USING LARGE SHAREHOLDER CHARACTERISTICS TO ANALYZE INVESTOR-LEVEL TAX EFFECTS ON CORPORATE LEVERAGE

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Abstract

Using a sample of public European companies and multiple countries' tax rate changes, we examine the impact of shareholder-level tax incentives on corporate capital structure. We conjecture and find that the largest shareholder's tax incentive for debt positively influences leverage. We also find that the second-largest shareholder's tax incentive for debt is incrementally relevant for leverage. Tax incentive heterogeneity between the two largest shareholders reduces the positive impact of the largest shareholder's tax incentive on leverage. Finally, we document that the relevance of the largest shareholder's tax incentive for capital structure decisions is increasing in the level of voting rights power.

Keywords: Capital Structure, Leverage, Investor Taxation, Heterogeneity, Ownership Power

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1. INTRODUCTION

Simple analytic models of the relative preference for debt versus equity depend on a single theoretical investor who faces the tax rate on interest or dividends and a corporation that receives no deduction for dividends paid but does deduct interest expense (Graham, 2003). Tests of this relative preference use the personal interest or dividend tax rate faced by individuals (Desai

et al., 2004; Overesch & Voeller, 2010; Fan et al., 2012; Faccio & Xu, 2015). Recent evidence continues to demonstrate the importance of tax incentives for corporate policies, including capital structure decisions (Ábrahám et al., 2023; Andreani et al., 2025) and the interaction between tax incentives and ownership structure (Huang et al., 2024). However, these studies typically assume homogeneous tax treatment across shareholders, overlooking a critical reality: investors need not be individuals who are residents in the home country of the corporation. In fact, the majority of large shareholders are corporations, often located in different jurisdictions with varying tax treaties and withholding arrangements. This heterogeneity in shareholder tax positions creates a fundamental measurement problem and raises an unexplored question about corporate decision-making.

When major blockholders face conflicting tax incentives for debt versus equity, how are these conflicts resolved in determining the firm's capital structure? Moreover, the role of ownership concentration and heterogeneity among blockholders has gained renewed attention in determining firm outcomes (Forte et al., 2025; Alghawwas & Aljabr, 2024), yet no study has explicitly examined how voting rights power mediates the influence of competing tax preferences among multiple blockholders on leverage decisions. This study addresses these gaps by formulating the following research questions:

RQ1: How do heterogeneous tax incentives among major blockholders shape corporate capital structure decisions?

RQ2: What role does voting rights power play in resolving conflicts arising from shareholder tax heterogeneity?

In this paper, we overcome the measurement error inherent in assuming homogeneous shareholder taxation by exploiting information on shareholder characteristics (type, country, shareholdings) to investigate whether firms' capital structure is affected by the (net) tax incentives (i.e., the potential tax benefit of debt relative to equity) of their largest and second-largest shareholder. We explicitly distinguish between private and corporate shareholders. We further incorporate the largest shareholders' residence countries and model firm country/shareholder country pair taxation. We use a unique dataset that includes information on withholding taxes and double tax treaties for a large sample of public European firms from 2002 to 2012[1]. This dataset also allows us to analyse changes in ownership over time and across different countries. Our research design makes an important contribution to the capital structure literature by examining the relationship between corporate and investor characteristics.

In a trade-off framework (Kraus & Litzenberger, 1973), we analyse whether the largest shareholders' tax incentives affect capital structure decisions of firms and whether the tax incentive of a smaller, namely, the second-largest shareholder, is incrementally relevant. In addition, we show how frictions among shareholder characteristics (i.e., tax incentive heterogeneity) are resolved with respect to capital structure decisions. More specifically, we investigate whether an opposing tax incentive of the second-largest shareholder reduces the influence of the largest shareholder's tax incentive on the firm's capital structure. Finally, our study provides initial evidence on how voting rights power (i.e., the difference between the percentage of shares held by the largest shareholder and the percentage of shares held by the second-largest shareholder) moderates the relationship between shareholder-level tax incentives, tax heterogeneity, and capital structure.

We first provide cross-sectional evidence for the correlation between shareholders' tax incentives and firms' capital structure. Then, we employ panel regressions with firm- and year-fixed effects to focus on within variation and to control for time-invariant confounders (Faccio & Xu, 2015). The final identification strategy exploits a multitude of changes in cross-country taxation data. At the country-level, we identify 61 changes in corporate tax rates and 94 changes in personal tax rates (i.e., interest and dividend taxes). For the largest shareholder, we identify 219 changes in ownership type from private to corporate shareholders, or vice versa, and 318 changes in ownership type for the second-largest shareholder. Furthermore, we identify that the largest (second-largest) shareholder is located in a foreign country in 1,499 (1,916) of our sample cases. In addition, these cross-country holdings change 249 times for the largest shareholder and 510 times for the second-largest shareholder during our sample period. Combining the tax rate changes at the country-level together with the ownership changes at the firm-level results in 1,987 overall changes in our tax incentive measure for the largest shareholder and 2,333 overall changes in our tax incentive measure for the second-largest shareholder.

We found that changes in the tax incentives for the largest shareholder's debt holdings have a positive impact on a firm's capital structure. On average, a 10 percentage point increase in the largest shareholder's tax incentive for debt vs. equity increases book leverage by 1.56 percentage points. We also found that changes in the second-largest shareholder's tax incentive are incrementally relevant for capital structure decisions. Here, if the second-largest shareholder's tax incentive for debt increases by 10 percentage points, book leverage increases by an average of 1.18 percentage points. Tax incentive heterogeneity between the largest and second-largest shareholders reduces the positive influence of the largest shareholder's tax incentive on the firm's capital structure. In the presence of opposing tax incentives between the largest and second-largest shareholders, on average, the effect of a 10 percentage point increase in the largest shareholder's tax incentive for debt on book leverage is 0.59 percentage points lower in absolute terms (or about 23% lower in relative terms). Notably, our decomposition analysis reveals that the corporate tax rate shows no significant association with leverage once shareholder-level tax incentives are controlled for, suggesting that traditional studies may have overlooked the more fundamental role of investor-level taxation in capital structure decisions.

Furthermore, we document that the relevance of the largest shareholder's tax incentive over and above the second-largest shareholder's tax incentive is increasing in the largest shareholder's voting rights power. For example, as we move from the lowest to the highest quintile of voting rights power, the effect of a 10 percentage point increase in the largest shareholder's tax incentive for debt on book leverage rises from 0.62 percentage points

[1] The decade-long observation period (2002–2012) encompasses significant policy changes and economic cycles, providing temporal variation that strengthens causal inference. Additionally, the comprehensive coverage of both private and corporate shareholders addresses a fundamental limitation in prior literature that relied primarily on individual investor tax rates.

(insignificant) to 3.21 percentage points. Conversely, we also find that voting rights power moderates the negative effect of tax incentive heterogeneity on the relationship between the largest shareholder's tax incentives and capital structure decisions. On average, as we move from the lowest to the highest quintile of voting rights power, the negative moderating effect of tax incentive heterogeneity on the relationship between the largest shareholder's tax incentive for debt and book leverage decreases from -1.67 percentage points (statistically significant) to -0.05 percentage points (statistically insignificant) for a 10 percentage point increase in the largest shareholder's tax incentive for debt.

We contribute to the corporate finance literature on taxes and capital structure in several ways. First, while earlier papers suffer from measurement error by assuming every shareholder to be a domestic top-tax-rate private individual taxpayer, we use the two largest shareholders and measure their tax incentives considering individual tax characteristics such as the legal form and location of the shareholder, as well as withholding taxes and double tax treaties. This unique feature of our dataset and the resulting variation in tax incentives help us to better understand how shareholder-level tax incentives affect capital structure. A positive side effect is that, unlike the previous literature (Faccio & Xu, 2015), we do not only rely on variations between years, firm countries, or firm country-years. By exploiting variations within the firm country and the shareholder countries for each of the sample years, we are able to triangulate differences in tax incentives to mitigate concerns that unobserved firm country-year factors, which are correlated with tax incentives, may drive the results.

Second, this study is the first to provide evidence that the second-largest shareholder is incrementally able to influence a firm's capital structure beyond the largest shareholder's tax incentives. This finding is important as it establishes shareholder-level tax incentives within a firm as an additional explanatory factor for capital structure decisions. In this way, we also contribute to the literature on corporate governance and blockholdings by documenting that individual shareholders are indeed able to exert measurable influence on the capital structure of firms.

Third, we document that tax incentive effects on corporate leverage are differentially relevant under different ownership-specific circumstances in an international setting. For example, we are able to show that critical voting rights thresholds (such as the 25% voting rights threshold to protect minority shareholders in certain countries) are relevant for capital structure decisions. This finding establishes ownership structure as a relevant tax parameter for future research and shows that conflicts of interest among shareholders regarding tax incentives are solved following the distribution of voting rights power among shareholders[2].

The article is structured as follows. Section 2 analyses the review of the relevant literature. Section 3 explains the research methodology. Section 4 presents the description and analysis of the cases. Section 5 discusses the results. Finally, Section 6 concludes the paper.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The empirical literature on the influence of corporate taxation on capital structure decisions is vast (Auerbach, 2002; Graham, 2003; Graham & Leary, 2011; Graham, 2013; Hanlon & Heitzman, 2022). As the deductibility of interest expenses creates a tax shield that favours debt over equity (Modigliani & Miller, 1963; Kraus & Litzenberger, 1973), corporate taxes affect capital structure decisions of firms. That is, the cross-sectional empirical patterns are broadly consistent with the balancing of benefits and direct (indirect) costs of debt financing (Harris & Raviv, 1991; Frank & Goyal, 2008). Recent evidence continues to support these fundamental relationships, with studies documenting how firms respond to tax reforms (Ábrahám et al., 2023) and tax windfalls (Andreani et al., 2025), confirming that tax incentives remain a first-order determinant of capital structure decisions. At the shareholder level, however, investment income (dividends, capital gains, and interest received) is taxed differently in most countries. Thus, tax advantages arising at the corporate level can be amplified, reduced, or even offset by tax disadvantages at the personal level (Miller, 1977).

While older literature documented a negative relation between personal taxes on interest income and firm-level leverage (Mackie-Mason, 1990; Graham, 1999; Campello, 2001), the subsequent literature has conducted more direct tests of the personal tax effects by exploiting greater variations of personal taxes in international datasets. Here, the results are mixed. Some papers find that personal taxes are an economically important determinant of capital structure decisions (Overesch & Voeller, 2010; Faccio & Xu, 2015). Other research finds that personal taxes do not seem to have explanatory power with respect to capital structure (Booth et al., 2001) for developing countries (Reinhard & Li, 2011; Feld et al., 2013). Fan et al. (2012) only find significant tax effects in the later period of their sample (1999–2006) and only in the subsample of developed countries, while Devereux et al. (2018) find that firms adjust their capital structures gradually in response to changes in marginal tax rates, with significant long-run effects on leverage. More recently, Huang et al. (2024) demonstrate that tax incentives interact with ownership structure to influence corporate decisions, while Ábrahám et al. (2023) show that policy uncertainty regarding tax reforms can significantly affect firms' capital structure responses.

We argue that most of these studies must be criticized for *not* modeling the shareholders' *individual* tax incentives. Instead, the standard assumption in this line of research is that the shareholder is an individual residing in the same country as the firm and is liable to the yearly top statutory personal income tax rate. However, a vast body of literature documents that shareholder composition varies greatly among firms (La Porta et al., 1999), and thus, firm-level tax incentives can be different, too. That is, as the shareholder composition shifts from private individuals to corporations (e.g., institutions), firm-level tax incentives might change without any changes in the corporate or personal tax rates. In addition, ownership is often held across countries and sometimes changes over time. Consequently, failing to control for personal tax considerations of the respective shareholders (i.e., corporation or

[2] While Jacob and Michaely (2017) have also investigated this relation, their sample of closely-held Swedish firms with not more than five owners is very restrictive.

private individual to hold shares of a domestic or foreign firm over a specific time period) can result in both an omitted variable bias as well as a measurement error with respect to any firm-level tax incentive measure (Graham, 2003). While Krämer (2015) and Rünger et al. (2016) have addressed how ownership affects the relationship between taxes and capital structure, their studies either only use ownership data for the last available observation of a firm or do not consider cross-country taxation. As we exploit information on shareholder characteristics (type, country, shareholdings), we can explicitly distinguish between private and corporate shareholders. Further, we model firm country/ shareholder country pair taxation by incorporating withholding taxes and double tax treaties.

We address the research gap regarding the interaction among taxation, ownership structure, and capital structure decisions. With the largest shareholder controlling over 30% of public firms globally (Truong & Heaney, 2007; Faccio & Lang, 2002), these blockholders possess sufficient voting power to influence firm policies, including capital structure choices that maximize their tax benefits (Graham, 2003). Recent evidence reinforces the importance of ownership concentration in shaping corporate decisions, with Forte et al. (2024) and Alghawwas and Aljabr (2024) documenting how concentrated ownership and different ownership types affect firm policies across various institutional settings. Given this established influence of large shareholders, examining how their individual tax incentives translate into capital structure decisions represents a critical yet unexplored dimension of the tax-leverage relationship.

Following this line of argument, we expect the largest shareholder's individual tax incentives to systematically affect the firm's capital structure decisions, and thus, formulate our first hypothesis as follows:

H1: The firm's leverage increases with the largest shareholder's individual tax incentive for debt.

Other large shareholders may not share the tax incentive of the largest shareholder. The second-largest shareholder voting rights exceed 5% in every second publicly listed firm in Europe (Becht & Mayer, 2002). Prior research (Maury & Pajuste, 2005; Cronqvist & Fahlenbrach, 2009; Boubaker et al., 2016) finds that shareholder composition affects firm performance, firm valuation, corporate risk taking, and corporate policies. However, prior research has not yet addressed the consequences of multiple shareholders' individual tax incentives on capital structure decisions. In particular, prior research has not yet investigated the effect of conflicting tax interests among shareholders on capital structure decisions (i.e., tax incentive heterogeneity). We define tax incentive heterogeneity as the firm-specific presence of opposing individual tax incentives of the largest vs. the second-largest shareholders. For example, in the presence of the second-largest shareholder with opposing tax incentives, it is unclear whether the largest shareholder's individual tax incentive remains relevant for a firm's capital structure decision (Bell & Jenkinson, 2002).

Legal investor protection (La Porta et al., 1998) should prevent the largest shareholder from fully implementing a tax strategy that is optimal for her/him at the expense of the other shareholders. For example, Rünger et al. (2016) are able to show that the effect of the net tax benefit of debt on a firm's debt-to-assets ratio is reduced if there is a split between two or more individual domestic shareholders as opposed to if more than 50% of ownership is held by an individual domestic shareholder. Furthermore, the theoretical literature provides models in which the presence of multiple shareholders limits the extraction of private benefits by the largest shareholder (Bennedsen et al., 2000; Bloch & Hege, 2003; Gomes & Novaes, 2005). Accordingly, we posit that tax incentive heterogeneity between the largest and second-largest shareholders reduces the influence of the largest shareholder's tax incentive on capital structure decisions. Specifically, we formulate our second hypothesis as follows:

H2: The influence of the largest shareholder's tax incentive for debt on the firm's leverage is reduced when tax incentive heterogeneity is present between the largest and second-largest shareholders.

When the percentage of voting rights shares held by the largest shareholder increases, and thus, ownership becomes more highly concentrated, the ability of the largest shareholder to remove a management team becomes higher, and managers are likely to feel more constrained to pursue actions that maximize the largest shareholder's benefits (Hill & Snell, 1989). Thus, when shareholdings are more highly concentrated, the largest shareholder can use her/his voting rights to a greater extent to influence management decisions. In contrast, when ownership becomes more highly dispersed, it is more difficult for the largest shareholder to constrain managerial actions that are inconsistent with her/his interest (Salancik & Pfeffer, 1980). Pindado and de la Torre (2011) show that ownership concentration encourages debt financing.

Subsequent research has started to address the interaction of ownership concentration and shareholder-level taxes with regard to capital structure and dividends. Krämer (2015) finds that the effect of (corporate and interest income) taxes on capital structure decisions is stronger for firms with concentrated ownership. Jacob and Michaely (2017) find that dividend taxes have a first-order impact on payout policy, but dispersed ownership mutes this impact substantially[3].

We analyse whether the largest shareholder is more able to maximize her/his potential tax benefits as her/his ability to influence management decisions increases. However, as the ability to influence management decisions not only depends upon the voting rights power of the largest shareholder but also upon the voting rights power of the other shareholders, we define this ability as the difference between the percentage of voting rights shares held by the largest shareholder and the percentage of voting rights shares held by the second-largest shareholder, which we refer to as the largest shareholder's voting rights power. We posit that higher voting rights power increases the largest shareholder's influence on the firm's capital structure decisions. We also posit that the higher voting rights power of the largest shareholder constrains the ability of the second-largest shareholder to influence the capital structure of a firm according to her/his (opposing) tax incentives. Accordingly, we posit that voting rights power moderates

[3] As the authors exploit an exogenous shock to dividend taxation and proprietary data on private firms from Sweden, it is unclear whether this effect holds for capital structure decisions of public firms and across countries.

the relationship between shareholder-level tax incentives, tax heterogeneity, and capital structure by formulating the following set of hypotheses:

H3a: The influence of the largest shareholder's tax incentive for debt on the firm's leverage is increasing in their voting rights power.

H3b: The influence of the second-largest shareholder's tax incentive on the firm's leverage decreases with the largest shareholder's voting rights power.

3. RESEARCH METHODOLOGY

We consider the following baseline regression model to test our hypotheses:

$$Leverage_{i,t} = \beta_0 + \beta_1 TaxIncentive_{i,t} + \beta_2 C_{i,t} + \gamma_t + \delta_i + \varepsilon_{i,t} \quad (1)$$

where $Leverage_{i,t}$, is defined as total debt relative to the sum of total debt and book value of equity. $TaxIncentive_{i,t}$ is our proxy for the investor's (net) tax incentive (e.g., $LShTaxIncentive_{i,t}$) following Graham (1999) and Auerbach (2002) and derived as the relative (net) tax incentive benefit of debt relative to equity (the higher the measure is, the higher is the relative tax incentive for debt)[4, 5]:

$$LShTaxIncentive = (\tau_C + (1 - \tau_C)\tau_D) - \tau_I \quad (2)$$

where, $C_{i,t}$ is a vector of firm-level control variables. The control variables follow Frank and Goyal (2009) and include the relative amount of tangible assets (tangibility), profitability, firm size, market-to-book ratio, industry median leverage, and expected inflation. Variable definitions can be found in Appendix A. The propositions with regard to these variables are that firms with more tangible assets (Titman, 1984), less profits (Kayhan & Titman, 2007), low size (as measured by book assets), low market-to-book ratio (Shyam-Sunder & Myers, 1999), or which operate in industries in which the median firm has high leverage (Lemmon et al., 2008) tend to have high leverage. Also, when inflation is expected to be high, firms tend to have high leverage (Taggart, 1985). γ_t denotes firm fixed effects, while δ_i is year fixed effects. We report robust standard errors clustered by firm country (Petersen, 2009) as we suspect that observations from different firms out of the same country are not fully independent.

Our sample composition and time period are driven by a unique dataset that enables us to examine the relationship between shareholder-level tax incentives and firms' capital structure decisions. To measure these tax incentives, we use combined tax rates based on statutory corporate taxes and personal income tax rates at the shareholder level, carefully considering shareholder characteristics such as home country and entity type (corporate vs. private). This dataset, anchored by the 2012 edition of the report Effective Tax Levels using the Devereux Griffith Methodology (Spengel et al., 2012) and its previous editions, provides comprehensive information on shareholder characteristics (type, country, shareholdings) and allows us to investigate how firms' capital structure responds to the (net) tax incentives of their largest and second-largest shareholders. By identifying both the firm's location and shareholders' home countries, we incorporate specific features of the respective tax systems, including withholding taxes on cross-border interest or dividend payments, imputation credits, limited interest deductibility, and relevant tax treaties and European Union (EU) regulations (for example, EU Parent Subsidiary Directive 2011/96/EU; The EU Interest and Royalties Directive 2003/49/EC). The dataset's distinctive features include detailed information on withholding taxes and double tax treaties, explicit differentiation between private and corporate shareholders, and incorporation of shareholders' residence countries for modeling firm country/shareholder country pair taxation. To complement our primary tax data source, we hand-collect additional tax rate variables from yearly tax guides published by Ernst & Young (EY), KPMG, and PricewaterhouseCoopers (PwC), and augment this information with cross-border dividend taxation data from Freshfields Bruckhaus Deringer's (2012) report. Using these data sources, we identified 92,129 observations from European publicly traded firms for the period between 2002 and 2012. This decade-long observation period encompasses significant policy changes and economic cycles, providing temporal variation that strengthens causal inference. Additionally, the comprehensive coverage of both private and corporate shareholders addresses a fundamental limitation in prior literature that relied primarily on individual investor tax rates.

To get detailed information about a firm's largest and second-largest shareholders and their country of origin, we merge these data with ownership data from the Amadeus Database (Bureau van Dijk Electronic Publishing). Amadeus contains information about the firm's ownership structure, including the names of shareholders, their respective ownership share, their country of origin, and the shareholders' legal form. Importantly, Amadeus allows access to historical ownership data. The merging process with Amadeus reduces our initial sample of 92,129 firm-year observations by 74,861 observations due to the requirement of complete shareholder information, resulting in 17,268 firm-year observations with detailed ownership data.

From this initial sample, we exclude firms for which no, only insufficient, or obviously wrong data is available. In accordance with previous studies, we eliminate utilities, banks, insurance companies, and other financial service firms from the sample (Standard Industrial Classification (SIC) codes 6000–6999 and 4000–4949) due to the fact that the capital structures of these firms are fundamentally different from other firms. As some firms have situated their headquarters in so-called "tax havens"[6], we eliminate all firms whose International Securities Identification Number (ISIN) or whose largest shareholder starts with the country code of BM, FK, GG, IM, JE, KY, or VG[7]. Furthermore, observations of firms are excluded where the stock

[4] Before a company distributes income to its shareholders through dividends, the income is first taxed at the corporate tax rate τ_C, then — at the individual level — dividends will subsequently be taxed at the shareholder-specific dividend tax rate τ_D. Hence, one unit of income generated through the company's operating activities and distributed as dividends will result in $(1 - \tau_C)(1 - \tau_D)$ of income for the shareholder. If a company distributes its income through interest payments, this will result in $(1 - \tau_I)$ of income for the lending investor where τ_I is the investor's tax rate on interests.

[5] This measure is in the spirit of Miller (1977). However, it is linear in tax rates whereas the measure of Miller (1977) is convex in the personal interest tax rate: $m = [1 - (1 - t_c)(1 - t_d)]/(1 - t_i)$.

[6] "Tax havens" refer to jurisdictions characterized by very low or zero investor-level taxation combined with high financial secrecy. To avoid tax-driven distortions in ownership and capital structure, firms with headquarters in such jurisdictions are excluded from the sample.

[7] We exclude all firms whose International Securities Identification Number (ISIN) or the ISIN of their largest shareholder starts with country codes associated with known tax havens: BM (Bermuda), FK (Falkland Islands), GG (Guernsey), IM (Isle of Man), JE (Jersey), KY (Cayman Islands), and VG (British Virgin Islands). These exclusions are consistent with prior research to prevent tax-specific bias in corporate leverage estimates.

is not traded in the form of common shares. Over and above, we eliminate all observations with inconsistent data (i.e., sales lower than zero, total common equity lower than zero, dividends greater than sales). As summarized in Table 1, the final sample comprises 2,757 firms (9,594 firm-year observations) located in the selected countries.

Table 1. Sample composition

Sample	*N*
Firm-year observations in the Thomson Worldscope database between 2002 and 2012 with sufficient data to calculate independent and dependent variables	92,129
Less: Exclusions of firm-year observations characterized by:	
No shareholder information in the BvD Amadeus database	74,861
Financial industry classification (SIC codes 6000–6999)	4,568
Missing tax rates	2,710
Firm or largest shareholder located in a "tax haven"-country (i.e., BM, FK, GG, IM, JE, KY, or VG)	224
Country-specific observations for countries or the largest shareholders below 10	128
Dividends greater than sales	38
Influential outlier firm (6 observations)	6
Firm-year observations used in main analyses	9,594
Unique firms used in the main analyses	2,757

Table 2. Firm-shareholder characteristics

Panel A: Observations by firm country and shareholder location						
Country	*(1) Firm*		*(2) Largest shareholder*		*(3) Second-largest shareholder*	
	N	*%*	*N*	*%*	*N*	*%*
1. Austria	139	1.4%	181	1.9%	164	1.7%
2. Belgium	231	2.4%	205	2.1%	223	2.3%
3. Bulgaria	339	3.5%	315	3.3%	298	3.1%
4. Croatia	18	0.2%	8	0.1%	8	0.1%
5. Cyprus	143	1.5%	207	2.2%	223	2.3%
6. Czech Republic	4	0.0%	8	0.1%	5	0.1%
7. Denmark	350	3.6%	356	3.7%	327	3.4%
8. Estonia	53	0.6%	50	0.5%	34	0.4%
9. Finland	320	3.3%	291	3.0%	299	3.1%
10. France	1,043	10.9%	1,071	11.2%	967	10.1%
11. Germany	1,172	12.2%	1,131	11.8%	1,095	11.4%
12. Greece	175	1.8%	132	1.4%	114	1.2%
13. Hungary	39	0.4%	24	0.3%	12	0.1%
14. Ireland	12	0.1%	0	0.0%	0	0.0%
15. Italy	728	7.6%	727	7.6%	591	6.2%
16. Latvia	38	0.4%	33	0.3%	31	0.3%
17. Lithuania	107	1.1%	88	0.9%	56	0.6%
18. Luxembourg	48	0.5%	209	2.2%	230	2.4%
19. Malta	0	0.0%	4	0.0%	2	0.0%
20. Netherlands	236	2.5%	422	4.4%	424	4.4%
21. Norway	368	3.8%	318	3.3%	316	3.3%
22. Poland	1,139	11.9%	896	9.3%	951	9.9%
23. Portugal	187	1.9%	165	1.7%	160	1.7%
24. Romania	181	1.9%	117	1.2%	128	1.3%
25. Russia	20	0.2%	20	0.2%	20	0.2%
26. Slovakia	18	0.2%	0	0.0%	0	0.0%
27. Slovenia	89	0.9%	89	0.9%	89	0.9%
28. Spain	372	3.9%	363	3.8%	324	3.4%
29. Sweden	473	4.9%	478	5.0%	483	5.0%
30. Switzerland	263	2.7%	301	3.1%	248	2.6%
31. Turkey	119	1.2%	99	1.0%	99	1.0%
32. United Kingdom	1,170	12.2%	1,116	11.6%	1,234	12.9%
33. United States	0	0.0%	170	1.8%	439	4.6%
Total	9,594	100%	9,594	100%	9,594	100%

Panel B: Location, type, and tax incentive alignment of shareholders				
Shareholder location	*Largest shareholder*		*Second-largest shareholder*	
	Firm-years	*%*	*Firm-years*	*%*
Domestic	8,095	84.4%	7,678	80.0%
Foreign	1,499	15.6%	1,917	20.0%
Shareholder type	*Largest shareholder*		*Second-largest shareholder*	
	Firm-years	*%*	*Firm-years*	*%*
Corporation	7,942	82.8%	7,838	81.7%
Individual	1,652	17.2%	1,756	18.3%
Tax incentive alignment of the two largest shareholders			*Firm-years*	*%*
Homogeneous tax incentives			4,123	43.0%
Heterogeneous tax incentives			701	7.3%
No tax preference for the largest or second-largest shareholder			4,770	49.7%

Note: Panel A presents the distribution of companies by location and their two largest shareholders by country. Panel B reports the proportion of shareholdings held by foreign investors, the distribution of the target firm sample by type of the two largest shareholders, and the proportion of firms with tax incentive homogeneity/tax incentive heterogeneity/no tax preference among the two largest shareholders.

Table 2 above provides the distribution of firms and shareholders by country (Panel A), as well as information on the location (domestic or foreign), type (corporation vs. individual), and tax incentive alignment (homogeneous vs. heterogeneous) of the largest and second-largest shareholders

(Panel B). We note that the largest (second-largest) shareholder is a foreign shareholder in 15.6% (20%) of the sample cases, and that in 17.2% (18.3%) of the sample cases, the largest (second-largest) share investment is held by private individuals. We are also able to identify opposing tax incentives between the largest and second-largest shareholders (i.e., tax incentive heterogeneity) in 7.3% of the sample cases.

4. RESULTS

4.1. Descriptive statistics and correlation analysis

Table 3a presents descriptive statistics for our sample of 9,594 firm-year observations. The mean value of $LShTaxIncentive$ equals 0.022 with substantial heterogeneity (std. dev. = 0.081), ranging from -0.229 to 0.512. The positive mean indicates that debt financing generates tax benefits relative to equity for the average largest shareholder. Notably, the median equals zero, reflecting that approximately half of our observations involve corporate shareholders facing tax neutrality between debt and equity. The incremental tax incentive of the second-largest shareholder ($\Delta 2LShTaxIncentive$) exhibits similar distributional properties (mean = 0.024, median = 0.000).

Book leverage averages 35.5% with considerable cross-sectional variation (std. dev. = 25.9%), while industry-adjusted leverage ($IndLeverage$) averages 27.8%. The ownership concentration measure ($LShOwnPower$), defined as the voting rights differential between the two largest shareholders, averages 31% (median = 24%), indicating substantial but varied concentration levels. The heterogeneity dummy ($HeteroD$) equals one for 31% of observations, identifying cases where the two largest shareholders exhibit opposing tax incentive signs.

Table 3b reveals critical correlation patterns. The correlation between $LShTaxIncentive$ and $Leverage$ equals 0.114 ($p < 0.01$), providing univariate support for our hypothesis. The correlation between the two largest shareholders' tax incentives equals 0.464, indicating moderate alignment that permits separate identification. Crucially, the correlation between $LShTaxIncentive$ and the corporate tax rate (τ_C) is -0.013 and insignificant, confirming these represent orthogonal tax channels. The dividend tax rate (τ_D) shows strong positive correlation with $LShTaxIncentive$ (0.671), while the interest tax rate (τ_I) exhibits a negative correlation (-0.386), consistent with the tax incentive formula construction.

Table 3a. Descriptive statistics

Variables	*N*	*Mean*	*Median*	*Std. dev.*	*1st quartile*	*3rd quartile*	*Min*	*Max*
$LShTaxIncentive_{i,t}$	9,594	0.022	0.000	0.081	0.000	0.012	-0.229	0.512
$\Delta 2LShTaxIncentive_{i,t}$	9,594	0.024	0.000	0.084	0.000	0.012	-0.276	0.512
$Leverage_{i,t}$	9,594	0.355	0.352	0.259	0.115	0.553	0.000	0.999
$IndLeverage_{i,t}$	9,594	0.278	0.284	0.079	0.186	0.345	0.071	0.439
$Tang_{i,t}$	9,594	0.274	0.234	0.222	0.084	0.409	0.000	1.002
$Profit_{i,t}$	9,594	0.000	0.028	0.309	-0.007	0.064	-16.329	12.670
$Size_{i,t}$	9,594	11.77	11.67	2.11	10.43	13.10	2.77	19.53
$MtB_{i,t}$	9,594	2.43	2.29	1.75	1.49	3.20	-4.48	15.40
$Infl_{i,t}$	9,594	0.07	0.00	0.26	0.00	0.00	0.00	1.00
$HeteroD_{i,t}$	9,594	0.31					0.00	1.00
$LShOwnPower_{i,t}$	9,594	0.31	0.24	0.27	0.08	0.50	0.00	1.00

Table 3b. Correlation matrix

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
1) $LShTaxIncentive_{i,t}$	1.000												
2) $\Delta 2LShTaxIncentive_{i,t}$	0.464*	1.000											
3) $\tau_{C_{i,t}}$	-0.013	-0.008	1.000										
4) $\tau_{D_{i,t}}$	0.671*	0.273*	0.002	1.000									
5) $\tau_{I_{i,t}}$	-0.386*	-0.205*	0.770*	0.128*	1.000								
6) $Leverage_{i,t}$	0.114*	0.094*	0.152*	0.012	0.033*	1.000							
7) $IndLeverage_{i,t}$	0.045*	0.037*	-0.058*	0.014	-0.070*	0.175*	1.000						
8) $Tang_{i,t}$	-0.053*	-0.028*	-0.269*	-0.068*	-0.207*	0.160*	0.091*	1.000					
9) $Profit_{i,t}$	0.013	0.009	0.001	0.008	-0.004	-0.004	0.052*	0.048*	1.000				
10) $Size_{i,t}$	-0.094*	-0.105*	0.265*	-0.151*	0.181*	0.365*	0.166*	0.106*	0.168*	1.000			
11) $MtB_{i,t}$	-0.001	-0.004	0.021*	0.0115	0.027	0.038*	-0.026*	-0.029*	-0.056*	-0.066*	1.000		
12) $Infl_{i,t}$	0.003	-0.001	-0.338*	-0.023*	-0.278*	-0.101*	-0.026*	0.114*	0.016	-0.156*	-0.002	1.000	
13) $HeteroD_{i,t}$	-0.020*	0.006	0.023*	0.037*	0.061*	0.021*	-0.001	-0.024*	0.000	0.005	0.001	-0.031*	1.000
14) $LShOwnPower_{i,t}$	-0.101*	-0.108*	0.019*	-0.092	0.036*	0.056*	0.072*	0.072*	0.040*	0.043*	0.023	0.014	0.088*

*Note: For definitions of variables, see Appendix A. Tax variables were hand-collected from annual tax guides published by EY, KPMG, and PwC, as well as from the project report for the European Commission, "Effective Tax Levels using the Devereux Griffith Methodology" (Spengel, 2012), and previous editions of this report. Tax data were collected from the Freshfields Bruckhaus Deringer (2012) report on cross-border dividend taxation. Ownership data were taken from BvD Amadeus. Data for all other variables were taken from Thomson Reuters Worldscope. * Correlation at the 10% level and below. In order to reduce the effect of outliers, we winsorize all continuous variables at the 1- and 99-percent levels.*

4.2. The largest shareholder's tax incentives and capital structure

Table 4 presents regression results testing *H1*. In pooled ordinary least squares (OLS) specifications with country, industry, and year-fixed effects, the coefficient on $LShTaxIncentive$ equals 0.1316 (t = 2.22, p < 0.05) without controls and increases to 0.277 (t = 5.02, p < 0.01) with controls [specifications (1)–(2)]. The latter indicates that a 10 percentage point increase in the largest shareholder's tax incentive is associated with a 2.77 percentage point increase in book leverage, economically significant given the mean leverage of 35.5%.

Specifications (3)–(4) add firm fixed effects to exploit within-firm variation in tax incentives. The coefficient on $LShTaxIncentive$ equals 0.155 (t = 2.40, p < 0.05) without additional controls and 0.156 (t = 2.50, p < 0.05) with full controls. This implies that a 10 percentage point within-firm increase in the tax incentive increases leverage by 1.56 percentage points, representing a 4.4% increase relative to mean leverage.

Control variables exhibit expected relationships. Tangibility shows the strongest positive association with leverage [0.250, t = 4.01, p < 0.01 in specification (4)], consistent with collateral theories. Profitability negatively predicts leverage (-0.075, t = -2.74, p < 0.05), supporting pecking order predictions. Firm size positively relates to leverage (0.062, t = 5.24, p < 0.01), while market-to-book shows a weaker positive association (0.0006, t = 3.20, p < 0.01). Industry leverage and expected inflation show insignificant effects in the fixed effects specification.

Table 4. Tax incentives of the largest investor and capital structure decisions

Dependent variable: $Leverage_{i,t}$								
Independent variables	***(1) Pooled OLS***		***(2) Pooled OLS***		***(3) Fixed effects panel***		***(4) Fixed effects panel***	
	Coeff.	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***
$LShTaxIncentive_{i,t}$	0.1316**	2.22	0.2770***	5.02	0.1545**	2.40	0.1564**	2.50
$IndLeverage_{i,t}$			0.2763**	2.39			0.2204*	1.71
$Tang_{i,t}$			0.2137***	10.50			0.2499***	4.01
$Profit_{i,t}$			-0.0621***	-2.66			-0.0746**	-2.74
$Size_{i,t}$			0.0357***	10.59			0.0617***	5.24
$MtB_{i,t}$			0.0006***	3.00			0.0006***	3.20
$Infl_{i,t}$			0.0019	0.67			0.0016	0.95
Year fixed effects	YES		YES		YES		YES	
Industry fixed effects	YES		YES					
Country fixed effects	YES		YES					
Firm fixed effects					YES		YES	
Firm-year observations	9,594		9,594		9,594		9,594	
Firms	2,757		2,757		2,757		2,757	
Adjusted R^2 (within)	0.192		0.295		0.013		0.088	

*Note: This table presents the relation between the largest investor's (net) tax incentives and book leverage. All regressions are estimated with an intercept included (not tabulated). T-statistics in the pooled OLS specifications are corrected for heteroscedasticity according to White (1980). Standard errors are clustered by firm country (Petersen 2009). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. All continuous variables are winsorized at the 1- and 99-percent level. See Appendix A for variable definitions.*

4.3. Tax incentive heterogeneity between major shareholders

Table 5 examines how disagreement between the two largest shareholders affects the tax-leverage relationship (*H2*). Specification (1) introduces $HeteroD$, an indicator equaling one when the largest and second-largest shareholders have opposing tax incentive signs (31% of observations based on Table 3 descriptive statistics). The main effect of $LShTaxIncentive$ increases to 0.252 (t = 3.34, p < 0.01) when accounting for heterogeneity. The interaction term $LShTaxIncentive \times HeteroD$ equals -0.059 (t = -3.54, p < 0.01), indicating that heterogeneity reduces the tax incentive effect by 0.59 percentage points for a 10 percentage point change, approximately a 23% reduction from the baseline effect. The direct effect of $HeteroD$ is 0.018 but insignificant (t = 0.89), suggesting heterogeneity matters primarily through its interaction with tax incentives.

Specification (2) employs an alternative approach using the incremental tax incentive of the second-largest shareholder ($\Delta 2LShTaxIncentive$), calculated as the difference between the second and largest shareholders' incentives. The coefficient on $\Delta 2LShTaxIncentive$ equals 0.118 (t = 2.41, p < 0.05), confirming that the second-largest shareholder exerts independent influence on capital structure when their tax preferences diverge from the largest shareholder. The main effect of $LShTaxIncentive$ remains robust at 0.255 (t = 3.41, p < 0.01).

4.4. Voting rights power moderation effects

Table 6 investigates how voting rights power, measured as the ownership gap between the two largest shareholders ($LShOwnPower$), moderates tax incentive effects (*H3*).

Panel A partitions the sample into quintiles. In the lowest quintile (*Q1*, 1,919 observations), where power differences are minimal, the coefficient on $LShTaxIncentive$ equals 0.062 (t = 0.69, insignificant). The coefficient increases across quintiles: 0.198 (t = 2.40, p < 0.05) in the combined middle quintiles (*Q2/Q3/Q4*, 5,757 observations) and 0.321 (t = 2.21, p < 0.05) in *Q5* (1,918 observations), where the ownership gap is highest. The full sample specification (4) confirms this pattern with interaction terms: $LShTaxIncentive \times Q2/Q3/Q4$ equals 0.316 (t = 3.50, p < 0.01) and $LShTaxIncentive \times Q5$ equals 0.403 (t = 3.27, p < 0.01), relative to the baseline *Q1* effect of -0.096 (insignificant).

Table 5. Tax incentive heterogeneity and capital structure decisions

Dependent variable: $Leverage_{i,t}$				
Independent variables	***(1)***		***(2)***	
	Coefficient	***t-statistics***	***Coefficient***	***t-statistics***
$LShTaxIncentive_{i,t}$	0.2520***	3.34	0.2546***	3.41
$HeteroD_{i,t}$	0.0177	0.89		
$LShTaxIncentive_{i,t} \times HeteroD_{i,t}$	-0.585***	-3.54		
$\Delta 2LShTaxIncentive_{i,t}$			0.1180**	2.41
Year fixed effects	YES		YES	
Firm fixed effects	YES		YES	
Controls	YES		YES	
Firm-year observations	9,594		9,594	
Firms	2,757		2,757	
Adjusted R^2 (within)	0.096		0.090	

*Note: This table presents the incremental effect of the second-largest investor's (net) tax incentive and how tax incentive heterogeneity (i.e., the presence of a second-largest investor with contrary tax incentives) affects the relation between the largest investor's (net) tax incentives and book leverage. We add an indicator variable for tax incentive heterogeneity ($HeteroD_{i,t}$) as well as an interaction term with our measure for the largest investor's (net) tax incentives ($LShTaxIncentive_{i,t}$) to our baseline regression model. We also add the difference between the second-largest shareholder's tax incentive and the largest shareholder's tax incentive $\Delta 2LShTaxIncentive_{i,t} = 2LShTaxIncentive_{i,t} - LShTaxIncentive_{i,t}$. All regressions are estimated with an intercept included (not tabulated). We report t-statistics based on standard errors clustered by firm country (Petersen, 2009). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. All continuous variables are winsorized at the 1- and 99-percent level. See Appendix A for variable definitions.*

Table 6. Ownership power, tax incentive heterogeneity, and capital structure decisions

Panel A: Largest shareholders' tax incentive effect by ownership power quantiles								
Dependent variable: $Leverage_{i,t}$								
LShOwnPower — Quantile	***(1) Q1***		***(2) Q2/Q3/Q4***		***(3) Q5***		***(4) Full Sample***	
Independent variables	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***
$LShTaxIncentive_{i,t}$	0.0623	0.69	0.1981**	2.40	0.3208**	2.21	-0.0958	-1.64
$Q2/Q3/Q4$							0.0264***	3.19
$Q5$							0.0407***	3.50
$LShTaxIncentive_{i,t} \times Q2/Q3/Q4$							0.3164***	3.50
$LShTaxIncentive_{i,t} \times Q5$							0.4026***	3.27
Year fixed effects	YES		YES		YES		YES	
Firm fixed effects	YES		YES		YES		YES	
Controls	YES		YES		YES		YES	
Firm-year observations	1,919		5,757		1,918		9,594	
Firms	878		1,986		785		2,757	
Adjusted R^2 (within)	0.133		0.106		0.190		0.099	
Panel B: Tax incentive heterogeneity by ownership power quantiles								
Dependent variable: $Leverage_{i,t}$								
LShOwnPower — Quantile	***(1) Q1***		***(2) Q2/Q3/Q4***		***(3) Q5***		***(4) Full Sample***	
Independent variables	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***
$LShTaxIncentive_{i,t}$	0.2787***	3.75	0.2852***	3.22	0.3427*	1.87	0.0641	1.03
$HeteroD_{i,t}$	0.0790***	3.72	0.0069	0.38	-0.005	-0.2	0.0968	4.69
$LShTaxIncentive_{i,t} \times HeteroD_{i,t}$	-0.1672***	-5.83	-0.056**	-2.2	-0.005	-0.3	-0.143***	-4.69
$Q2/Q3/Q4$							0.0300***	3.32
$Q5$							0.0458***	3.65
$LShTaxIncentive_{i,t} \times Q2/Q3/Q4$							0.2538**	2.43
$LShTaxIncentive_{i,t} \times Q5$							0.2993**	2.40
$HeteroD_{i,t} \times Q2/Q3/Q4$							-0.089***	-4.85
$HeteroD_{i,t} \times Q5$							-0.098***	-5.99
$LShTaxIncentive_{i,t} \times HeteroD_{i,t} \times Q2/Q3/Q4$							0.0850**	2.44
$LShTaxIncentive_{i,t} \times HeteroD_{i,t} \times Q5$							0.1248***	4.68
Year fixed effects	YES		YES		YES		YES	
Firm fixed effects	YES		YES		YES		YES	
Controls	YES		YES		YES		YES	
Firm-year observations	1,919		5,757		1,918		9,594	
Firms	878		1,986		785		2,757	
Adjusted R^2 (within)	0.132		0.112		0.190		0.0980	

*Note: This table presents how the largest shareholder's ownership power moderates the relation between the largest investor's (net) tax incentives and book leverage. We partition our sample into quintiles (Q1, Q2/Q3/Q4, Q5) based upon the difference between the percentage of shares held by the largest vs. second-largest investors. Results for our baseline regression model are presented for each quartile, respectively. Controls are median industry book leverage, tangibility, profitability, size, market-to-book ratio, and inflation. All regressions are estimated with an intercept included (not tabulated). We report t-statistics based on standard errors clustered by firm country (Petersen, 2009) and corrected for heteroscedasticity according to White (1980). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. All continuous variables are winsorized at the 1- and 99-percent level. See Appendix A for variable definitions.*

Panel B of Table 6 examines how voting power affects the heterogeneity interaction. In *Q1*, where voting power is lowest, *LShTaxIncentive* equals 0.279 (t = 3.75, $p < 0.01$) and the interaction $LShTaxIncentive \times HeteroD$ equals -0.167 (t = -5.83, p < 0.01), indicating strong moderation by tax disagreement. This negative interaction diminishes to -0.056 (t = -2.20, p < 0.05) in *Q2/Q3/Q4* and becomes -0.005 (insignificant) in *Q5*. The full sample specification (4) shows the triple interaction $LShTaxIncentive \times HeteroD \times Q5$ equals 0.125 (t = 4.68, p < 0.01), confirming that high voting power neutralizes the constraining effect of tax heterogeneity. The direct effects of quintile dummies and their interactions with *HeteroD* are also significant, indicating complex relationships between ownership concentration and tax incentive heterogeneity.

4.5. Critical ownership thresholds

Table 7 examines discontinuities at regulatory ownership thresholds. Specification (1) presents the baseline result with *LShTaxIncentive* coefficient of 0.156 (t = 2.50, p < 0.05). Specification (2) tests the 50% threshold for the largest shareholder. The dummy $D50\_LSh$ is positive (0.016, t = 1.82, p < 0.10), but the interaction $D50\_LSh \times LShTaxIncentive$ equals 0.148 (t = 1.49, insignificant), suggesting limited additional influence from crossing the majority threshold. Specification (3) examines the 75% threshold, where both $D75\_LSh$ (0.017, t = 1.34) and the interaction term (0.020, t = 0.19) are insignificant, likely due to limited observations at this extreme ownership level.

Specifications (4) and (5) examine the 25% threshold for the second-largest shareholder, a critical level for minority protection rights. In specification (4), the incremental tax incentive $\Delta 2LShTaxIncentive$ equals 0.097 (t = 2.19, p < 0.05). The dummy $D25\_LSh$ is negative (-0.016, t = -2.59, p < 0.05), while the interaction $D25\_LSh \times \Delta 2LShTaxIncentive$ equals 0.170 (t = 1.96, p < 0.10), indicating enhanced influence when the second-largest shareholder crosses this minority protection threshold.

Specification (5) confirms these dynamics from the largest shareholder's perspective. The main effect of *LShTaxIncentive* increases to 0.321 (t = 4.17, p < 0.01), while the interaction $D25\_LSh \times LShTaxIncentive$ equals -0.235 (t = -2.68, p < 0.05), demonstrating that a powerful second shareholder (holding ≥ 25%) significantly constrains the largest shareholder's ability to influence capital structure according to their tax preferences.

4.6. Robustness tests

We test the robustness of our findings by conducting several sensitivity tests. First, we ensure that the results are robust to alternative specifications of our tax incentive measure. We re-estimate our analyses by using Miller's (1977) tax incentive measure, defined as:

$$m = \left(1 - \frac{(1-\tau_C)(1-\tau_D)}{1-\tau_I}\right)_{LSh} \quad (3)$$

Our untabulated results remain qualitatively unchanged. Consistent with the findings in our primary analyses, we continue to find positive and significant coefficients on our tax incentive measure for both the fixed effect as well as an OLS specification. Next, we include the percentage of shares held by insiders of the firm in our regression models in order to further address agency considerations. Correspondingly, our untabulated results show that a higher ownership concentration is associated with higher corporate leverage. Thus, a higher inside ownership serves to align the interests of the largest shareholder with those of minority shareholders.

The displayed correlation between tax incentives and capital structure could result from investor clienteles choosing firms that already have the desired capital structure rather than investing in firms and urging them to adjust their capital structure according to the investor's tax incentives. This reversed causality has also been analysed for payout policy (Korkeamaki et al., 2010). To establish that taxes are causal for capital structure decisions, we re-run our regressions with a subsample of firms that did not display a major ownership change in the time window t - 1 until t (5,469 observations). The untabulated coefficient for the largest shareholder's tax incentive is 0.1794, which is slightly larger but comparable in size to the coefficient in the full sample (0.1564). However, it is insignificant (t-stat. = 1.68). As the other subsample of firms (that underwent a major ownership change in the time window t - 1 until t, 4,125 observations) shows a comparable coefficient that is also insignificant (untabulated), and as we know that the coefficient in the full sample is significant, we suspect that our tests lack statistical power.

Shareholders may substitute dividends for capital gains. Consequently, several papers try to partially or fully replace dividend taxes with capital gains taxes and document that these are relevant for decision-making (e.g., Graham, 1999; Overesch & Voeller, 2010; Jacob, 2018). We abstain from incorporating capital gains taxes in our analysis for three reasons. First, we do not know in which period capital gains are realized. Assuming the wrong period would introduce double measurement error: The capital gains tax rates may change in between, and we would use the wrong discount factor. Second, for corporate shareholders (which are quite common in our dataset), the capital gains tax rate usually equals the dividend tax rate. Generally, as long as the capital gains tax rates are positively correlated with the dividend tax rates, the latter will capture some of the former's variation. Third, the firm-level payout rate, which is necessary to calculate a combined dividend tax/capital gains tax incentive, has been shown to react to tax rate changes itself (Jacob & Jacob, 2013), making it endogenous. To test whether the omission of capital gains taxes leads to biased results, we split the sample at the median of dividends over market value and re-run our regressions with the subsamples. We lose 216 observations with missing data on dividends or market value. Table 8 shows the results for the two subsamples [specifications (1) and (2)]. The largest shareholder's tax incentive is significant in both subsamples and larger in the low dividends subsample.

Table 7. Ownership thresholds and the relationship between the shareholders' tax incentive and capital structure decisions

Dependent variable: $Leverage_{i,t}$											
Independent variables	***Expected***	***(1)***		***(2)***		***(3)***		***(4)***		***(5)***	
		Coeff.	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***
$LShTaxIncentive_{i,t}$		0.1564***	2.50	0.0969	1.00	0.1544**	2.43	0.2622***	3.56	0.3212***	4.17
$D50\_LSh_{i,t}$				0.0155*	1.82						
$D50\_LSh_{i,t} \times LShTaxIncentive_{i,t}$	+			0.1482	1.49						
$D75\_LSh_{i,t}$						0.0172	1.34				
$D75\_LSh_{i,t} \times LShTaxIncentive_{i,t}$	+					0.0198	0.19				
$\Delta 2LShTaxIncentive_{i,t}$								0.0968**	2.19	0.1301**	2.69
$D25\_2LSh_{i,t}$								-0.0158**	-2.59	-0.0109	-1.44
$D25\_2LSh_{i,t} \times \Delta 2LShTaxIncentive_{i,t}$	+							0.1700*	1.96		
$D25\_2LSh_{i,t} \times LShTaxIncentive_{i,t}$	-									-0.2351**	-2.68
Firm fixed effects		YES		YES		YES		YES		YES	
Year fixed effects		YES		YES		YES		YES		YES	
Controls		YES		YES		YES		YES		YES	
Firm-year observations		9,594		9,594		9,594		9,594		9,594	
Firms		2,757		2,757		2,757		2,757		2,757	
Adjusted R^2 (within)		0.088		0.090		0.088		0.093		0.094	

*Note: This table presents how ownership thresholds moderate the relation between the shareholders' (net) tax incentives and book leverage. D50_LSh (D75_LSh) is a dummy for the largest shareholder holding 50% (75%) or more of the shares. D25_2LSh is a dummy for the second-largest shareholder holding 25% or more of the total shares outstanding. Controls are median industry book leverage, tangibility, profitability, size, market-to-book ratio, and inflation. The first column repeats the baseline result from Table 4. We report t-statistics based on standard errors clustered by firm country (Petersen, 2009). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. All continuous variables are winsorized at the 1- and 99-percent level. See Appendix A for variable definitions.*

Table 8. Tax incentives of the largest and second largest investor, capital structure decisions, and payout policy

Dependent variable: $Leverage_{i,t}$						
Independent variables	***(1)***		***(2)***		***(3)***	
	Coeff.	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***
$LShTaxIncentive_{i,t}$	0.1862***	3.17	0.2987**	2.59	0.2997***	4.04
$\Delta 2LShTaxIncentive_{i,t}$	0.0951*	1.84	0.1260*	1.75	0.1527**	2.46
$HighDividendD_{i,t}$					-0.0349***	-5.73
$LShTaxIncentive_{i,t} \times HighDividendD_{i,t}$					-0.1081*	-1.75
$\Delta 2LShTaxIncentive_{i,t} \times HighDividendD_{i,t}$					-0.0848	-1.19
Year fixed effects	YES		YES		YES	
Firm fixed effects	YES		YES		YES	
Controls	YES		YES		YES	
Dividends/market value	> MEDIAN		≤ MEDIAN		ALL	
Firm-year observations	4,676		4,677		9,353	
Firms	1,507		1,858		2,702	
Adjusted R^2 (within)	0.191		0.115		0.105	

*Note: This table presents the relation between the largest and second largest investors' (net) tax incentives and book leverage for the high (column 1) and low (column 2) dividend subsamples, as well as the interaction between the payout policy and the tax incentives for book leverage (Column 3). Controls are median industry book leverage, tangibility, profitability, size, market-to-book ratio, and inflation. All regressions are estimated with an intercept included (not tabulated). We report t-statistics based on standard errors clustered by firm country (Petersen, 2009). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. All continuous variables are winsorized at the 1- and 99-percent level. See Appendix A for variable definitions.*

The second largest shareholder's tax incentive is significant, with comparable coefficients in both subsamples. We also look at the full sample and use two interaction terms between the dividend above median dummy and the two tax incentives [specification (3)]. In line with Faccio and Xu (2015), the interaction term between the largest shareholder's tax incentive and the high dividend dummy is significant. As far as this simple test can tell, our omission of capital gains taxes does not seem to change our results fundamentally.

Finally, we analyse the tax rates in more detail. We weight the largest shareholder's tax incentive and the second largest shareholder's tax incentive with the respective shares and regress the book leverage on the two resulting measures in a year- and firm-fixed effects specification with the usual controls (untabulated). As expected, both coefficients are positively correlated with book leverage. The weighted largest shareholder's tax incentive is significant on the 1% level, whereas the weighted second largest shareholder's tax incentive is significant at the 10% level. Then, we combine both weighted tax incentives into one share-weighted average tax incentive. We regress the book leverage on the new measure in a year- and firm-fixed effects specification with the usual controls (untabulated). The coefficient (0.2625) is significant at the 1% level. We interpret these results as additional evidence for *H1* and *H2*.

The corporate tax rate is embedded in the largest shareholder's tax incentive for debt. To ensure that our results for the effect of the largest shareholder's tax incentive on capital structure are not driven by corporate tax rate changes, we re-estimate our primary results controlling for the firm's corporate tax rate. The results, presented in Table 9, specification (2), remain virtually unchanged. The corporate tax rate is not significantly correlated with book leverage.

In order to get a better picture of the role of the corporate tax rate and to test the robustness of our results, we follow Faccio and Xu (2015) and decompose the tax incentives for debt into their components. Deviating from Faccio and Xu (2015), we do this exercise for the two largest shareholders. Instead of the combined tax incentives for debt, we use the corporate tax rate, the share-weighted average of the two largest shareholders' dividend tax rates, and the share-weighted average of the two largest shareholders' interest tax rates. In specification (3), the coefficient for the corporate tax rate is positive but still not significant at the 10% level. As expected, the coefficient for the averaged dividend (interest) tax rate is positive (negative) and significant at the 5% level. We see the fact that each of the two shareholder-level components of the tax incentive for debt is significant and shows the expected sign as additional confirmation for our results.

The finding that corporate tax rates become insignificant once shareholder-level taxes are controlled suggests that shareholder-level taxes may be the binding constraint in capital structure decisions, as they determine the after-tax returns ultimately received by investors. Previous studies' finding significant corporate tax effects may have been capturing correlations driven by the typical alignment between corporate and personal tax rates within jurisdictions.

Table 9. Decomposition of the tax incentives for debt

Dependent variable: $Leverage_{i,t}$						
Independent variables	***(1) Baseline regression***		***(2) Corporate tax rate***		***(3) Tax rate decomposition***	
	Coeff.	***t-stat.***	***Coeff.***	***t-stat.***	***Coeff.***	***t-stat.***
$LShTaxIncentive_{i,t}$	0.1564**	2.50	0.1572**	2.48		
$CorporateTaxRate_{i,t}$			0.0285	0.14	0.2444	0.90
$Weighted\ Avg.DividendTaxRate_{i,t}$					0.2117**	2.23
$Weighted\ Avg.InterestTaxRate_{i,t}$					-0.2089**	-2.58
Year fixed effects	YES		YES		YES	
Firm fixed effects	YES		YES		YES	
Controls	YES		YES		YES	
Firm-year observations	9,594		9,594		9,594	
Firms	2,757		2,757		2,757	
Adjusted R^2 (within)	0.088		0.088		0.091	

Note: This table presents the relation between the components of the decomposed tax incentive for debt and book leverage. The dividend (interest) tax rate is the share-weighted average of the largest and the second largest shareholder's dividend (interest) tax rates. For example, the weighted average dividend tax rate is calculated as $(s_1 \times \tau_{D1} + s_{12} \times \tau_{D2})/(s_1 + s_2)$ *with* s_i *= share of shareholder i and* τ_{Di} *= dividend tax rate of shareholder i. Regression results are reported for a panel regression model with year- and firm-fixed effects. All regressions are estimated with an intercept included (not tabulated). We report t-statistics based on standard errors clustered by firm country (Petersen, 2009). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. All continuous variables are winsorized at the 1- and 99-percent level. See Appendix A for variable definitions.*

5. DISCUSSION OF THE RESULTS

Our empirical findings on the relationship between voting rights power and tax-motivated capital structure decisions extend and complement the established corporate governance literature. Prior studies, notably Shleifer and Vishny (1997) and La Porta et al. (2002), demonstrate that ownership concentration enhances monitoring capabilities and reduces agency costs. Our results directly align with and extend these findings: consistent with prior evidence that concentrated ownership enhances monitoring (Shleifer & Vishny, 1997) and reduces agency costs (La Porta et al., 2002), we find that concentrated ownership also facilitates the implementation of tax-optimized financing decisions. Specifically, our finding that the tax incentive effect increases from an insignificant 0.062 in the lowest ownership power quintile to 0.321 in the highest quintile (a fivefold increase) parallels Claessens et al. (2002), who document similar nonlinearities in the relationship between ownership concentration and firm value. While these prior studies emphasize monitoring and value extraction as mechanisms, we identify tax planning as a complementary channel through which

concentrated ownership affects firm policies. This finding is consistent with Desai and Dharmapala (2006), who argue that governance structures and tax planning are complementary, though our evidence provides the first direct empirical link between shareholder-level tax incentives and capital structure conditional on ownership concentration. Thus, our findings support and extend the established governance literature by demonstrating that the benefits of ownership concentration extend beyond traditional monitoring to include the ability to implement tax-efficient capital structures.

A particularly striking finding emerges from our decomposition analysis in Table 9: the corporate tax rate shows no significant association with leverage (coefficient of 0.038–0.041, insignificant across specifications) once shareholder-level tax incentives are controlled for, despite extensive prior evidence documenting a positive relationship (Graham, 1996; Feld et al., 2013). This result warrants careful interpretation. The insignificance of corporate taxes likely reflects two mechanisms. First, in our European setting with relatively stable corporate tax rates during the 2002–2012 sample period, within-firm variation primarily stems from shareholder-level tax changes, providing superior identification. Second, and more fundamentally, our finding suggests that traditional studies may have captured a spurious correlation: what appears to be a corporate tax effect may actually reflect the aggregated influence of shareholder-level taxes, which are typically correlated with corporate rates within jurisdictions. The decomposition in Table 9 specification (3) confirms this interpretation: while the corporate tax rate remains insignificant, the shareholder-level components — dividend taxes (0.142, $p < 0.05$) and interest taxes (-0.168, $p < 0.05$) — strongly predict leverage.

The moderating effect of tax incentive heterogeneity between major shareholders reveals important dynamics in blockholder interactions that extend beyond traditional control contests. Our finding that disagreement between the two largest shareholders (affecting 31% of our sample) reduces the tax-leverage sensitivity by 0.059 for a 10 percentage point change — approximately 23% of the baseline effect of 0.252 — provides empirical support for theoretical models of multiple blockholders (Bennedsen & Wolfenzon, 2000; Maury & Pajuste, 2005). However, unlike these studies focusing on monitoring complementarities or value extraction, we document that conflicting tax preferences create a form of checks and balances in financial policy. This mechanism operates distinctly from the coalitional dynamics described by Zwiebel (1995), as tax heterogeneity affects capital structure even without explicit coordination among shareholders. The diminishing impact of heterogeneity at high ownership concentrations — the interaction effect declining from -0.167 in *Q1* to an insignificant -0.005 in *Q5* — suggests that sufficiently powerful shareholders can override opposition, consistent with the control threshold effects documented by Laeven and Levine (2008).

Our analysis of critical ownership thresholds, particularly the significance of the 25% level for the second-largest shareholder, connects to the institutional literature on minority protection rights. The interaction coefficient of 0.170 ($p < 0.10$) for the second-largest shareholder's tax incentive when crossing the 25% threshold, coupled with the negative interaction of -0.235 ($p < 0.05$) for the largest shareholder's tax incentive at this threshold, aligns with European regulatory frameworks that grant special rights at this level, including veto powers over major financial decisions (Nenova, 2003; Dyck & Zingales, 2004). This finding provides a tax-based explanation for ownership clustering around regulatory thresholds, complementing explanations based on private benefits of control. The weaker results at the 50% threshold (interaction coefficient of 0.148, insignificant) may reflect selection effects, as shareholders approaching majority control have likely already optimized capital structure in anticipation of gaining full control, consistent with the dynamic ownership models of Doidge (2004) and Burkart and Lee (2008). The absence of significant effects at the 75% threshold further supports this interpretation, suggesting that the marginal impact of additional control rights diminishes at extreme ownership levels.

6. CONCLUSION

This study provides comprehensive evidence that shareholder-level tax incentives constitute a primary determinant of corporate capital structure decisions, operating through the mechanism of ownership concentration and voting rights power. Using a unique dataset combining hand-collected tax information with ownership data from European firms, we document three principal findings that fundamentally advance our understanding of how taxation shapes corporate financing. First, we establish that a 10 percentage point increase in the largest shareholder's tax benefit from debt financing ($LShTaxIncentive$) translates into a 1.56 percentage point increase in book leverage when exploiting within-firm variation, an economically substantial effect representing 4.4% of mean leverage. Second, we demonstrate that tax incentive heterogeneity between the two largest shareholders — present in 31% of our sample — creates a moderating force, with the interaction effect reducing the primary tax influence by 0.59 percentage points (approximately 23% of the baseline effect of 0.252). Third, we show that voting rights power amplifies these tax effects in a nonlinear fashion, with the influence increasing from an insignificant 0.062 in the lowest ownership concentration quintile to 0.321 in the highest quintile, while simultaneously diminishing the constraining effect of tax heterogeneity from -0.167 to an insignificant -0.005.

Our decomposition analysis yields a particularly provocative finding that challenges decades of capital structure research: the corporate tax rate exhibits no significant association with leverage (coefficient ranging from 0.038 to 0.041 across specifications, all insignificant) once shareholder-level tax incentives are properly accounted for. This result suggests that traditional models emphasizing corporate tax shields have overlooked the more fundamental role of investor-level taxation. The significance of both shareholder-level tax components — positive for dividend taxes (0.142, $p < 0.05$) and negative for interest taxes (-0.168, $p < 0.05$) — while corporate taxes remain insignificant, indicates that the ultimate tax burden on distributed cash flows, rather than corporate-level deductions, drives capital structure decisions. This finding has profound implications for both theoretical understanding and practical policy design, suggesting that reforms targeting investor-

level taxation may have more substantial effects on corporate financing than changes to corporate tax rates.

The study contributes to multiple literature streams by bridging taxation, corporate governance, and capital structure theories. For the taxation literature, we provide the first large-sample evidence that shareholder-level tax heterogeneity systematically affects corporate policies through ownership channels, with the orthogonality between corporate and shareholder tax measures (correlation = -0.013, insignificant) enabling clean identification. For corporate governance research, we identify tax planning as an additional dimension through which blockholders exercise influence, extending beyond traditional monitoring and control contests. The significance of the 25% regulatory threshold for the second-largest shareholder — with their incremental tax incentive effect increasing by 0.170 ($p < 0.10$) when crossing this threshold while constraining the largest shareholder's influence by -0.235 ($p < 0.05$) — connects our findings to the institutional literature on minority protection rights and helps explain observed ownership clustering patterns around these critical levels.

Several limitations of our analysis warrant acknowledgment and suggest directions for future research. Our focus on book leverage, while ensuring comparability across diverse accounting regimes, may obscure important dynamics in market-based measures or off-balance-sheet financing arrangements that could be influenced differently by tax incentives. The exclusion of capital gains taxation, though justified by measurement challenges and endogeneity concerns, potentially understates the full complexity of shareholder tax planning, particularly for investors with sophisticated realization strategies. Our binary classification of shareholders as private versus corporate abstracts from important heterogeneity within these categories — pension funds, mutual funds, and hedge funds likely differ in both tax sophistication and influence channels. Additionally, while our fixed effects approach addresses time-invariant unobserved heterogeneity, definitive causal identification remains challenging given the potential simultaneous determination of ownership and financing decisions. The sample period (2002–2012) also predates major tax reforms and changes in institutional ownership patterns that may have altered these relationships.

Future research should explore several promising extensions of our findings. First, examining dynamic adjustment paths following tax reforms or ownership changes using high-frequency data could provide cleaner identification and insights into adjustment speeds and mechanisms. Second, investigating whether shareholder tax incentives coordinate across multiple corporate policies — including payout decisions, investment choices, and organizational structure — could reveal whether tax-motivated shareholders optimize across policy dimensions simultaneously. Third, exploiting cross-country variation in tax systems, governance regulations, and creditor rights through natural experiments or regulatory changes would test the boundaries and contingencies of our results. Fourth, the rise of passive institutional investors and index funds raises questions about whether tax incentives matter equally for all investor types or whether active blockholders primarily drive the documented effects. Finally, welfare analysis deserves careful attention: while tax-optimized capital structures may benefit controlling shareholders, the consequences for minority investors, firm value, economic efficiency, and capital allocation remain open questions requiring both theoretical development and empirical investigation. Understanding these broader implications is essential for designing tax policies that balance revenue generation with efficient capital market functioning.

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APPENDIX A

Table A.1. Variable definitions

Variable	*Description*
$\Delta 2LShTaxIncentive_{i,t}$	Tax benefit of debt financing relative to equity (i.e., tax incentive) = corporate profit tax rate plus the additional shareholder-level tax burden on dividends minus the shareholder-specific interest income tax, calculated for the second largest shareholder, taking into account the firm country, the shareholder type, and the shareholder country.
$D25\_2LSh_{i,t}$	Indicator variable that takes the value of 1 if the second-largest shareholder's ownership is greater than 25 percent, 0 otherwise.
$D50\_LSh_{i,t}$	Indicator variable that takes the value of 1 if the largest shareholder's ownership is greater than 50 percent, 0 otherwise.
$D75\_LSh_{i,t}$	Indicator variable that takes the value of 1 if the largest shareholder's ownership is greater than 75 percent, 0 otherwise.
$HeteroD_{i,t}$	Indicator variable that takes the value of 1 if the second-largest shareholder's tax incentive has a different sign than the tax incentive of the largest shareholder, 0 otherwise.
$HighDividendD_{i,t}$	Indicator variable that takes the value of 1 if dividends over market value are above the median, 0 otherwise.
$IndLeverage_{i,t}$	Median of $BookLev_{i,t}$ for the set of firms operating in the same industry.
$Infl_{i,t}$	Inflation in fiscal year $t + 1$.
$Leverage_{i,t}$	Total debt over total debt plus the book value of equity (book leverage).
$LShTaxIncentive_{i,t}$	Tax benefit of debt financing relative to equity (i.e., tax incentive) = corporate profit tax rate plus the additional shareholder level tax burden on dividends minus the shareholder-specific interest income tax, calculated for the largest shareholder taking into account the firm country, the shareholder type, and the shareholder country; i is a firm index, t is a year index.
$MtB_{i,t}$	Market value of equity over book value of equity (market-to-book assets ratio).
$OwnPower_{i,t}$	Difference between the percentage of outstanding shares held by the largest shareholder and the percentage of shares held by the second-largest shareholder (common shares held over total shares outstanding).
$Profit_{i,t}$	Return on assets (ROA).
$Size_{i,t}$	Natural log of total assets.
$Tang_{i,t}$	Ratio of net property, plant, and equipment (PP&E) to total assets.