148	0.000	-0.011	0.074
Sales to assets	-0.004	0.036	0.000	0.326	0.008	0.021	0.001	0.652
Volatility of sales	-0.042	0.005	0.005	0.000	-0.061	0.010	0.005	0.552
Size	0.035	0.000	-0.002	0.006	0.033	0.001	0.022	0.000
Age	0.006	0.813	0.000	0.652	0.003	0.934	-0.016	0.312
Firm leverage	-0.289	0.000	-0.017	0.000	-0.424	0.000	0.091	0.000
Retained earnings to equity	0.012	0.000	0.002	0.000	0.024	0.000	-0.002	0.089
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.080		0.079		0.080		0.130	
Number of observations	63,918		64,489		47,414		64,489	
Number of firms	28,945		29,041		24,511		29,041	

The models estimated in this table use the clean sample and the subperiod in 2006–2009 to show how tax shocks to the controlling family's personal wealth relate to the cash flow from the firm to the family and to the firm's liquidity position. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. This variable is instrumented by the change in the tax value of the family's home and by the home's tax value as a proportion of the family's gross assets. "Family gross assets" is the family's assets from the family's tax returns. "Family leverage" is the family's personal debt to gross wealth lagged. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities divided to assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Standard errors are clustered at the firm level. Investment, sales growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings to equity are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.

*Continued on the next page*

**Table A2: Financial and real effects in 2006–2009** (continued)

## Panel B. Real effects

Independent variable	Dependent variable							
	Investment		Sales growth		Employment growth		Profitability	
	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>
<i>Family characteristics</i>								
Family wealth tax to liquid assets	-0.367	0.043	-0.442	0.010	-0.284	0.087	-0.501	0.000
Family gross assets	0.000	0.681	0.000	0.872	0.000	0.961	0.000	0.057
Family leverage	-0.001	0.601	-0.007	0.000	-0.001	0.462	-0.001	0.227
<i>Firm characteristics</i>								
Cash to assets	-0.062	0.000	-0.128	0.000	0.014	0.170	-0.062	0.000
Return on assets	0.016	0.188	-0.212	0.000	0.084	0.000		
Sales to assets	0.181	0.000	-0.030	0.000	-0.007	0.001	0.026	0.000
Volatility of sales	0.003	0.854	-0.079	0.000	0.016	0.300	-0.006	0.475
Size	-0.460	0.000	-0.583	0.000	-0.062	0.000	-0.084	0.000
Age	0.044	0.130	0.103	0.000	0.021	0.437	-0.003	0.849
Firm leverage	-0.047	0.000	0.070	0.000	-0.035	0.001	0.110	0.000
Retained earnings to equity	0.001	0.701	-0.001	0.488	0.000	0.891	-0.002	0.049
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.01		0.01		0.01		0.01	
Number of observations	59,027		58,916		59,027		59,017	
Number of firms	25,925		25,895		25,925		25,922	

This table shows how the controlling owner's wealth tax payments relates to the firm's investment, growth, and profitability in the clean sample in the subperiod 2006–2009. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. This variable is instrumented by the change in the tax value of the family's home and by the home's tax value as a proportion of the family's gross assets. "Family gross assets" is the family's assets from the family's tax returns. "Family leverage" is the family's personal debt to gross wealth lagged. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities divided to assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Standard errors are clustered at the firm level. Investment, sales growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings to equity are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.

**Table A3: Results using propensity-score matching***Panel A. Matching on family and firm characteristics*

	Average treatment		Number of observations
	effect	<i>p</i> -value	
<i>Financial effects</i>			
Dividends to earnings	0.006	0.072	98,345
Distressed dividends	0.002	0.094	99,273
Dividends and salary to earnings before salary	0.015	0.001	73,640
Change in cash to assets	-0.018	0.002	99,126
<i>Real effects</i>			
Investment	-0.003	0.044	91,177
Sales growth	-0.015	0.000	90,992
Employment growth	-0.008	0.008	91,178
Profitability	-0.003	0.091	91,164

*Panel B. Difference-in-difference estimation with matching*

	Difference before	Difference after	Difference in	
	(treatment-control)	(treatment-control)	difference	<i>p</i> -value
<i>Real effects</i>				
Investment	0.013	0.009	-0.004	0.038
Sales growth	0.015	0.001	-0.014	0.000
Employment growth	-0.001	-0.005	-0.004	0.080
Profitability	0.015	0.008	-0.008	0.000

This table presents results using propensity score matching in the full sample. Panel A shows the average treatment effect for our proxies of the firm's financial effects and real effects. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "Dividends to earnings" is the ratio between the firm's dividends and operating earnings. "Distressed dividends" equals 1 if the firm has negative operating earnings and positive dividends, and 0 otherwise. "Dividends and salary to earnings before salary" is the sum of dividends and salary paid to the controlling family divided by the family's part of the firm's operating earnings plus salary. "Change in cash to assets" is the change in the firm's cash to total assets ratio. All ratios are winsorized at 5% (0% if only positive values are meaningful) and 95%. The full sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and is vs. is not affected by a tax shock on the personal home. We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2006-2010. We match on industry, year, firm, and family characteristics. Panel B shows difference-in difference-results for matched firms where the controlling shareholder is vs. is not affected by a tax shock on the personal home. We match on industry, firm, and family characteristics measured as averages over the 2000-2005 period, which is prior to the tax shock. The time period for the difference-in-difference estimation is 2000-2010.



**Table A4: Robustness to the liquidity shock measure***Panel A. Financial effects*

Independent variable	Dependent variable							
	Dividends to earnings		Distressed dividends		Dividends and salary to earnings before salary		Change in cash to assets	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
Family wealth tax to bank deposits	0.120	0.041	0.025	0.196	0.171	0.002	-1.583	0.000
Family gross assets	-0.001	0.085	0.001	0.502	0.000	0.020	0.000	0.038
Family leverage	0.003	0.055	0.001	0.338	0.007	0.000	0.031	0.000
<i>Firm characteristics</i>								
Cash to assets	0.245	0.000	-0.040	0.000	-1.041	0.000	0.261	0.000
Return on assets	0.088	0.000	0.003	0.335	0.054	0.000	1.304	0.000
Sales to assets	-0.006	0.002	0.000	0.728	0.035	0.000	-0.068	0.000
Volatility of sales	-0.035	0.007	0.005	0.210	-0.030	0.026	-0.005	0.840
Size	0.041	0.000	-0.007	0.000	0.004	0.554	0.210	0.000
Age	-0.004	0.857	0.000	0.998	-0.026	0.243	-0.170	0.000
Firm leverage	-0.274	0.000	-0.019	0.000	-0.185	0.000	0.012	0.505
Retained earnings to equity	0.012	0.000	0.002	0.003	0.006	0.002	0.000	0.893
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.079		0.008		0.050		0.058	
Number of observations	69,717		70,354		51,010		70,271	
Number of firms	29,596		29,684		25,095		29,655	

The models estimated in this table use a modified measure of the controlling shareholder's wealth tax shock to show how illiquidity shocks to the controlling family's personal wealth influence the cash flow from the firm to the family and the firm's liquid position in the clean sample. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2006–2010. "Dividends to earnings" is the ratio between the firms dividends and operating earnings. "Distressed dividends" equals 1 if the firm has negative operating earnings and positive dividends, and 0 otherwise. "Dividends and salary to earnings before salary" is the sum of dividends and salary paid to the controlling family divided by the family's part of the firm's operating earnings plus salary. "Change in cash to assets" is the change in firm's cash to total assets ratio. "Family wealth tax to bank deposits" is the family's wealth tax payments divided by its bank savings. This variable is instrumented by the change in the tax value of the family's home and by the home's tax value as a proportion of the family's gross assets. "Family gross assets" is the family's assets from the tax returns. "Family leverage" is the lagged family's personal debt to gross wealth. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities divided by its assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Dividends to earnings, dividends and salary to earnings, cash to assets, sales to assets, volatility of sales, and retained earnings are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.

*Continued on the next page*

**Table A4: Robustness to the liquidity shock measure (continued)***Panel B. Real effects*

Independent variable	Dependent variable							
	Investment		Sales growth		Employment growth		Profitability	
	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>	Coefficient	<i>p-value</i>
<i>Family characteristics</i>								
Family wealth tax to bank deposits	-0.083	0.073	-0.143	0.013	-0.045	0.465	-0.171	0.000
Family gross assets	0.000	0.966	0.000	0.991	0.000	0.722	0.000	0.041
Family leverage	-0.002	0.358	-0.003	0.080	0.000	0.942	0.002	0.062
<i>Firm characteristics</i>								
Cash to assets	0.010	0.349	-0.205	0.000	0.107	0.000	-0.053	0.000
Return on assets	-0.054	0.000	-0.117	0.000	0.019	0.068		
Sales to assets	0.174	0.000	-0.032	0.000	-0.003	0.201	0.029	0.000
Volatility of sales	0.022	0.111	-0.008	0.538	0.048	0.001	-0.005	0.545
Size	-0.427	0.000	-0.553	0.000	-0.089	0.000	-0.083	0.000
Age	0.077	0.001	0.083	0.000	0.040	0.089	0.020	0.120
Firm leverage	-0.053	0.000	0.060	0.000	-0.040	0.000	0.123	0.000
Retained earnings to equity	-0.001	0.616	-0.002	0.204	0.000	0.874	-0.003	0.004
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.006		0.005		0.010		0.007	
Number of observations	64,895		64,780		64,895		64,885	
Number of firms	26,846		26,816		26,846		26,843	

The models estimated in this table use a modified measure of the controlling shareholder's wealth tax shock to show how illiquidity shocks to the controlling family's personal wealth influence the firm's investment, growth, and profitability in the clean sample. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2006–2010. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "Family wealth tax to bank deposits" is the family's wealth tax payments divided by its bank savings. This variable is instrumented by the change in the tax value of the family's home and by the home's tax value as a proportion of the family's gross assets. "Family gross assets" is the controlling family's assets from the family's tax returns. "Family leverage" is the controlling family's lagged personal debt to gross wealth. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities to assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Standard errors are clustered at the firm level. Investment, sales growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings to equity are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.

**Table A5: Accounting for the market value of residential real estate**

Panel A. Financial effects using IV regressions

Independent variable	Dependent variable							
	Dividends to earnings		Distressed dividends		Dividends and salary to earnings before salary		Change in cash to assets	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
Family wealth tax to liquid assets	0.494	0.001	0.119	0.000	0.536	0.000	-1.087	0.000
Family gross assets	-0.001	0.006	-0.001	0.710	-0.001	0.004	0.001	0.002
Family leverage	0.003	0.037	0.001	0.019	0.006	0.002	-0.001	0.561
<i>Firm characteristics</i>								
Cash to assets	0.084	0.000	0.001	0.996	0.052	0.000	0.969	0.000
Return on assets	0.245	0.000	-0.032	0.000	-1.023	0.000	-0.005	0.321
Sales to assets	-0.005	0.003	0.000	0.299	0.035	0.000	0.000	0.820
Volatility of sales	-0.040	0.001	0.005	0.000	-0.040	0.002	0.006	0.425
Size	0.033	0.000	-0.002	0.003	0.004	0.486	0.021	0.000
Age	-0.011	0.587	0.001	0.323	-0.022	0.285	0.003	0.766
Firm leverage	-0.261	0.000	-0.017	0.000	-0.173	0.000	0.096	0.000
Retained earnings to equity	0.011	0.009	0.002	0.000	0.007	0.000	-0.002	0.056
Change in local home prices	0.046	0.139	0.009	0.264	0.073	0.018	0.029	0.113
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.06		0.01		0.06		0.13	
Number of observations	77,516		78,234		56,878		78,234	
Number of firms	31,833		31,928		27,067		31,928	

The models in this table estimate how the controlling owner's tax payments relate to the firm's payout and cash holdings when we account for changes in market value of the controlling owner's personal home and use instrumental variables (IV) estimation in the clean sample. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2006–2010. "Dividends to earnings" is the ratio between the firms dividends and operating earnings. "Distressed dividends" equals 1 if the firm has negative operating earnings and positive dividends, and 0 otherwise. "Dividends and salary to earnings before salary" is the sum of dividends and salary paid to the controlling family divided by the family's part of the firm's operating earnings plus salary. "Change in cash to assets" is the change in firm's cash to total assets ratio. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. This variable is instrumented by the change in the tax value of the family's residential real estate and by the ratio between residential real estate and the family's total gross assets. "Family gross assets" is the family's assets from the tax returns. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Retained earnings to equity" is the firm's retained earnings divided by its equity. "Change in local home prices" is the change in the price per square meter for residential real estate in the county. Dividends to earnings, dividends and salary to earnings, sales growth, asset growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings are winsorized at 97.5%. Returns on assets are winsorized at 2.5% and 97.5%.

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**Table A5: Accounting for the market value of residential real estate** (*continued*)*Panel B. Real effects using IV regressions*

Independent variable	Dependent variable							
	Investment		Sales growth		Employment growth		Profitability	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
Family wealth tax to liquid assets	-0.303	0.056	-0.450	0.003	-0.187	0.123	-0.486	0.000
Family gross assets	0.001	0.682	0.001	0.944	0.001	0.844	0.001	0.716
Family leverage	-0.002	0.322	-0.005	0.004	-0.001	0.462	0.001	0.120
<i>Firm characteristics</i>								
Cash to assets	0.025	0.018	-0.114	0.000	0.070	0.000	-0.049	0.000
Return on assets	-0.046	0.000	-0.030	0.000	0.017	0.020		
Sales to assets	0.170	0.000	-0.019	0.000	-0.003	0.061	0.027	0.000
Volatility of sales	0.017	0.185	-0.533	0.121	0.009	0.394	0.001	0.900
Size	-0.414	0.000	0.079	0.000	-0.049	0.000	-0.076	0.000
Age	0.059	0.007	0.061	0.000	0.002	0.922	0.009	0.420
Firm leverage	-0.060	0.000	0.070	0.000	-0.033	0.000	0.124	0.000
Retained earnings to equity	0.001	0.703	-0.001	0.534	0.001	0.435	-0.002	0.006
Change in local home prices	-0.042	0.208	-0.014	0.667	0.016	0.527	0.006	0.716
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.01		0.01		0.01		0.01	
Number of observations	71,818		71,684		71,818		71,807	
Number of firms	28,582		28,552		28,582		28,580	

This table shows how the controlling owner's tax payments on residential real estate relate to the firm's investment, growth, and profitability when we account for changes in market value of the controlling owner's personal home and use instrumental variables (IV) estimation in the clean sample. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2006–2010. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. This variable is instrumented by the change in the tax value of the family's residential real estate and by the ratio between residential real estate and the family's total gross assets. "Family gross assets" is the family's assets from the family's tax returns. "Family leverage" is the family's personal debt to gross wealth lagged. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities to assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. "Change in local home prices" is the change in the price per square meter for residential real estate in the county. Standard errors are clustered at the firm level. Investment, sales growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings to equity are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.

*Continued on the next page*

**Table A5: Accounting for the market value of residential real estate** (*continued*)

Panel C. Real effects using DiD regressions

Independent variable	Dependent variable							
	Investment		Sales growth		Employment growth		Profitability	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
After tax shock	-0.016	0.000	-0.008	0.001	0.000	0.816	-0.014	0.000
Home owner	0.006	0.006	0.011	0.000	-0.002	0.380	0.018	0.000
Home owner * After tax shock	-0.005	0.032	-0.012	0.000	-0.003	0.160	-0.010	0.000
Family gross assets	0.008	0.000	-0.001	0.127	-0.004	0.000	0.003	0.000
Family leverage	0.002	0.000	0.002	0.014	0.001	0.063	-0.001	0.007
<i>Firm characteristics</i>								
Cash to assets	-0.039	0.000	-0.043	0.000	-0.008	0.003	0.115	0.000
Return on assets	0.090	0.000	-0.263	0.000	0.078	0.000		
Sales to assets	0.024	0.000	-0.011	0.000	-0.003	0.000	-0.005	0.000
Volatility of sales	0.032	0.000	0.012	0.003	-0.001	0.698	-0.024	0.000
Size	-0.020	0.000	-0.008	0.000	0.009	0.000	0.017	0.000
Age	-0.010	0.000	-0.025	0.000	-0.012	0.000	-0.013	0.000
Firm leverage	-0.048	0.000	0.005	0.226	-0.019	0.000	0.040	0.000
Retained earnings to equity	-0.001	0.564	-0.003	0.014	-0.002	0.007	0.003	0.000
Change in local home prices	0.239	0.000	0.330	0.000	-0.007	0.519	0.115	0.000
Industry fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.025		0.029		0.010		0.066	
Number of observations	164,209		163,840		164,212		164,187	
Number of firms	26,554		26,543		26,554		26,551	

This table uses a difference-in-difference (DiD) approach to compare the effect on investment, growth, and profitability in the full sample of firms where the controlling family is vs. is not affected by a tax shock on the personal home. The full sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity. We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2001–2010. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "After tax shock" is 1 for 2006–2010 and 0 otherwise. "Home owner" equals 1 for firms where the controlling family owns residential real estate and pays wealth tax in 2005, and 0 otherwise. "Family gross assets" is the controlling family's assets from the family's tax returns. "Family leverage" is the controlling family's personal debt to gross wealth lagged. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities to assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. "Change in local home prices" is the change in the price per square meter for residential real estate in the county. Investment, sales growth, employment growth, cash to assets, sales to assets, and volatility of sales are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.

**Table A6: Using asset tangibility to measure debt capacity**

Panel A. Financial effects using IV regressions

Independent variable	Dependent variable							
	Dividends to earnings		Distressed dividends		Dividends and salary to earnings before salary		Change in cash to assets	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
Family wealth tax to liquid assets	0.896	0.000	0.153	0.000	1.143	0.000	-1.237	0.000
Family gross assets	-0.001	0.001	-0.001	0.622	-0.001	0.004	0.001	0.001
<i>Firm characteristics</i>								
Cash to assets	0.103	0.000	0.005	0.000	0.117	0.000	0.976	0.000
Return on assets	0.155	0.000	-0.034	0.000	-0.310	0.000	0.032	0.000
Sales to assets	-0.014	0.000	0.000	0.284	-0.010	0.001	0.005	0.000
Volatility of sales	-0.038	0.002	0.005	0.000	-0.043	0.026	0.006	0.400
Size	0.041	0.000	-0.003	0.000	0.036	0.000	0.018	0.000
Age	-0.030	0.144	0.000	0.766	-0.038	0.231	0.011	0.358
Asset tangibility	-0.031	0.015	0.000	0.704	-0.086	0.000	0.073	0.000
Retained earnings to equity	0.004	0.009	0.001	0.000	0.016	0.000	0.001	0.205
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.06		0.01		0.01		0.12	
Number of observations	77,626		78,345		56,960		78,329	
Number of firms	31,886		31,982		27,110		31,976	

The models in this table estimate how the controlling owner's tax payments relate to the firm's cash flows when we use asset tangibility to replace leverage in the clean sample. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2006–2010. "Dividends to earnings" is the ratio between the firms dividends and operating earnings. "Distressed dividends" equals 1 if the firm has negative operating earnings and positive dividends, and 0 otherwise. "Dividends and salary to earnings before salary" is the sum of dividends and salary paid to the controlling family divided by the family's part of the firm's operating earnings plus salary. "Change in cash to assets" is the change in firm's cash to total assets ratio. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. This variable is instrumented by the change in the tax value of the family's residential real estate and by the ratio between residential real estate and the family's total gross assets. "Family gross assets" is the family's assets from the tax returns. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Asset tangibility" is fixed assets divided by total assets. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Dividends to earnings, dividends and salary to earnings, cash to assets, sales to assets, volatility of sales, and retained earnings are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.

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**Table A6: Using asset tangibility to measure debt capacity (continued)***Panel B. Real effects using IV regressions*

Independent variable	Dependent variable							
	Investment		Sales growth		Employment growth		Profitability	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
Family wealth tax to liquid assets	-0.218	0.050	-0.533	0.000	-0.131	0.255	-0.743	0.000
Family gross assets	0.001	0.762	0.001	0.861	0.001	0.924	0.001	0.007
<i>Firm characteristics</i>								
Cash to assets	0.004	0.687	-0.187	0.000	0.058	0.000	-0.047	0.000
Return on assets	-0.040	0.000	-0.128	0.000	0.022	0.005		
Sales to assets	0.167	0.000	-0.028	0.000	-0.004	0.008	0.031	0.000
Volatility of sales	0.018	0.178	-0.022	0.073	0.009	0.379	0.002	0.783
Size	-0.412	0.000	-0.534	0.000	-0.048	0.000	-0.071	0.000
Age	0.054	0.012	0.085	0.000	-0.002	0.922	0.013	0.294
Asset tangibility	-0.001	0.960	-0.035	0.006	0.004	0.667	0.033	0.000
Retained earnings to equity	-0.001	0.586	0.001	0.522	0.000	0.933	0.001	0.120
Firm fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup>	0.01		0.01		0.01		0.01	
Number of observations	71,906		71,772		71,906		71,895	
Number of firms	28,622		28,593		28,622		28,622	

The models in this table present the clean sample estimates of how the controlling owner's tax payments relate to the firm's investment, growth, and profitability when we use asset tangibility to replace leverage. The clean sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity and either does not own its home, experiences a standard change in the home's tax value plus/minus 1% (2006–2009), or where the change in tax value is between NOK -100,000 and NOK +500,000 (year 2010). We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2006–2010. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "Family wealth tax to liquid assets" is the family's wealth tax payments divided by its liquid assets. This variable is instrumented by the change in the tax value of the family's residential real estate and by the ratio between residential real estate and the family's total gross assets. "Family gross assets" is the family's assets from the tax returns. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Volatility of sales" is the coefficient of variation of sales over the past three years. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Asset tangibility" is fixed assets divided by total assets. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Investment, sales growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings to equity are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.

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**Table A6: Using asset tangibility to measure debt capacity (continued)**

Panel C. Real effects using DiD regressions

Independent variable	Dependent variable			
	Sales growth Coefficient <i>p-value</i>	Asset growth Coefficient <i>p-value</i>	Employment growth Coefficient <i>p-value</i>	Profitability Coefficient <i>p-value</i>
<i>Family characteristics</i>				
After tax shock	-0.008 0.000	-0.015 0.000	0.001 0.639	-0.016 0.000
Home owner	0.008 0.001	0.002 0.290	-0.002 0.197	0.019 0.000
Home owner * After tax shock	-0.009 0.002	-0.009 0.000	-0.003 0.153	-0.010 0.000
Family gross assets	-0.003 0.000	0.008 0.000	-0.004 0.000	0.002 0.000
<i>Firm characteristics</i>				
Cash to assets	-0.047 0.000	-0.031 0.000	-0.005 0.049	0.102 0.000
Return on assets	-0.254 0.000	0.086 0.000	0.074 0.000	
Sales to assets	-0.012 0.000	0.023 0.000	-0.004 0.000	-0.004 0.000
Volatility of sales	0.016 0.000	0.033 0.000	0.001 0.791	-0.024 0.000
Size	-0.008 0.000	-0.019 0.000	0.009 0.000	0.016 0.000
Age	-0.025 0.000	-0.009 0.000	-0.012 0.000	-0.013 0.000
Asset tangibility	-0.001 0.874	-0.003 0.338	-0.007 0.016	-0.009 0.000
Retained earnings to equity	-0.004 0.001	-0.004 0.000	-0.003 0.001	0.005 0.000
Industry fixed effects	Yes	Yes	Yes	Yes
R <sup>2</sup>	0.026	0.025	0.010	0.059
Number of observations	178,011	178,427	178,427	178,398
Number of firms	27,505	27,512	27,512	27,556

This table uses a difference-in-difference (DiD) approach to compare the effect on firm investment, growth, and profitability in full sample of firms where the controlling family is vs. is not affected by a tax shock on the personal home. The full sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity. We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2001–2010. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "After tax shock" is 1 for 2006–2010 and 0 otherwise. "Home owner" equals 1 for firms where the controlling family owns residential real estate and pays wealth tax in 2005, and 0 otherwise. "Family gross assets" is the controlling family's assets from the family's tax returns. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Asset tangibility" is fixed assets divided by total assets. "Retained earnings to equity" is the firm's retained earnings divided by its equity. Investment, sales growth, employment growth, cash to assets, sales to assets, volatility of sales, and retained earnings to equity are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.



**Table A7: Real effects with year and firm and fixed effects and interaction effects for the control variables**

Independent variable	Dependent variable							
	Investment		Sales growth		Employment growth		Profitability	
	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value	Coefficient	<i>p</i> -value
<i>Family characteristics</i>								
Home owner * After tax shock	-0.008	0.019	-0.022	0.000	-0.006	0.103	-0.005	0.003
Family gross assets	-0.003	0.020	-0.006	0.001	-0.001	0.710	-0.005	0.000
Family gross assets* After tax shock	-0.003	0.057	-0.008	0.000	0.000	0.761	0.000	0.806
Family leverage	-0.001	0.234	-0.001	0.655	-0.001	0.504	0.002	0.000
Family leverage* After tax shock	0.001	0.459	-0.002	0.353	0.001	0.646	-0.001	0.067
<i>Firm characteristics</i>								
Cash to assets	-0.073	0.000	-0.127	0.000	0.015	0.018	0.002	0.468
Return on assets	0.016	0.035	-0.328	0.000	0.101	0.000		
Sales to assets	0.121	0.000	-0.032	0.000	-0.006	0.000	0.016	0.000
Volatility of sales	0.014	0.014	0.030	0.000	0.034	0.000	0.008	0.007
Size	-0.284	0.000	-0.442	0.000	-0.050	0.000	-0.025	0.000
Age	0.070	0.000	0.080	0.000	-0.016	0.141	0.015	0.006
Firm leverage	-0.035	0.000	0.035	0.000	-0.031	0.000	0.097	0.000
Retained earnings to equity	-0.003	0.008	-0.001	0.700	-0.002	0.120	0.000	0.498
Cash to assets* After tax shock	0.052	0.000	-0.009	0.248	-0.009	0.160	-0.013	0.001
Return on assets* After tax shock	0.085	0.000	0.116	0.000	0.015	0.136		
Sales to assets* After tax shock	0.007	0.000	-0.003	0.022	0.000	0.845	0.000	0.413
Volatility of sales* After tax shock	-0.001	0.918	0.012	0.095	0.030	0.000	0.013	0.000
Size* After tax shock	0.009	0.000	0.019	0.000	-0.001	0.551	0.000	0.722
Age* After tax shock	0.006	0.133	0.002	0.743	0.001	0.823	0.003	0.131
Firm leverage* After tax shock	-0.051	0.000	0.030	0.000	-0.006	0.388	0.051	0.000
Retained earnings to equity* After tax shock	0.005	0.003	-0.004	0.054	0.002	0.316	-0.004	0.000
D2002	-0.005	0.129	-0.027	0.000	-0.006	0.071	-0.009	0.000
D2003	0.030	0.000	0.019	0.000	0.005	0.158	-0.002	0.270
D2004	0.032	0.000	0.020	0.000	0.000	0.934	0.000	0.932
D2005	0.084	0.000	0.048	0.000	0.007	0.127	-0.005	0.023
D2006	0.107	0.000	0.150	0.000	0.006	0.822	-0.030	0.025
D2007	0.043	0.099	0.104	0.001	0.016	0.548	-0.054	0.000
D2008	0.022	0.403	0.022	0.504	0.005	0.846	-0.063	0.000
D2009	0.040	0.148	0.071	0.034	0.014	0.620	-0.067	0.000
D2010	0.051	0.070	0.094	0.006	-0.002	0.954	-0.057	0.000
Firm fixed effects	Yes		Yes		Yes		Yes	
R <sup>2</sup> : overall	0.011		0.008		0.008		0.001	
within	0.168		0.208		0.008		0.060	
between	0.002		0.002		0.002		0.046	
Number of observations	164,271		163,902		164,274		164,249	
Number of firms	26,568		26,557		26,568		26,565	

This table uses a difference-in-difference (DiD) approach to compare the effect of shareholder illiquidity on the firm's investment, growth, and profitability in the full sample. The full sample includes all active limited-liability firms in Norway where a nuclear family (i.e., parents and their underage children) holds more than 50% of the equity. We exclude financials, business groups, holding companies, the families with zero gross wealth, and the smallest 5% of firms by assets, sales, and employment. The sample period is 2001–2010. "Investment" is the log of the percentage change in real assets the year after the tax shock. "Sales growth" and "Employment growth" are the log of the percentage change in sales and employment in the year after the wealth tax shock, respectively. "Profitability" is the return on assets the year after the tax shock. "Home owner" equals 1 for firms where the controlling family owns residential real estate and pays wealth tax in 2005, and 0 otherwise. "After tax shock" is 1 for 2006–2010 and 0 otherwise. "Family gross assets" is the controlling family's assets from the family's tax returns. "Family leverage" is the controlling family's personal debt to gross wealth lagged. "Cash to assets" is the ratio between the firm's cash holdings and total assets. "Return on assets" is the sum of firm's operating earnings and interest expense divided by total assets. "Sales to assets" is the ratio between the firm's sales and total assets. "Size" is the log of the firm's revenues in million NOK as of 2010. "Age" is the log of the number of years since the firm was founded. "Firm leverage" is the firm's liabilities to assets lagged. "Retained earnings to equity" is the firm's retained earnings divided by its equity. "D200X" is 1 if the observation is from year 200X (X = 2, ..., 10) and 0 otherwise. Investment, sales growth, employment growth, cash to assets, sales to assets, and volatility of sales are winsorized at 97.5%. Return on assets is winsorized at 2.5% and 97.5%.