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Tax planning and investment responses to dividend taxation

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Abstract

This study explores how business owners respond to dividend taxes in different margins including tax planning and investment. I use administrative tax data on all privately held Finnish corporations and their main owners in 2006–2016. By using tax schedule discontinuities and changes in the schedule as variation, I find exceptionally clear dividend payment responses to tax rates. Evidence on the asset composition of firms indicates that a notable part of the payment response is due to inter-temporal income-smoothing, while changes in the tax schedule did not cause significant real responses in output or investment. Hence, dividend taxes capitalize into share values, as earnings are left in the firms to avoid higher dividend tax. In addition, studying the income composition of owners around tax changes reveals income-shifting between wage and dividends with negligible effect on gross income received from the firm.

JEL classification codes: G38, H21, H24, H25
Keywords: Dividend taxation, investment, income-shifting, bunching

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1 Introduction

Understanding the mechanisms of how business owners respond to dividend taxation is essential in planning a good income tax scheme. While equity reasons favor taxing entrepreneurial income as progressively as labour income, efficiency considerations may suggest a lower rate. Dividend taxes reduce the return on invested capital and the owner's own work, hence decreasing incentives for new investments and exerting effort. However, business owners have many channels for adjusting their tax burden - i.e. tax planning - and several channels to fund investment, so the distortions can also be small. In this paper, I study how Finnish firms and firm owners respond to dividend taxation in different decision margins, including tax planning and investment. I use discontinuities in the owner's dividend tax schedule as well as changes in the tax rates to empirically study the importance of various response channels. I find that business owners adjust their dividend income strongly to match the tax schedule thresholds. The strong observed bunching in different margins implies taxable income elasticities from 0.5 at the threshold for higher capital income tax to 3.6 at the threshold where a progressive labor income tax kicks in. Further investigation of the firms suggests that the bunching mainly reflects intra-temporal and intertemporal tax planning, while I do not observe responses in investment when studying changes in the tax brackets.

The Finnish dividend tax schedule provides exceptionally large incentives for firms to respond. The owners of privately held corporations can quite freely choose whether to receive income from the firm as dividend (taxed as profit with corporate tax and at the owner level with dividend tax) or to pay wages (only progressive earned income tax on wages). The dividend tax schedule in Finland includes deduction thresholds, effectively causing clearly lower marginal tax rates for certain amounts of dividend income in comparison to e.g. labor income. The dividend tax rate jumps notably at a threshold that is set first at 9% (2006–2013) then at 8% (2014–) return on net assets, after which a more progressive labour income tax kicks in. Moreover, there is a monetary threshold for dividends exempted from most capital income tax to alleviate the double taxation of corporate profits.[1] These discontinuities create strong incentives, and both the thresholds and tax rates have changed several times over the past decade. I use detailed administrative data to study the responses to these dividend tax schedule discontinuities.

[1]For example, the marginal tax rate on dividends (including corporate taxes) jumped from 28% to 40.5% at 90,000EUR between 2006 and 2011.

First, I study the incidence of dividend payments at the thresholds using the bunching method, developed by Saez (2010). I find exceptionally clear dividend responses to the dividend tax rate thresholds. The excess mass at each threshold is from 6 to 20 times that of the estimated counterfactual mass. I use the excess mass and the tax difference to estimate the elasticity of taxable dividend income with respect to the net of marginal tax rate. I estimate an elasticity of 0.5 at the monetary thresholds. This implies that a 1% increase in the net of dividend tax rate increases taxable dividend income by 0.5%, which is a large response. I find an even larger elasticity of 3.6 at the net asset thresholds. This massive elasticity is likely driven by the fact that above the net asset threshold, dividends are taxed as highly as wages, so there is no benefit in paying dividends instead of wages. Furthermore, the owner may increase the future net asset position by retaining earnings instead of distributing dividends. These incentives lead to business owners reacting to the net asset threshold very strongly. The strong bunching responses also highlight that business owners are well informed about the tax schedule and find it easy to adjust accordingly.

Second, I examine the mechanisms driving bunching at the thresholds. I study real economic effects, using changes in the dividend tax thresholds. Moving the dividend tax threshold brings new firms into the range of the higher/lower marginal tax rate, but I find no statistically significant responses in the investment or output of these firms.[2] While no real effects are found, the evidence presented in this study shows the bunching is mostly driven by tax planning. Further analysis of the asset structures of the firms suggests that a notable part of the payment response is due to inter-temporal income-smoothing, as the balance sheet information shows firms at the thresholds accumulating financial assets in the firm. Hence, owners avoid the higher tax bracket by retaining earnings in the firm, which is also predicted in earlier literature as the capitalization of dividend tax (Auerbach, 1979). Retaining profits has several tax benefits. In addition to avoiding the higher tax bracket, the retained earnings increase the firm's value by increasing its net assets, and therefore allows for a higher amount of dividend to be distributed at the lower capital income tax in the future as the tax schedule depends on the firm's net assets. Also, some forms of capital income are taxed more lightly when received by a firm, so saving by investing through a firm may be lucrative. This is likely to further boost the capitalization

[2]However, these results cannot rule out global effects affecting the overall distribution of the firms, as I study these responses locally.

of dividend taxes into share values. Finally, by studying the income composition of firm owners around the time of tax changes, I observe that owners engage in income-shifting across wage income and dividends to minimize their tax burden.

This study builds on several strands of tax literature. First, I contribute to the bunching literature. I show sizeable responses to the dividend tax schedule in a new institutional context and provide an elasticity estimate, helpful e.g. in policy analysis. Kinks and notches have been used to study the responsiveness of taxpayers in various income tax bases. Earlier literature has shown that bunching appears to be particularly driven by the self-employed. This literature includes Mortenson and Whitten (2020), who observe taxpayers responding to tax credit maximizing kinks in the US and Chetty, Friedman, et al. (2011), who study kinks in the Danish income tax schedule and find the self-employed bunch more clearly than wage earners, who face greater adjustment costs and hours constraints. Bastani and Selin (2014) find similar results in the Swedish income tax schedule. Kreiner, Søren Leth-Petersen, et al. (2014) and Kreiner, Soren Leth-Petersen, et al. (2016) use the bunching method to study year-end income-shifting in Denmark. They find that in particular high-income individuals, such as managers, shift income around the end of the year, when tax rates are about to change the next year.

Second, I build on the intricate dividend tax literature by exploring a variety of possible responses to dividend taxation, including investment in new capital and tax planning. Responses to dividend taxes have challenged economists for decades. Auerbach (1979) and King (1974) suggest that dividend tax does not enter the marginal investment decision as marginal investment is funded with retained earnings (or debt). Thus, dividend payments mainly reflect the responses to inter-temporal incentives to pay dividends, and this leads taxes on dividends to capitalize into share values[3]. Chetty and Saez (2005) study the US dividend tax cut of 2003 and show that dividend payments responded massively to the tax cut, reflecting the inter-temporal incentives to pay out dividends. Yagan (2015) extends the research by showing that despite the notable dividend windfall, there was no increase in investment following the dividend tax cut in the US. Le Maire and Schjerning (2013) give empirical support to the presumption of business owners' using retained and withdrawn earnings to adjust their taxation, and Miller et al. (2022) find similar evidence to us of dividend tax thresholds leading to inter-temporal income-smoothing in the UK. Boissel and Matray (2022)

[3]For example Zodrow (1991) describes the capitalization mechanism in more detail.

also find that dividend tax increases in France led to more earnings being retained in the firm. However, they found that these earnings were spent as investment in productive capital. Part of the earlier literature suggests that dividend taxes affect investment by firms negatively even if the investment is funded with retained earnings (Poterba and Summers, 1985). The reason may be that shareholders do not consider retained earnings as valuable as paid-out profits due to asymmetric information, i.e. principal-agent conflicts[4], and dividend taxation amplifies these principal-agent conflicts of interest (Chetty and Saez, 2010). Alstadsæter et al. (2017) lends support to this point empirically. While finding no average investment response, they show that as a response to a tax cut in Sweden, the investment of cash-constrained firms increased relative to cash-rich firms, in line with the principal-agent conflict theory. The response is explained by higher dividend payouts in cash-rich firms and better access to external equity in cash-constrained firms. I contribute to this literature by providing new country evidence of tax planning as the primary response channel to dividend taxes, while I find no impact on investment or output. In addition, this study differs from earlier research by the precision of the data, which e.g. allows me to trace the dividend income of the owner of a particular firm and to study different outcome variables as potential response channels, including components of the assets of a firm such as financial assets.

Finally, I contribute to the literature on the tax planning of business owners by describing the profit-shifting responses to the complex Finnish dividend tax schedule. I show that Finnish business owners shift income both intra-temporarily across income bases and inter-temporarily by retaining and distributing profits in accordance with the tax thresholds. Including inter-temporal income-shifting as a response margin builds on the earlier evidence by Pirttilä and Selin (2011) and Harju and Matikka (2016), who show that corporate owners in Finland actively shift income between dividend and wage tax bases[5].

The rest of the paper is organized as follows. Section 2 outlines the institutions and the data. In Section 3, I represent the payment responses to dividend taxation using the bunching method and estimate the corresponding elasticity. Section 4 discusses

[4]Dividends signal the true value of the firm, and retaining earnings leaves more cash under the control of managerial choices, and thereby disincentivizes the close monitoring of managers, leading to unproductive investments using retained earnings.

[5]Literature showing income-shifting between tax bases in other countries includes Tazhitdinova (2020), López-Laborda et al. (2018), Alstadsaeter and Jacob (2016) and Waseem (2018).

what the payment responses imply, covering real responses, income-smoothing and income-shifting. Section 5 concludes.

2 Institutions and Data

2.1 Institutions

Table 1: Dividend tax schedule in Finland

A. Dividend tax thresholds

Years	Kink	Net asset threshold
2006–2011	90,000EUR	9%
2012–2013	60,000EUR	9%
2014–2016	150,000EUR	8%

B. Owner-level tax burden around the tax thresholds

		Effective marginal tax rate	
Years		Below net asset threshold	Above net asset threshold
2006–2011		26%	26–∼55%
2012–2013	Below	24.5%	24.5–∼55%
2014–2016	kink	26–26.8%	20–∼55%
2006–2011	Above	40.5%	26–∼55%
2012–2013	kink	40.36%	24.5–∼55%
2014–2016		40.4–43.12%	20–∼55%

Note: Panel A lists the monetery thresholds and the net asset thresholds in place in the dividend tax schedule in 2006–2016 The earned income tax rate varies depending on the taxpayer's income and municipality. Panel B lists the implied marginal tax rates below and above each threshold in 2006–2016. The highest rate above the net asset threshold depends on the other earned income of the taxpayer. The highest overall marginal earned income tax rate has been circa 55%.

In Finland, personal capital income, such as capital gains and rental income, are taxed at a nearly flat capital tax rate. Other income, such as wage and social benefits, is taxed with a progressive earned income tax rate schedule. The ∼30% capital income tax is lower than the highest marginal tax rates on earned income, ∼55%, aiming to boost capital mobility and to respond to international tax competition. The

dividends of privately held corporations[6] face a somewhat complicated tax scheme, with both capital and earned income tax schedules applied, depending of the size of the dividends. Furthermore, owners of privately held firms can quite freely choose whether to receive their income as wages or dividends, or leave income in the firm as retained earnings.[7]

To prevent extensive income-shifting, the tax rate for dividends from a privately held corporation depends on the level of net assets of the firm: only the amount of distributed dividends below a predetermined rate of return on the firm's net assets, 8% since 2014, is taxed at the lower capital income tax rate. Moreover, for dividends below the net asset threshold, part of the capital income tax is deducted in order to reduce the double taxation of distributed profits. The overall tax burden on distributed dividends includes both the flat corporate tax rate, 20% from 2014 onward, and personal dividend taxes. In 2006–2011, dividends below both the net asset threshold and the monetary threshold were taxed at an effective tax rate of 26% including both corporate and dividend tax. Dividend payments above the monetary thresholds but below the net asset threshold are taxed at a 40.5% effective marginal tax rate. Dividend payments above the net asset threshold are taxed at the progressive earned income tax rate, implying an effective marginal tax rate above around 55% at most[8]. The earned income share of the dividends is added to the other earned income of the owner when calculating the effective tax rate.

Table 1 collects the parameters of the dividend tax schedules in use in 2006–2016. Panel A compiles the thresholds in the tax schedule and panel B displays the effective tax rates around each threshold in each period. The first column in Table 1 B features the marginal tax rates below and above the monetary kink, for dividends below the net asset threshold. For example, from 2006 to 2011, the effective tax rate below the monetary threshold was 26% as capital tax was fully exempted, and above the 90,000EUR kink the effective tax rate rate was 40.5%[9]. The marginal tax rate above

[6]Dividends from publicly traded firms face a different dividend tax scheme.

[7]The Finnish dividend tax system varies depending on the organizational form of the company. In this study, I focus on privately held corporations that are limited companies owned by a single person or a group of individuals. The privately held corporation is the most common corporate form in Finland, covering nearly half of all firms.

[8]The earned income tax is applied to 75% of excess dividends to reduce double taxation, causing the higher effective tax rates to nearly equal the tax on wages.

[9]0.26+(1-0.26)*0.7*0.3. Above the monetary threshold the capital tax rate has been applied to 85% of excess dividends since 2014, and before 2014 to 70%.

the net asset threshold in the second column depends on the owner's other personal income, as dividends above this threshold face the progressive earned income tax schedule, with the highest rates around 50%.

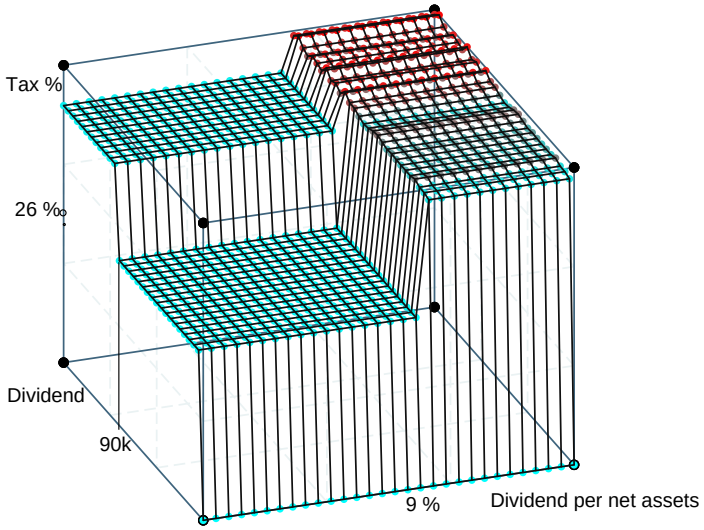
Figure 1 visualizes the thresholds in marginal tax rates. It is three-dimensional to reflect the fact that the dividend tax rate depends not only on the dividend amount but also on the net asset position of the firm. For an individual firm owner, the entire region is not available, and the firm's net assets define a restriction that slices the three-dimensional dividend tax schedule. For example a sole owner of a firm with exactly 1 million euros of net assets could locate exactly at the corner of the lowest plane. By receiving more dividends, the owner would face the earned income schedule, which is the high uneven plane in the graph. The earned income tax rates above the threshold are calculated as averages of the individual marginal tax rates of owners at the threshold.

To sum up, the key features of the schedule are: i) below the net assent threshold the effective dividend tax rate including the corporate tax is clearly lower (max. $\sim$ 40%) than the highest ($\sim$ 55%) income tax rates for wages. This means that excluding low levels of wage income[10], it is optimal to pay dividends instead of wages up to the net asset threshold. ii) Above the net asset threshold the difference in tax between paying dividends or wages is negligible (again excluding for low levels of wages). This means that iii) The net asset threshold creates additional incentives to retain the earnings exceeding the net asset threshold in the firm as they increase the firm's asset position, enabling higher dividend payments in the lower tax bracket in the future.

This complex system creates a challenging tax-minimization puzzle for the owner. The thresholds described in the tax schedule and changes in them create variation that enables me to study the effects of dividend taxes. I study bunching caused by both the monetary and the net asset threshold, to estimate the dividend tax elasticities. Then, I use the changes in the tax schedule to study the mechanisms driving the elasticity.

[10]It is usually optimal to pay wages until the marginal tax reaches the level of dividend tax. The optimal low amount of wage depends on the particular year and municipality (more detail in the Appendix) as well as the amount of dividend, but the tax rate was always lower for wages than for dividends for wage income of around 20,000–25,000EUR at the time.

Fig. 1: Marginal tax rate for dividends 2006–2011



Note: This graph describes the thresholds in 2006-2011, when the kink was at 90,000EUR and the net asset threshold at 9%. Above the net asset threshold, the owner pays earned income tax on 70% of income (85% since 2014) in addition to the corporate tax. The tax rate above the net asset threshold is estimated as a mean of the actual marginal earned income tax rates in each 5000-euro dividend bin.

2.2 Data

I use firm- and owner-level tax filing data that cover all privately held Finnish corporations with a matched main owner. As the data are constructed based on tax records of firms' reported income, it leaves out firms for which the main owner did not receive any income. The data cover the years 2006–2016 with three different dividend tax schedules in use. The data are obtained annually from the Finnish Tax Administration and are maintained by Statistics Finland. Annual firm-level tax data are matched with tax return data for the main owners of the firm and are combined into a panel. The data includes one main owner for each firm and this title is assigned based on having the highest ownership share. Firms with another firm as the main owner are excluded from the data.

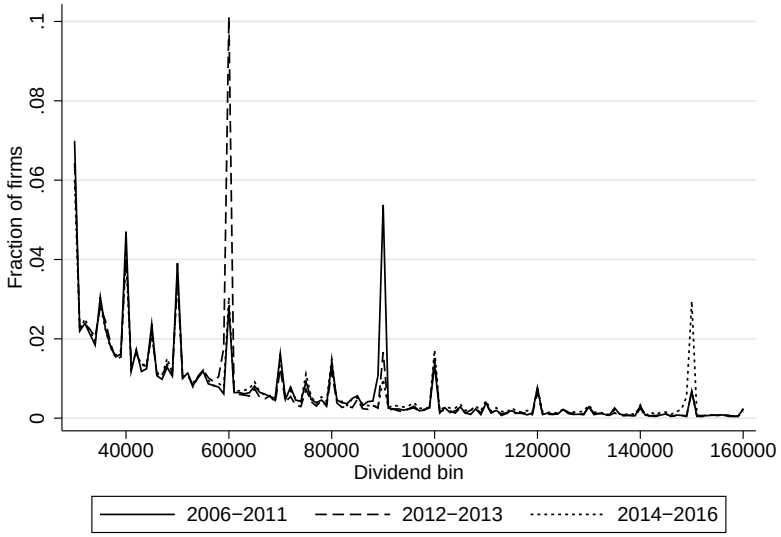
The data include information on dividends and wages paid to the owner, and firm-level variables such as turnover, net assets and new investment. The detailed owner-level tax data allow me to calculate the marginal tax rates for different forms of income. Table 2 describes yearly summary statistics for the years 2006, 2011

Table 2: Summary statistics of the data 2006, 2011 and 2016

				Firm level					
	2006			**2011**			**2016**		
	mean	sd	p50	mean	sd	p50	mean	sd	p50
Turnover	1125410	8381004	241015	992964	7120131	202573	1156016	11536122	201493
Profit	104884	584402	21222	79296	450167	14025	170311	14030253	15114
Net Assets	501911	4255174	104207	560925	4969151	112843	849292	14312194	147004
Financial assets	320556	2749007	69913	341785	2649446	77216	490535	7021860	95587
Investment	54236	329184	2897	47634	269958	1732	58389	639241	1300
No. owners (all)	2.71	53.53	2.00	3.04	216.13	2.00	5.34	290.23	2.00
No. owners	2.65	51.81	2.00	2.95	206.70	2.00	5.08	276.99	1.00
				Owner level					
	2006			**2011**			**2016**		
	mean	sd	p50	mean	sd	p50	mean	sd	p50
Dividends	21769	75496	7624	27752	136389	8500	28943	284546	9642
Wages	18887	22926	13500	23055	27778	16414	26792	32143	19360
Observations	49101			59947			62589		

Note: This table provides summary statistics for the data in 2006, 2011 and 2016. Turnover refers to annual sales, profit is the taxable income of the firm, net assets refers to the book value of assets after depreciation, and investment refers to additions to depreciating assets, such as newly installed fixed capital. The first value of the number of owners includes all owners of the firm and the second variable only owners that are individuals, i.e. not firms. The owner with the highest share of stock is considered the main owner and each firm has only one main owner in the data. Dividends and wages refer to the main owner's income from the firm. By the nature of the tax record data, all firms in the data paid dividends to their main owner.

Fig. 2: Dividend payment distributions during the three tax schedules (nominal)



Note: This figure plots the distribution of dividend payments to the main owners during three dividend tax schedules. The vertical line shows the fractions of firms in each 1000-euro dividend bin. In addition to round number bunching during each schedule, there is a clear spike at the prevailing monetary threshold. In 2006–2011, the monetary threshold was at 90,000EUR, in 2012–2013 the threshold was at 60,000EUR, and in 2014–2016 it was at 150,000EUR.

and 2016[11] in nominal terms. Turnover refers to the firm's annual sales, profit is the taxable income, net assets refer to the book value of assets after depreciation, and investment refers to additions to depreciating assets such as newly installed fixed capital. Owner-level dividends and wages refer to those received from the corporation studied, i.e. if the owner receives wages or dividends from other firms, those are not included in this value. The data include more than 600,000 observations during the research period and 113,835 distinct firms.[12]

Figure 2 shows the dividend payment distributions during the three dividend tax schedules studied. The interest of this paper lies in the highest spikes, which are driven by the thresholds. The figure also shows clear round number bunching, suggesting that the dividend payout choice is not random and there is some behavioral aspect to

[11]Table A1 in the Appendix describes the pooled data covering all years in the panel.

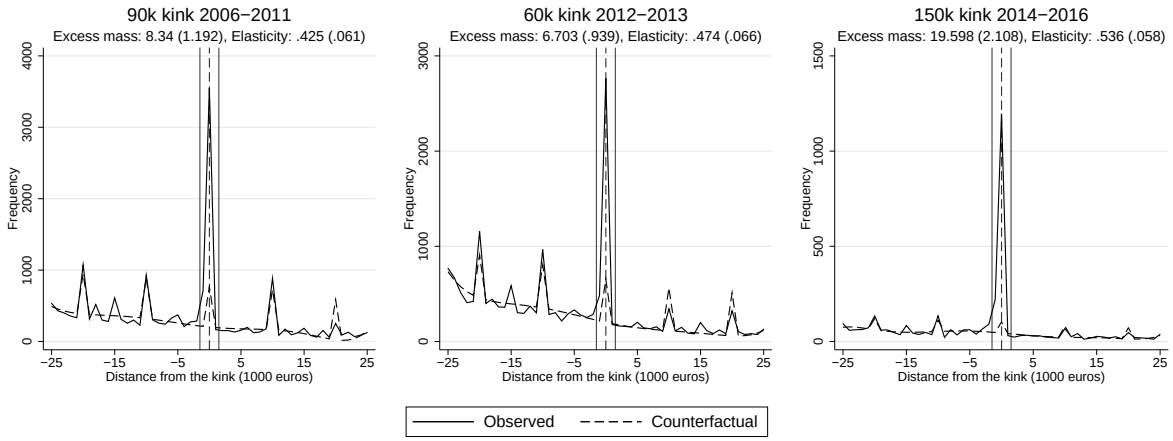
[12]The owner can postpone redeeming the dividends from the firm. Thus, the dividend tax is paid according to the tax rate of the year when the dividend is redeemed, not based on the year of distribution of dividend. Therefore, some of the owners have several dividend observations for the same company and year. As a solution, dividend observations for an owner-company pair in a single year have been aggregated.

it. In the following section, I describe this bunching at the thresholds in more detail.

3 Dividend Payment Responses

I estimate the extent of excess mass and the according elasticity of taxable income with the bunching method, developed by Saez (2010)[13]. The elasticity of taxable income (ETI) is the ratio of a percentage change in taxable income to a percentage change in the net-of-tax income rate (one minus the tax rate). The bunching method uses the excess mass at a tax schedule discontinuity to estimate the corresponding elasticity of taxable income. Appendix A1 explains the applied methodology in more detail.

Fig. 3: Bunching at the monetary threshold

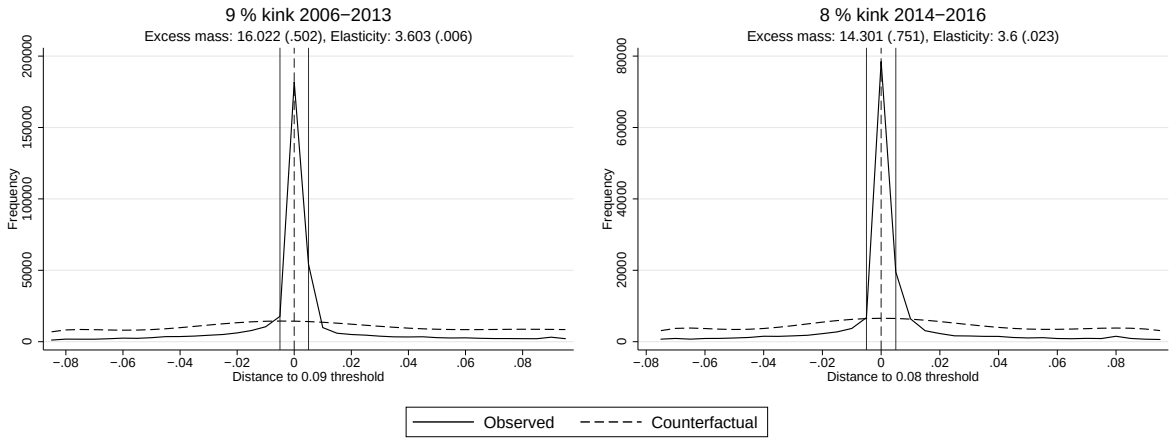


Note: These graphs plot the actual distribution of observations, represented by the solid line, and the counterfactual distribution, represented by the dashed line, in 1000-euro bins around the 90,000EUR threshold in 2006–2011, the 60,000EUR threshold in 2012–2013 and the 150,000EUR threshold in 2014–2016. The vertical solid lines show the bunching region. The estimated excess mass and the corresponding elasticity estimate are reported above each graph together with the standard errors.

Figure 3 provides the excess mass estimates at different monetary thresholds in place, and with the pooled data covering all firm-year observations for the period in question. The first plot on the left depicts the evidence for 2006–2011, when the threshold was at 90,000EUR. The horizontal axis is the dividend amount relative to

[13]Kleven (2016) provides a review of the method and its indications.

Fig. 4: Bunching at the net asset threshold



These graphs plot the bunching mass at the 9% net asset threshold in 2006–2013 and at the 8% net asset threshold in 2014–2016. The elasticities are first estimated for each buncher individually based on their respective tax rates around the kink using the aggregate excess mass. The final elasticity reported above the graph is a mean of all the individual elasticities. The capital income tax rate below and above are chosen using only dividend income, i.e. the higher capital income tax brackets in later years are only used when taxable dividends below the net asset threshold exceed the monetary limit (eg. 2015–2016: 30,000e).

the 90,000EUR kink. The frequency of firms in each 1000-euro bin is shown on the vertical axis. The solid line in the figure is the actual observed dividend distribution in the region. The dashed line is the estimated counterfactual distribution, which takes into account bunching at round numbers and excludes the area near the kink. The vertical lines around the kink show the bunching range $[-R; R]$ that is used to estimate the excess mass and elasticity. A substantial excess mass takes place at the tax kink, the excess mass is more than eight times the counterfactual, and the corresponding elasticity is 0.43. Bunching at the later monetary discontinuities at 60,000EUR in 2012–2013 and at 150,000EUR in 2014–2016 is as large. The corresponding elasticities are 0.47 and 0.54 respectively.

Figure 4 shows the bunching results at the net asset thresholds. The horizontal axis is now the dividend amount relative to the firm's net assets. The estimated elasticity of taxable dividend income is 3.6 in both estimations. The elasticity estimate reported is the mean elasticity of individual elasticities estimated using personal tax rates and the excess mass. Even though the excess mass at the threshold does not differ greatly in comparison to the monetary kinks, the elasticity estimate is clearly

larger. Mathematically, this is due to the lower tax difference for many of the taxpayers in comparison to the tax rate difference at the monetary kink.

The elasticity estimates at the monetary thresholds are lower than the estimates at the net asset threshold, so the incentives for firm owners to bunch seem to be higher at the net asset threshold. There are some clear reasons for this. First, the incentive to increase the firm's net assets by retaining earnings is stronger at the net asset threshold. Even though the owner cannot affect the marginal tax rates around the threshold, he/she can affect the position of the threshold in euros. That is, retaining earnings in the firm increases the net assets of the firm, thereby allowing for a larger amount of dividends to be distributed in the future at a lower tax rate[14]. I will discuss this finding and its implications further in Section 4.3. Second, for most income levels, the schedule above the net asset threshold is in principle the same as for wages, so the owner may just as well pay wages. Income-shifting is covered in Section 4.2. In addition, the earned income tax schedule is a lot more complex than the capital income tax schedule, so the marginal tax rate above the net asset threshold may be less salient for the owner.

Considering both of these tax planning channels captured in the bunching response, inter-temporal and tax base income-shifting, the elasticity estimates of a single tax base capture more than the real economic impacts of taxation and should obviously not be interpreted as structural elasticity estimates. However, the elasticity estimates enable a comparison of the strength of the different incentives in the different type of thresholds (net asset vs kink) as well as a comparison at similar thresholds. Furthermore, the estimates enable the revenue impacts of tax changes to be simulated. As it is, the estimated excess masses vary when the tax rates vary, but the corresponding elasticities are notably stable. Table 3 collects all the elasticity estimates.

[14]The marginal tax rate in the earned income tax bracket could also be less clear for the owner due to the complexity of the earned income tax schedule.

Table 3: Elasticity estimates

Years	Threshold	Elasticity estimate (SE)
2006–2011	90,000EUR	0.425 (0.061)
2012–2013	60,000EUR	0.474 (0.066)
2014–2016	150,000EUR	0.536 (0.058)
2006–2013	9% of net assets	3.603 (0.006)
2014–2016	8% of net assets	3.600 (0.023)

Note: This table collects together all the elasticities estimated with different thresholds and data periods.

4 Other outcomes

4.1 Real effects

Dividend taxes reduce the return on invested capital and the owner's own work effort, hence they may decrease incentives for new investments and exertion of effort. An ongoing debate in the dividend tax literature is whether dividend taxation distorts investment. Thus a key question is: Could the real economic effects be driving some of the bunching responses? This is difficult to observe directly from the data as firms self-select to different thresholds. However, I can use changes in the dividend tax parameters to see how those facing a higher or lower marginal dividend tax rate respond to the tax changes. Dividend payouts are an endogenous choice, so I cannot use the dividend payments as such to assign treatment. Instead, I utilize the variation in the phased dividend tax schedule and the difference-in-differences set-up to study the effects of dividend tax changes on real outcomes, namely investment and output.

As the dividend tax rate depends on the net assets of the firm, the main owners of firms with equal net assets are taxed on dividends depending on the owner's net asset share. The main owners of equally wealthy firms face different dividend tax rates depending on this share. Thus, when tax brackets change, the tax change only applies in the case of a given owner's net asset share. In studying the responses to dividend taxation, I use changes in the tax brackets as variation and I use the owner's net asset share to identify owners into treated and control groups in the difference-in-differences set-up. The intuition is that moving the dividend tax threshold brings new owner+firm pairs into the range of the higher marginal tax rate. If the marginal

Table 4: Diagram of assignment into treatment and control groups: 2012 tax change

	Firm turnover	Firm net assets	Main owner's ownership share	Main owner's net asset share	Effective max MTR before	Effective max MTR after
Treated	Anything	666-1000K	$\leq 100\%$	666-1000K	26%	40.36%
Control	Anything	666-1000K	$\leq 100\%$	$<$ 666K	26%	24.5%

Note: This table describes the basic details of the assignment into treatment and control. The assignment is based on the main owner's share of the firm's net assets. The last two columns report the marginal tax rate on the capital income dividend-maximizing dividend before and after the reform. 666K is actually 666,666.667EUR.

tax rate distorts investment, there should be some response in the real outcomes in these new firms for which the main owner is now in the higher/lower tax bracket.

In 2012, the monetary threshold for a higher marginal dividend tax rate was reduced from 90,000EUR to 60,000EUR. I restrict the data to firms with net assets between 666K–1M€ in 2011, just before the tax change[15], and I use the variation in the owner's net asset share to assign similar-sized firms into treatment and control groups. The assignment into treatment and control groups is pinned down in table 4. Treated firms are those with owners whose ownership share of the firm's net assets exceeds 666K€[16], which implies that the maximum capital income dividend is between 60,000–90,000EUR. Thus they faced a marginal dividend tax increase of 14.36 percentage points (55.2%). The main owners of firms of this size face the dividend tax increase only if the owner's share of the net assets is high enough. Thus I can use as a control group firms whose main owner's net asset share is below 666K€. For them the maximum capital income dividend was already below 60,000EUR. Thus their marginal dividend tax rate decreased by 1.5 percentage points. The net asset position, which enables a firm to pay dividends in the lowest tax bracket, does not imply that the firm pays the maximum capital income dividend to the owner. However, more than 60% of the treated firms did pay dividends between 60,000–90,000EUR, making this a suitable tool for identifying the group affected by the tax rate increase (table 5).

Table 5 describes the data in the treatment and control groups. In terms of turnover, net assets (by definition), investment, and variable costs (spending on inputs, such as material or intermediate goods), both groups are quite similar. Labor costs, the number of employees and the number of owners differ between the groups,

[15]Hence, the data are a balanced panel based on the 2011 net asset position.

[16]The exact limit used is 666,666.667EUR

Table 5: Summary statistics of the restricted sample (year 2011)

	Treated			**Control**		
	mean	sd	p50	mean	sd	p50
Turnover	1541055	2556638	802945	1897639	2383413	1249627
Net Assets	846458	99282	842541	829473	97024	813990
Dividends (main owner)	80094	50810	71601	45592	35840	37524
Investment	76105	221196	9774	80363	161792	17920
Investment per lagged fixed assets	0.5617	4.3423	0.0466	0.2985	0.7011	0.0772
Financial assets	538541	398789	507063	580817	441668	528328
Variable costs	1130710	2181940	430710.5	1242189	1981976	648814.7
Employees	10.69	27.59	4	14.84	24.60	8
No. Owners	1.379	1.144	1	3.806	6.044	3
Observations (2011)	1038 (651*)			1394		
Observations (total)	8478			10059		

* 651 firms paid dividends between 60,000-90,000EUR (an increase in the marginal tax rate) for the main owner.

Note: This table provides the summary statistics for the difference-in-differences data in 2011. Turnover refers to annual sales, net assets refers to the book value of assets after depreciation, dividends are the main owner's dividend income from the firm, and investment refers to additions to depreciating assets, such as newly installed fixed capital. Labor costs include wage and payroll taxes paid by the firm and variable costs other input costs such as material and intermediate goods, number of workers means the number of employees in the firm in 2011. Each firm has only one main owner in the data. The owner with the highest share of stock is considered the main owner. Due to the nature of the data, all firms paid dividends to their main owner.

Table 6: Difference-in-differences results of the 2012 tax change

	Turnover (log)	Variable costs (log)	Investment (log)	Investment per lagged capital
$\alpha_2(Treat \times Post)$	-0.015	0.003	-0.100	-0.101
	(0.041)	(0.050)	(0.185)	(0.276)
Firm fixed effects	X	X	X	X
Year fixed effects	X	X	X	X
Constant	13.828***	12.733***	6.807***	0.656***
	(0.020)	(0.025)	(0.109)	(0.164)
r2	0.016	0.005	0.019	0.001
N	16857	15367	18537	13376

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports the regression results estimated following Equation 1. The dependent variables in the specifications are logarithmic transformation of annual turnover (sales), logarithmic transformation of annual variable costs, logarithmic transformation of annual investment (additions to depreciating capital) and annual investment relative to the capital of the previous year.

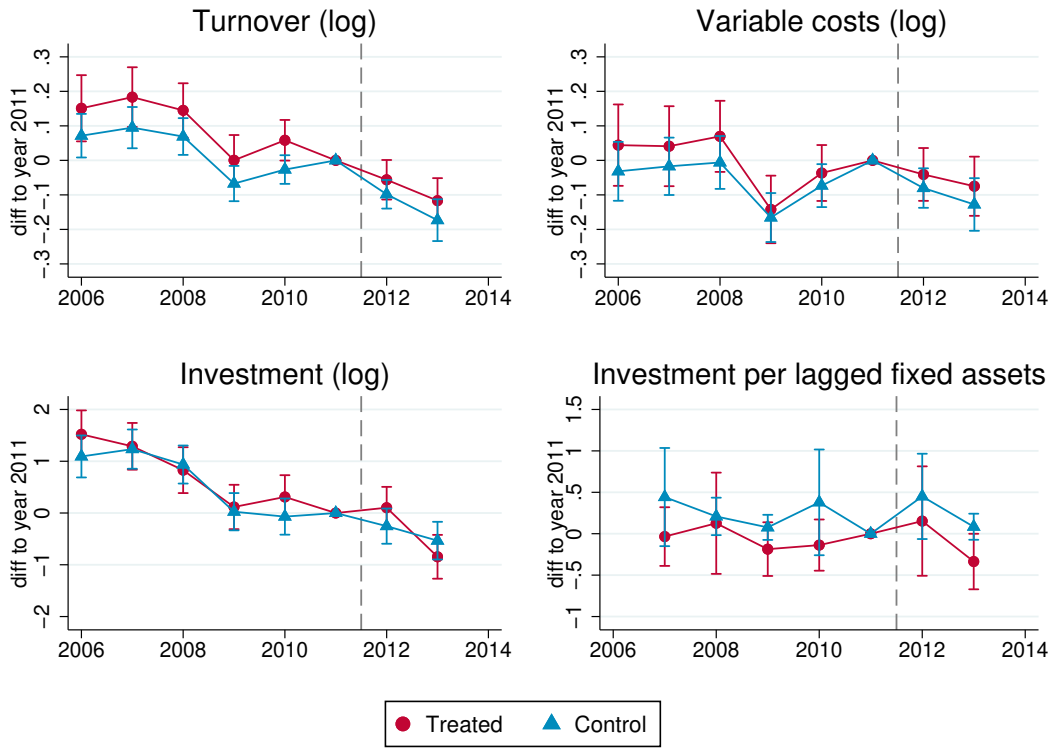
which is to some extent expected, since the number of owners differs across the groups by definition, as the groups are based on the ownership share.[17] There are approximately 1000 yearly observations in each group. The main threat for the set-up would be if the number of owners responded to the tax changes. This could happen if, for example, the owner were to split the firm to make it partially owned by e.g. a family member. However, the data show that there is no observable response in the number of owners.

Figure 5 shows the development of annual turnover, variable costs and investment. The plots are regressed year fixed effects with 2011 as the base year and firm fixed effects included. The figure shows that the outcome pre-trends are aligned. The upper panels present sales and input usage, showing that the trends were similar before the tax change, and that there is no notable response in business activity to the dividend tax increase in 2012 in the treated group. The lower panels show logarithmic investment and investment per lagged fixed assets, indicating that there is no statistically significant response in investment to the increase in the marginal tax rate.

To estimate the reduced-form difference-in-differences results for the tax change

[17]For firms of this size, it is common that the owner also works in the firm.

Fig. 5: Outcomes in treatment and control group relative to year 2011



Note: Coefficients are from a firm-fixed effect regression on year relative to 2011. The vertical dashed line depicts the time of the dividend tax increase. Variables are used in deflated values with inflation from Statistics Finland. Treatment group: Firm's net assets 666,666.667–1,000,000EUR in 2011 and main owner's share of net assets $>$ 666,666.667. Control group: Firm's net assets 666,666.667–1,000,000EUR in 2011 and main owner's share of net assets $<$ 666,666.667.

of 2012, I estimate the equation

$$Y_{it} = \alpha_1 + \alpha_2(Treat \times Post) + \beta_i' FE_i + \lambda_t Year_t + \varepsilon_i, \tag{1}$$

where Y_{it} is the outcome variable, α_1 is a constant, $Treat$ is a binary variable with value 1 for firms facing a tax increase, $Post$ is a binary variable with value 1 for firms after the tax change, hence α_2 measures the effect. $\beta_i' FE_i$ is a matrix capturing firm fixed effects and $\lambda_t Year_t$ is a matrix capturing year fixed effects. ε_i is the error term, standard errors are clustered at the firm level. All estimates of α_2 for different outcome variables are reported on the first line of table 6 and were close to zero and statistically insignificant. The results confirm the visual evidence that there is no statistically significant response in business activity to the tax change among the

Table 7: Diagram of assignment into treatment and control groups: 2014 tax change

	Firm turnover	Firm net assets	Main owner's ownership share	Main owner's net asset share	Effective max MTR before	Effective max MTR after
Treated	Anything	750-1875K	$\leq 100\%$	750-1875K	40.36%	26-26.8%
Control	Anything	750-1875K	$\leq 100\%$	< 750K	24.5%	26-26.8%

Note: This table describes the basic details of the assignment into treatment and control. The assignment is based on the main owner's share of the firm's net assets. The last two columns report the marginal tax rate for capital income dividend-maximizing dividend before and after the reform. 666K is actually 666,666.667EUR.

firms facing the tax increase[18].

I perform the same analysis for the 2014 tax change with the treatment group now facing a dividend tax decrease. The tax change reduced the dividend tax for firm owners paying 60,000–150,000EUR of dividends and dividends under the net asset threshold. In addition, the corporate tax rate was reduced. Again, I use firms of the same size but a smaller ownership share of the main owner as a control group. The net asset limit for the firm sample is from 750,000 to 1,875,000EUR. Firms whose ownership share of the net assets was 750,000EUR or more are the treated firms and those whose ownership share was under 750,000EUR act as a control group. Table 7 illustrates the assignment into treatment and control groups.

The summary statistics and number of observations are reported in Table 8. Figure 6 shows the firm-level development of different outcomes around the tax change and Table 9 reports the difference-in-differences results. Again, the results suggest that there is no statistically significant response to the reduction in the dividend tax among the treated firms in any of the outcomes.

The results suggest that the main mechanisms of response to dividend tax rate changes are through channels other than real economic effects such as output or investment. While the large confidence intervals in the investment responses, likely due to the relatively small sample size, cannot rule out investment impacts, it should be noted that new productive investments should likely lead to an increase in sales, which I do not observe. The set-up only studies local effects of changes in the current marginal tax rate, so I cannot rule out global effects caused by changes in average tax rates or indirect effects, e.g. through the future tax burden. In the next sections,

[18]As the reduced-form estimates do not show statistically significant effects, nor do the IV estimates (not reported).

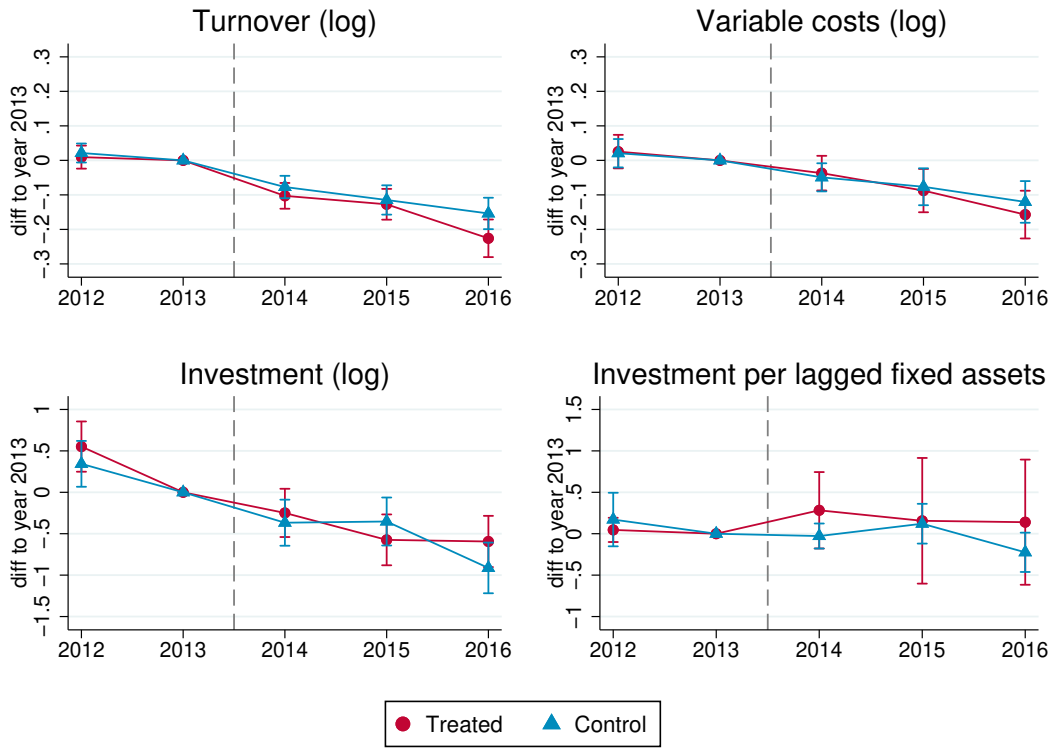
Table 8: Summary statistics of the restricted sample (year 2013)

	Treated			Control		
	mean	sd	p50	mean	sd	p50
Turnover	2307248	15076369	967603.8	2444987	3595202	1485020
Net Assets	1226032	325761	1170015	1089996	268768	1024905
Dividends (main owner)	85368	108177	69000	50472	39405	44000
Investment	101979	279940	16909	92262	215896	19639
Investment per lagged fixed assets	0.3737	2.1292	0.0488	0.3940	2.2299	0.0634
Financial assets	712604	553647	631676	764625	726121	622171
Variable costs	1872973	16714208	586906.2	1655490	3145893	765121.7
Employees	13.207	27.330	4	16.533	24.261	9
No. Owners	1.64	1.15	1	4.27	7.93	3
Observations (2013)	2027 (1513*)			2240		
Observations (total)	10437			10619		

* 1513 firms paid dividends between 60,000-150,000EUR (a decrease in the marginal tax rate) for the main owner.

Note: These are the descriptive statistics of the firms used in the diff-in-diff set-up of Figure 6 studying the tax cut in 2014. This table provides the summary statistics for the difference-in-differences data in 2013. Turnover refers to annual sales, net assets refers to the book value of assets after depreciation, dividends are the main owner's dividend income from the firm, and investment refers to additions to depreciating assets, such as newly installed fixed capital. Labor costs include wage and payroll taxes paid by the firm and variable costs other input costs such as material and intermediate goods, number of workers means the number of employees in the firm in 2013. Each firm has only one main owner in the data. The owner with highest share of stock is considered the main owner. Due to the nature of the data, all firms paid dividends to their main owner.

Fig. 6: Outcomes in treatment and control group relative to year 2013



Note: Coefficients are from a firm-fixed effect regression on year relative to 2013. The vertical dashed line depicts the time of the dividend tax decrease. Variables are used in deflated values with inflation from Statistics Finland. Treatment group: Firm's net assets 750,000–1,875,000EUR in 2013 and main owner's share of net assets $>$ 750,000EUR. Control group: Firm's net assets 750,000–1,875,000EUR in 2011 and main owner's share of net assets $<$ 750,000EUR.

I discuss other potential channels causing the bunching responses, namely income-shifting across time and across tax bases.

Table 9: Difference-in-differences results of the 2014 tax change

	Turnover (log)	Variable costs (log)	Investment (log)	Investment per lagged capital
$\alpha_2(Treat \times Post)$	-0.030	-0.013	-0.031	0.295
	0.026	0.032	0.146	0.247
Firm fixed effects	X	X	X	X
Year fixed effects	X	X	X	X
Constant	13.986***	13.043***	6.003***	0.541***
	0.010	0.013	0.069	0.097
r2	0.017	0.006	0.009	0.000
N	18294.000	16787.000	21056.000	17293.000

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

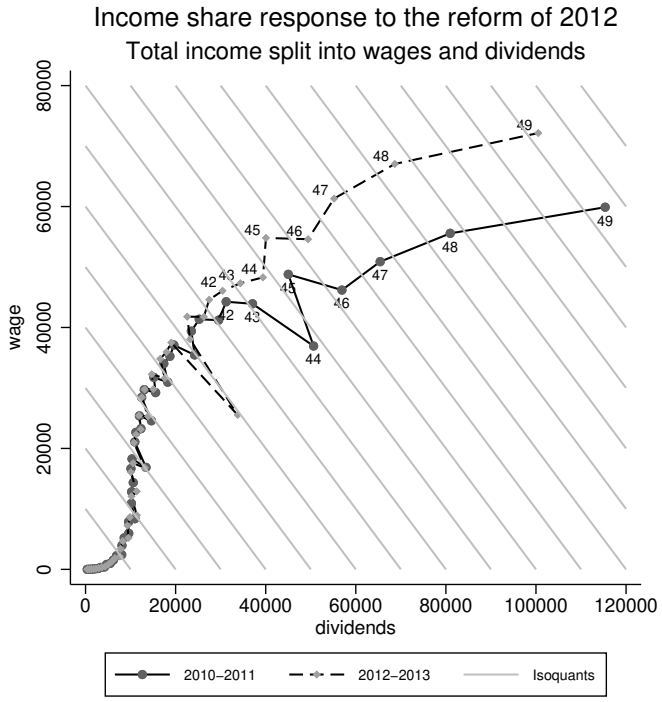
Note: This table reports the regression results estimated following Equation 1 for the tax cut in 2014. The dependent variables in the specifications are logarithmic transformation of annual turnover (sales), logarithmic transformation of annual variable costs, logarithmic transformation of annual investment (additions to depreciating capital), and annual investment relative to the capital of the previous year.

4.2 Income-shifting between tax bases

Firm owners can shift income between wage and dividends to minimize their income tax burden. They also do this as it is visible in the data.

Figure 7 visualizes how the division into wage and dividends shifts towards higher average wages for higher incomes as the dividend tax for higher incomes increases. The figure shows the owner's total income (both wage and dividends) from the firm in 50 income quantiles. The position of each quantile depicts how the income splits between wage and dividends on average in each income quantile. The horizontal axis describes the average dividends in each income quantile, and the vertical axis the average wage earned by the owner within a particular income quantile. The gray isoquant lines indicate the total income level, so that, for example, the 44th quantile received approximately 70,000EUR from the firm. In 2010–2011, the monetary threshold in the dividend tax schedule was 90,000EUR. In 2012, the threshold moved down to 60,000EUR. Income affected by the tax change, i.e. income above 60,000EUR, clearly shifts towards more wages in comparison to dividends. The position of the quantiles in relation to the isoquant lines reveals that, despite the tax increase and the ensuing reduction in dividend income, the inflation-adjusted income stays the same in the affected quantiles. It is just the division into wage and dividend that changes. There

Fig. 7: Income-shifting between wages and dividends



Note: This figure plots the income-shifting between wages and dividends as a response to the tax change in 2012, which increased the taxation on dividends above 60,000EUR. For the figure, the main owners' wage and dividends from the firm have been counted together as total income. Then, the owners are divided into 50 income quantiles (2-percentiles). Finally, for each quantile average wages and dividends are calculated. The horizontal line shows the average dividends and the vertical line the average wage in each bin. The isoquant lines show the total income from the firm. The figure shows that as a response to the tax change the owners started paying more wages and cut down on dividends.

is no similar pattern when there is no tax change, as shown in Figure A15 in the Appendix.

The income-shifting between tax bases can also be demonstrated in the same difference-in-differences setting as the impact on real outcomes in Section 4.1. Table 10 reports the difference-in-differences estimates for the impact of the 2012 dividend tax increase and the 2014 dividend tax cut on the wages and dividends of the main owner. In 2012, the dividend tax rate increased for the main owners in the treated group, and accordingly the main owners reduced their dividend payout. However, there was no counteractive wage increase within this group. In 2014, the main owners facing a dividend tax cut significantly increased their dividend pay-out and reduced their wages.

Table 10: Difference-in-differences results for income-shifting between dividends and wages

	2012 Dividend tax increase		2014 Dividend tax cut	
	Dividends (log)	Wage (log)	Dividends (log)	Wage (log)
$\alpha_2(Treat \times Post)$	-0.066**	-0.055	0.079***	-0.083**
	0.020	0.031	0.014	0.025
Firm fixed effects	X	X	X	X
Year fixed effects	X	X	X	X
Constant	10.782***	10.179***	10.893***	10.273***
	0.006	0.011	0.005	0.008
r2	0.071	0.001	0.050	0.009
N	12288	8804	21056	14862

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

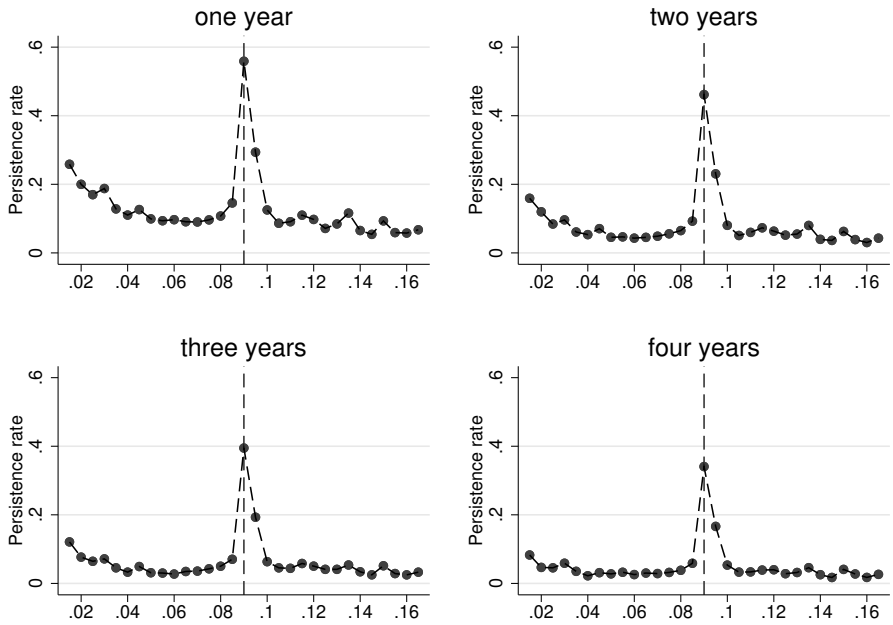
Note: This table reports the regression results estimated following Equation 1 for the tax increase in 2012 and the tax cut in 2014. The dependent variables in the specifications are logarithmic transformation of dividends for the main owner and logarithmic transformation of wages for the main owner.

4.3 Inter-temporal income-smoothing and net asset accumulation

Owners of privately held corporations do not need to adjust the firm profits to bunch at the dividend tax threshold; they can adjust owner-level taxable income using retained and withdrawn earnings to shift income across years. By smoothing income with retained earnings, tax filers can hold their marginal tax rates constant. Hence, there is likely to be bunching even if taxes have no effect on output. In addition to postponing the payment of dividends, the tax thresholds incentivize owners to spread dividends so as to be paid in advance too, effectively causing the bunching mass to accumulate not only from above but also from below the threshold. An important aspect to keep in mind is that leaving earnings in the firm does not imply that the earnings are spent on investment in productive capital they can merely be stored as financial assets (money, financial investment).

Figures 8 and 9 plot the persistence rates at the 9% and at the 90,000EUR thresholds respectively. The figures show that the extensive bunching is created by the same owners year after year. The share of firms in the bunching region that are also located in the same euro or net asset bin 1-4 years earlier is exceptionally large compared to

Fig. 8: Persistence at 9% in 2006-2013 – 1%-bins around the threshold



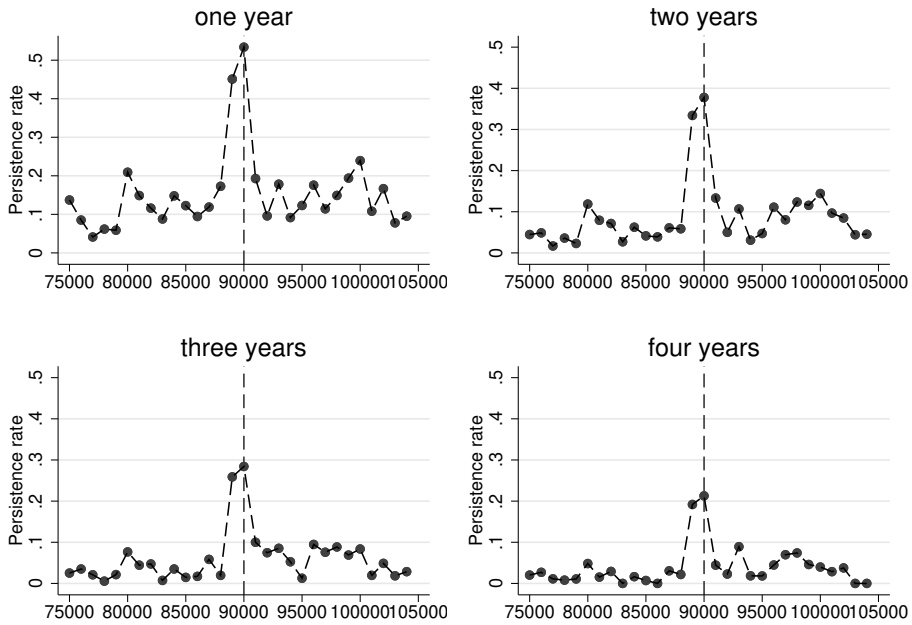
Note: The graph plots the share of same firms locating in the same 1%-bins around the 9% threshold for 1 to 4 years after.

the surrounding bins. At the 9% net asset threshold, the share of firms bunching for a second year in a row is almost 60% and four years after it is still approximately 30%. At the 90,000EUR kink the rate is above 50% in the first year and 20% after four years. As the threshold relocates, a large share of the previous bunchers follow the threshold: the share of movers is described in Table A2. Miller et al. (2022) argue that persistent bunchers are more likely to be systematically retaining profits in their firms to take advantage of lower taxes in the future, while intermittent bunching is more likely driven by smoothing income volatility. Following this argument, a notable share of bunchers in the Finnish dividend tax schedule are not merely smoothing for income volatility, but retaining profits consistently to achieve additional tax benefits.

Retaining wealth in the firm has three advantages. First, as mentioned, using retained and withdrawn earnings allows the owner to avoid higher marginal tax rates. Second, savings and returns on savings face a lower tax when received by a firm than at the owner level.[19] Thus if the owner in any case wishes to save some share of the income, then for tax purposes it may be desirable to keep some of those funds

[19]E.g. dividends received by a firm face lower taxes than those received by an individual taxpayer.

Fig. 9: Persistence at 90,000EUR in 2006–2011, in 1000-euro-bins

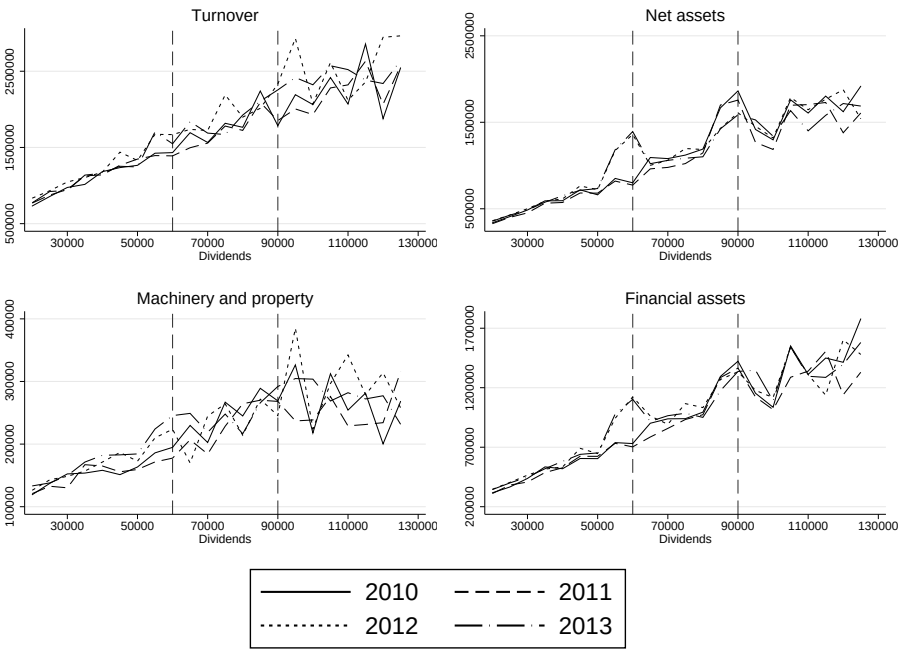


Note: The graph plots the share of the same firms locating in the same 1000-euro bins around the 90k threshold 1 to 4 years later.

incorporated. Third, by retaining earnings, the owner increases the net assets of the firm, thereby allowing for higher amounts of capital income dividends (lower tax bracket) to be distributed in the future. Then again, there are also arguments against leaving wealth in firm, such as controlling risk.

Figure 10 shows the firm's turnover, net assets, fixed capital (property and machinery), and financial assets on average across the dividend distribution of the main owners (in 5000-euro-bins). The upper left panel shows the average annual turnover in each dividend bin. The higher the dividend, the higher the turnover, indicating a positive linear relationship. This linear relationship does not hold in the second panel, which shows the average net assets in each bin. When the monetary threshold was at 90,000EUR, firms whose owners bunch at the dividend threshold have more net assets on average than firms in the surrounding dividend bins. However, there is no similar bunching in reported machinery and property, whereas it does appear in financial assets. Moreover, when the threshold moves to 60,000EUR in 2012, the net asset and financial asset bunching moves along with the threshold. This suggests that firm owners bunching at the thresholds indeed retain earnings in the firm and

Fig. 10: Average firm outcomes in 5000-euro-dividend bins



Note: The figure shows mean firm outcomes in 5000-euro dividend bins (for the main owner). In other words, the horizontal line shows the dividend received by the main owner and the vertical line the outcome in euros. In 2010 and 2011, the monetary threshold was at 90,000EUR, whereas in 2012-2013 it was 60,000EUR. This figure shows that bunchers have on average higher net assets and especially financial assets, as there is no bunching in fixed capital (machinery and property).

may even use the firm to store savings (as financial assets). As an additional detail, Figure A13 in the Appendix shows that firms in the financial industry bunch at the threshold more actively than other industries.

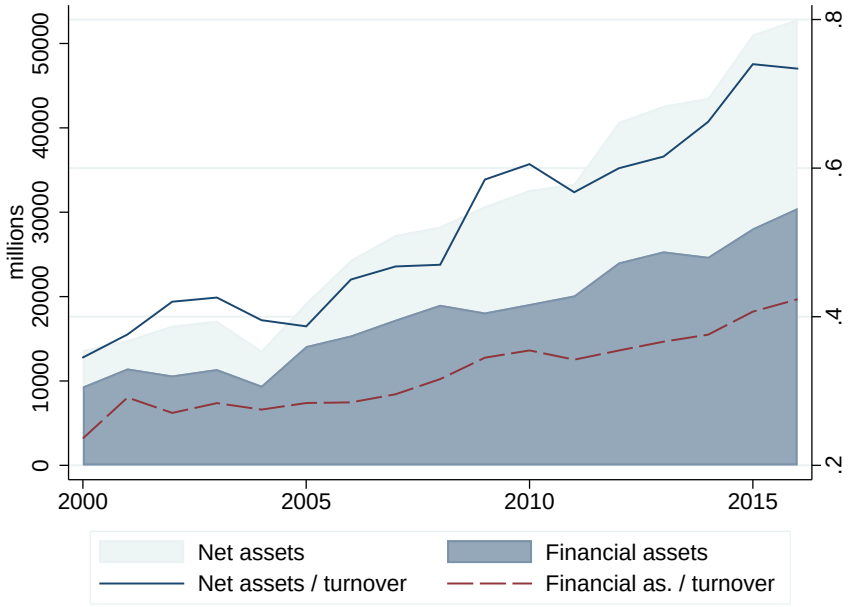
Retaining earnings has led to the accumulation of wealth in firms, which is visible from the reported balance sheet information. Figure 11 shows how the aggregated net assets and particularly financial assets of privately held corporations in Finland have increased. To ensure that this descriptive evidence is not just driven by the increasing number of firms, economic growth or increasing stock market values, I relate this information to aggregate turnover. Even in relation to turnover there is still a substantial growth in the assets of the firms. However, this does not appear as higher net investment or dividend payouts.[20]

Finally I implement the difference-in-differences analysis described and used in

[20]Shown in Figure A14 in the Appendix.

Sections 4.1 and 4.2 to see how the financial assets of firms facing a dividend tax change responded. Table 11 reports the difference-in-differences results for the financial assets reported in the firms' tax return. Again, we would expect an increase in the wealth of the firm after the dividend tax increase and a decrease in finances stored in the firm after the dividend tax cut. The signs of the impact estimates follow this prediction, although the estimates are not statistically significant bearing in mind the relatively small sample size.

Fig. 11: Aggregate net asset accumulation, profits and retained earnings



Note: The area plots here depict the aggregate net assets and financial assets of all firms in the data. In addition, the lines plot them both in relation to aggregate sales. The trends show that despite the economic turbulence in recent decades, firms' assets have been steadily increasing since the adoption of the current dividend tax schedule in 2005.

Table 11: Difference-in-differences results for financial assets

	2012 Dividend tax increase Financial assets (log)	2014 Dividend tax cut Financial assets (log)
$\alpha_2(Treat \times Post)$	0.017	-0.019
	0.027	0.020
Firm fixed effects	X	X
Year fixed effects	X	X
Constant	12.940***	13.140***
	0.009	0.007
r2	0.005	0.002
N	11867	20532

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: This table reports the regression results estimated following Equation 1 for the tax increase in 2012 and the tax cut in 2014. The dependent variable in the specifications is the logarithmic transformation of financial assets reported in the firms' tax returns.

5 Conclusion

Concerns about efficiency and investment have led to lower income tax rates for dividend income in most countries. This study explores empirically how firms and their owners actually respond to dividend taxation in a variety of decision margins. I show that the large payment responses to dividend tax thresholds are primarily driven by intra-temporal and inter-temporal income-shifting. Evidence using difference-in-differences analysis and shifts in the thresholds suggests that bunching at tax thresholds is not driven by real responses e.g. in output or investment.

This paper lends support to the modest investment elasticity of dividend taxes, suggesting that reduced dividend tax rates are not particularly successful in boosting investment. In addition, firm owners postpone dividend payouts: Retaining earnings within the firm enables firm owners to avoid higher tax brackets and capitalization is further encouraged by the possibility in the Finnish tax system to reduce the future tax burden by accumulating net assets in the firm. Leaving wealth in the firm also has some tax benefits, mainly in the return on savings. Finally, I find clear income-shifting between wage and dividends.

These results highlight that large differences in taxation between income bases create behavioral responses with mainly distributional implications. In other words,

with business owners already facing lower tax rates in comparison to wage earners, the tax planning responses to dividend taxation amplify this gap. The extensive income-shifting responses underline that, in predicting the revenue impacts of tax changes, the variety of tax bases and the implications for inter-temporal income-shifting should be considered. From a tax authority perspective income smoothing may also reduce the cyclicality of business income tax revenue.

Taken together, I show that dividend taxes capitalize into share values, yet the results suggest that retained earnings are primarily stored in financial assets instead of being spent on productive investment in fixed capital.

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A Appendix

A.1 Additional details of the institutions and data

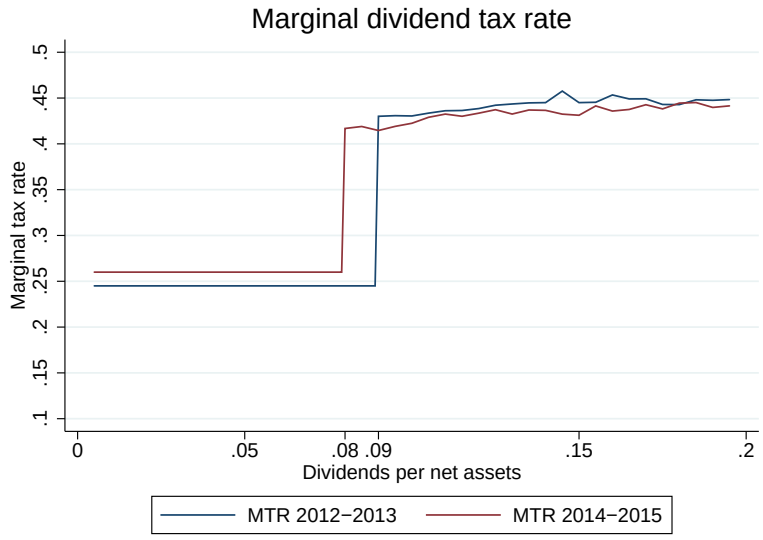
Earned income taxation in Finland includes a progressive government tax, a flat municipal income tax, and pension and social security contributions. Both government and municipal taxes include deductions for low-income individuals, making the effective tax schedule very progressive, with the lowest tax rates approximately zero and the highest around 55%, excluding the payroll tax paid by the employer. In calculating the marginal tax rate on earned income, I calculate the tax rate for one extra euro of the particular income type. I exclude the payroll tax[21], since for most business owners the payroll contribution is not defined by the wage sum, but is based on so-called entrepreneur's labor income, which is largely decided by the owner[22]. Thus, the marginal payroll tax of a business owner is generally not affected by an additional euro of gross income.

The earned income tax rate applied above the net asset threshold varies depending on the taxpayer's income and municipality. Both the municipal and government tax schedules change nearly every year. The lowest government tax rate has been zero over the whole period and, with deductions in the municipal tax for low income earners, the aggregate earned income tax rate has also been close to zero at the low end of the income distribution. The highest overall marginal earned income tax rate has been around 55%. The government tax rates on earned income decreased over the research period of 2006–2016, especially for low- and middle-income earners. However, municipal income tax has increased; in 2000, the average rate was 17.7%, but in 2015 it was 19.9%. The municipal income tax varies across municipalities; in 2015 it ranged from 16.5% to 22.5%. Figure A12 plots the average threshold created by the net asset threshold. As the tax rate above the threshold depends on the taxpayer's other income, the tax rates above the threshold in the figure are calculated as an average of the marginal tax rates of firm owners in each bin.

[21]Employer's social contributions (työnantajan sairausvakuutusmaksu, työeläkevakuutusmaksu, työttömyysvakuutusmaksu, ryhmähenkivakuutusmaksu) and employee's social contributions (työeläkevakuutusmaksu, työttömyysvakuutusmaksu, vakuutetun sairausvakuutusmaksu).

[22]This so-called YEL system, where the entrepreneur sets the labor income level, applies to all self-employed persons who are taxed according to the self employed person's pension act, implying business owners who, alone or together with family members, own at least 50% of their firm or hold a leading position in the firm and own over 30% of the company's shares. These are the majority of the owners studied in this essay.

Fig. A12: Average marginal tax rate for firms paying dividends under the monetary dividend tax threshold



Note: The tax rate above the threshold is estimated as a mean of the marginal earned income tax rates in the data. The earned income tax rate varies depending on the taxpayer's income and municipality. Both the municipal and government tax schedules change nearly every year. The lowest government tax rate has been zero during the whole period and, with deductions in the municipal tax for low-income earners, the aggregate earned income tax rate has also been close to zero in the low end of the income distribution. The highest overall marginal earned income tax rate has been around 55%. Overall government tax rates on earned income have been decreasing during the research period of 2000-2013, especially for low- and middle-income earners. However, the municipal income tax has been increasing; in 2000, the average rate was 17.7%, but in 2013 it was 19.4%. The municipal income tax varies across municipalities; in 2015 it ranged from 16.5% to 22.5%.

A.2 Bunching method

I estimate the extent of excess mass and the according elasticity of taxable income with the bunching method, developed by Saez (2010)[23]. The elasticity of taxable income (ETI) is the ratio of a percentage change in taxable income to a percentage change in the net-of-tax income rate (one minus the tax rate). The bunching method uses the excess mass at a tax schedule discontinuity to estimate the corresponding elasticity of taxable income.

To measure excess mass, I first estimate a counterfactual distribution that describes what the dividend distribution would approximately be in the absence of the

[23]Kleven (2016) provides a review of the method and its indications.

kink point[24]. The counterfactual distributions around the monetary kink points are estimated as

$$\widehat{C_j^0} = \sum_{i=0}^{p} \beta_i^0 \cdot (Z_j)^i + \rho \cdot \mathbf{1}\left[\frac{Z_j}{r} \in \mathbb{N}\right] + \varepsilon_j,\ Z_j \notin [-R; R]\,, \tag{2}$$

where $\widehat{C_j^0}$ is the estimate of the counterfactual distribution in each bin j with dividend income Z_j. β_i^0 are the regression estimates, and p denotes the degree of the polynomial. ρ in the second term captures the round number fixed effect that is observed in Figure 2. $[-R; R]$ is the excluded range of the distribution, which denotes the area where the kink point affects the behavior of the owners. Following earlier literature (e.g. Chetty, Friedman, et al. (2011)), this area is selected by visual observation of the data. My results and conclusions are not sensitive to the choice of $[-R; R]$ or the order of the polynomial.

I estimate the counterfactual distribution around the net asset threshold following Equation 3.

$$\widehat{C_j^0} = \sum_{i=0}^{p} \beta_i^0 \cdot (Z_j)^i + \frac{\sum_{j=-R}^{R} C_j}{2A+1} + \varepsilon_j,\ Z_j \notin [-R; R]\,,\ j \in [-A; A] \tag{3}$$

The basic principle is the same as in Equation 2. Given the very strong bunching, the second term is used to spread the bunchers to the surrounding region to make the sum of firms in the counterfactual distribution match that of the realized distribution. For this distribution, there is no need to consider round number bunching. In estimating the counterfactual distribution, I include both the region below and above the threshold, as the system is likely to induce early payments of dividends, as discussed in Kari and Laitila (2014).

The sum of the excess observations in the bunching range is

$$\sum_{j=-R}^{R} \widehat{B}_j = \sum_{j=-R}^{R} \left(C_j - \widehat{C_j^0}\right). \tag{4}$$

The estimate of excess bunching $\hat{b}$ is then the estimated excess mass around the kink relative to the average density of the counterfactual dividend distribution between

[24]A threshold in the dividend tax schedule creates a kink point in the budget set of received income net of taxes with different amounts of gross dividends.

$-R$ and R

$$\hat{b} = \frac{\sum_{j=-R}^{R} \widehat{B}_j}{\sum_{j=-R}^{R} \widehat{C_j^0}/(2R+1)}. \tag{5}$$

Finally, the excess bunching can be turned into an elasticity estimate. The elasticities at the kink points are estimated as

$$\varepsilon_D = \frac{dD}{d(1-\tau)} \frac{1-\tau}{D} = \frac{\hat{b}}{D^* \cdot \log\left(\frac{(1-\tau_D)}{(1-\tau_D-\triangle\tau_D)}\right)}. \tag{6}$$

D denotes dividend income, τ the dividend income tax rate that jumps at a kink point D^* from τ_D to $\tau_D + \triangle\tau_D$. When estimating the elasticities at the net asset thresholds, I specify the marginal tax rate above the threshold for each firm owner individually. Then I use the aggregate bunching response to estimate the elasticity for each owner and report the mean elasticity.

Following earlier literature, I use the bootstrap method to construct standard errors (see Kleven (2016) for a review). In the bootstrap method, I sample the residuals from the regression a large number of times (300), with replacement, and estimate an elasticity for each draw. Using these elasticities, I calculate a standard error for the original elasticity estimate.

A.3 Additional empirical details

Table A1 gives the summary statistics for the full data. Altogether, the data consists of 641,558 observations across 11 years.

Figure A13 shows how various industries are represented in each bin around the 90,000EUR threshold. The horizontal dashed line shows the industry's average share in the data. The figure shows that the finance industry is overrepresented among the firms bunching at the monetary threshold.

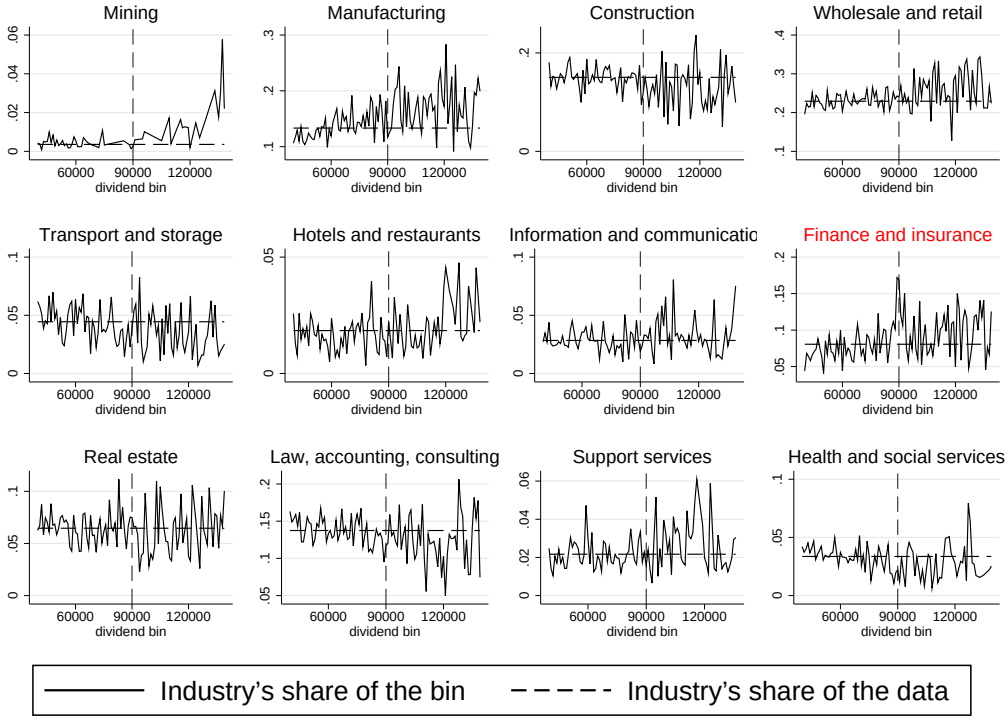
Table A2 shows the proportion of firms that move together with the threshold. When the monetary threshold moved from 90,000EUR to 60,000EUR, 47% of the preceding excess mass firms followed the threshold. At the 150,000EUR threshold, one third of the observations had previously paid exactly 60,000EUR of dividends, which was the preceding threshold. At the 8% net asset threshold, 70% of firms had previously bunched at the 9% threshold.

Table A1: Summary statistics of the data 2006-2016

	Firm level		
	mean	sd	p50
Turnover	1074031	8470531	210749
Profit	99678	4566064	15125
Net Assets	639844	8057283	119400
Financial assets	382373	4410980	80450
Investment	54562	672584	1773
No. owners (all)	4.48	272.23	2.00
No. owners (individuals)	4.29	259.43	2.00
	Owner level		
	mean	sd	p50
Dividends	25568	138318	8500
Wages	22931	28290	15660
Observations	641558		

Note: This table provides the summary statistics for the whole pooled panel data covering years 2006–2016. Turnover refers to annual sales, profit is the taxable income of the firm, net assets refer to book value of assets after depreciation and investment refers to additions to depreciating assets, such as newly installed fixed capital. Dividends and wages are the main owner's income from the firm. Each firm has only one main owner in the data. The owner with the highest share of stock is considered the main owner.

Fig. A13: Industry shares among 90k bunchers 2006-2011



Note: The figure plots the shares of each industry in bins around the 90,000EUR threshold. The horizontal axis shows the dividend amount and the vertical axis the share of the industry in each bin. The dashed horizontal line denotes the average share of the industry in the data. According to the figure, the financial sector seems to be over-represented at the kink.

Figure A15 shows the income composition in two consecutive years when there was no tax change. There is now no change in the income composition of the owners. The figure acts as a robustness check that the shift observed in Figure 7 was driven by the tax change.

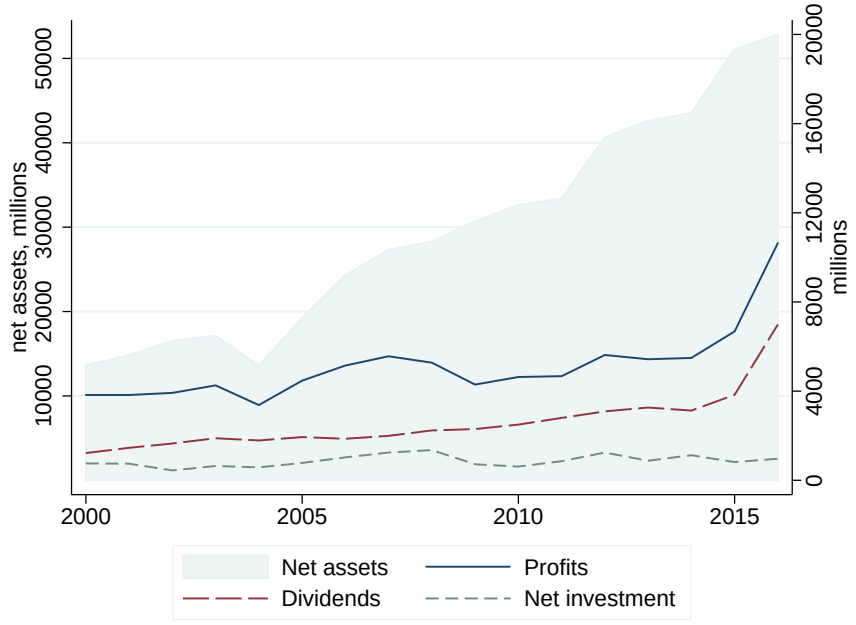
Figure A14 shows the accumulation of aggregated assets in privately held corporations in 2000–2016. Net assets consists of retained earnings, financial assets, and additions to depreciating capital. The figure also shows the evolution of aggregated profits, dividends and net investment in depreciating capital. The figure shows a clear increase in accumulated assets, starting especially after the introduction of the current dividend tax system in 2005. There is no increase in aggregate investment, so this is not likely to solely explain the accumulation of assets.

Table A2: Percentage share of firm owners relocating together with the kink

Tax change	Year	Movers as a share of bunchers before tax change	Movers as a share of bunchers after tax change
90k → 60k	2011/2012	46.72%	24.52%
60k → 150k	2013/2014	8.12%	35.45%
9pr → 8pr	2013/2014	60.33%	70.40%

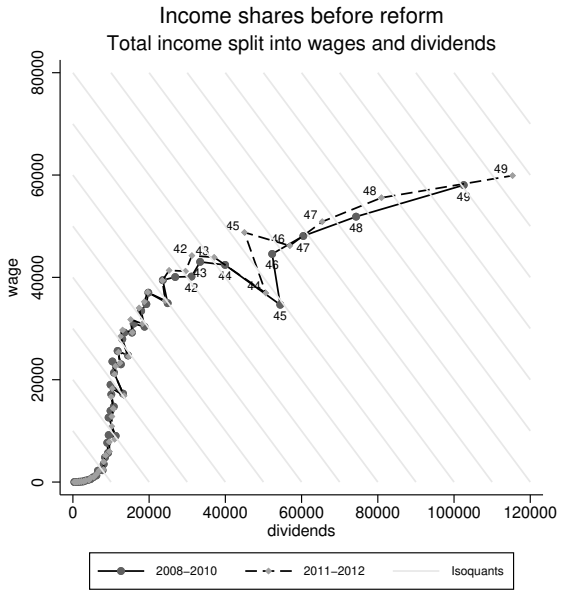
Note: This table reports the share of observations in the bunching region following a threshold change that in previous years bunched at the preceding threshold range. The share is reported as the proportion of bunchers at the preceding threshold as well as the proportion of bunchers after the tax change.

Fig. A14: Aggregate net asset accumulation, profits and retained earnings



Note: This figure shows the accumulation of aggregate net assets among the privately held firms studied in this paper in gray. The blue line shows annual aggregate profits, the red dashed line annual aggregate dividends of the main owner and the dashed green line annual aggregate net investment.

Fig. A15: Income-shifting between wages and dividends



Note: This figure plots the income composition between wages and dividends in 2008–2009 and in 2010–2011. For the figure, the main owners' wages and dividends from the firm are counted together as total income. Then the owners are divided into 50 income quantiles (2-percentiles). Finally, for each quantile average wages and dividends are calculated. The horizontal line shows the average dividends and the vertical line the average wage in each bin. The isoquant lines show total income from the firm. The figure shows that when there was no tax change the owners' income composition stayed more or less the same. This figure acts as a placebo check for Figure 7 in the main text.