Capital Structure, Corporate Investment, and Investor-Level Taxes: Evidence from a Natural Experiment in Europe*

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Abstract

We study a court ruling that materially affected dividend taxation in several European countries. The tax changes were not directly related to economic conditions or part of broader policy initiatives, providing a useful experiment for identifying the effect of taxation on capital structure, payout, and investment decisions. Consistent with theory, we find that dividends and equity issuance decline after these changes. Leverage ratios change little on average but increase substantially for capital-raising firms, which, in theory, are the most affected by the tax changes. Moreover, investment rates decrease for capital-raising firms, consistent with an increase in their after-tax cost of capital.

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1 Introduction

Since Modigliani and Miller (1963), it has been understood that taxes play an important role in shaping corporate financial and investment policies. Yet, reliably estimating causal effects of taxes on corporate policies has long been a challenge in assessing the theory. A number of papers over the years have studied firms' responses to changes in statutory tax rates and tax policies. However, these tax changes are generally motivated by economic and political considerations and are often part of broader policy initiatives, making it difficult to identify causal relationships between taxes and corporate policies. Our paper introduces and analyzes a new quasi-natural experiment in which several European Union (EU) countries made large, involuntary changes to their tax systems due to two European Court of Justice (ECJ) rulings. These changes increased the effective tax on dividends, but the rulings giving rise to them were based on a largely technical point that was unrelated to whether any country's effective dividend tax rates were suboptimally high or low. This feature allows us to sidestep concerns about many potential confounding factors in estimating the effect of taxes on corporate policies.

The ECJ ruled in the landmark 1999 *Verkooijen* case that a small exemption granted to shareholders in the Dutch tax system for dividends paid by domestic but not foreign firms violated European Commission (EC) law because it discriminated against firms in other EU countries. At the time of the ruling, seven of the 15 EU countries had "imputation" tax systems, wherein shareholders receive "franking credits" for corporate taxes paid at the firm level when they receive dividends. The other eight had "classical" tax systems, wherein equity income is effectively double-taxed. While the *Verkooijen* case involved a tax exemption, the court's conclusion that disparate tax treatment of investors in domestic and foreign firms violated EC law clearly implied that imputation systems in the EU also violated EC law, since investors only received franking credits for dividends paid by domestic firms. The ECJ

made this implication explicit, concluding that Finland's imputation system violated EC law, in the 2004 *Manninen* ruling. To comply with these rulings, all seven EU countries with imputation systems transitioned to classical systems between 2000 and 2008, substantially increasing the effective tax on dividends in these countries.

The EU in the wake of the the *Verkooijen* and *Manninen* rulings represents a powerful setting for studying the effect of taxes on corporate choices. In addition to being plausibly exogenous with respect to corporate policies in the affected countries, the tax changes in response to the rulings were large in magnitude and affected a large number of firms, providing statistical power. Moreover, the staggered timing of the changes helps to mitigate concerns about the contaminating effects of any other individual shock in Europe during this period. Finally, we exploit the fact that eight EU countries already had classical tax systems at the time of the *Verkooijen* ruling to construct a control sample.

We begin our analysis by comparing the financial and investment policies of firms in imputation and classical countries at the time of the *Verkooijen* ruling. Relative to matched firms from countries with classical systems at the time of the ruling, firms in countries with imputation systems pay more dividends, invest more in capital assets, and have lower leverage ratios, consistent with franking credits lowering the effective tax on dividends, the after-tax cost of capital, and the tax advantage of debt relative to equity. We then estimate changes in financial and investment policies following the tax system changes using a stacked cohort difference-in-differences approach. In our diff-in-diff framework, treatment is a switch from an imputation to classical tax system, the treated are firms in countries that switch (those with imputation systems at the time of *Verkooijen*), and controls are matched firms in countries that do not switch (those with classical systems at the time of *Verkooijen*). Firms in switching countries receive treatment during the measurement window, while those in non-switching countries are already treated at the beginning of the window.

Our analysis reveals that firms in switching countries realize large and statistically sig-

nificant dividend decreases as well as equity issuance increases and that this response to the treatment results in a convergence in these financing activities to the levels observed in control firms. Interestingly, firms decrease debt issuance as well, so the overall level of capital-raising decreases. This decrease in capital raising is consistent with a combination of reduced dividend payments increasing internal financing capacity and an increase in the after-tax cost of capital reducing investment and hence financing needs. Consistent with the effect of an increase in cost of capital, we find that firms decrease capital expenditures substantially after treatment. We estimate only a small and, at most, marginally statistically significant increase in leverage ratios after treatment.

These average effects ignore important differences across firms based on whether they rely on internal or external capital to finance investment. A higher tax on dividends raises the cost of external equity but may actually decrease the opportunity cost of using internal equity because it makes the alternative of paying out retained earnings less attractive (Auerbach, 1979). As a consequence, taxable shareholders' preferred investment level should decrease more in response to an increase in the dividend tax if the firm relies on external financing than if it relies on internal financing (Masulis and Trueman, 1988).[1] Consistent with this argument, we find that firms raising external capital pre-treatment decrease investment in response to treatment more than firms that did not recently rely on external capital.

The logic of Auerbach (1979) also has implications for the capital structure response to a dividend tax increase. While an increase in dividend taxes increases the tax advantage of debt (Miller, 1977) and hence the optimal leverage ratio, the need to pay dividends makes increasing leverage via recapitalization costly. This tax friction may retard increases in leverage by firms that finance their investment internally. However, it should have less of

[1]In principle, firms can also pay out equity by repurchasing shares, which tends to be more tax efficient than paying dividends. The *Verkooijen* and *Manninen* rulings had no effect on the tax costs of repurchasing shares. However, in practice, repurchases represented a small fraction of total payouts for firms in the EU during our sample period. We discuss various institutional frictions that may have prevented EU firms from using share repurchases to return cash to shareholders during this period.

a retarding effect for firms that are expected to raise external capital, since these firms can increase leverage by simply favoring debt issuance over equity issuance. Consistent with this difference, we find that firms raising capital pre-treatment increase leverage ratios more in response to the tax change than firms not relying on external capital. Indeed, while the average treated firm in our sample increases leverage either slightly or not at all, capital-raisers increase leverage ratios significantly.

Finally, we conduct a cross-country comparison that exploits variation in the effective size of the tax changes based on the details of different imputation systems. We find larger increases in investment and leverage ratios and decreases in equity issuance for firms in countries switching from "full imputation" systems, which award a franking credit for 100% of corporate taxes paid, than for firms in countries switching from "partial" imputation systems, which award a franking credit equal to only 50% of corporate taxes paid. We provide quantitative estimates of the effect of taxes on capital structure policy by analyzing the relationship between the change in leverage ratios and the country-specific change in the tax advantage of debt after switches. We estimate that a 1 cent increase in the tax advantage of debt per dollar of income increases book leverage by 0.1 percentage points.

While the *Verkooijen* and *Manninen* rulings were unlikely to have been motivated by broader financial or economic objectives, the timing of the resulting tax system changes raises two concerns for our empirical strategy. First, firms might have anticipated the tax system changes and adjusted policies prior to the changes. While we cannot rule out the possibility of anticipatory changes, we see no evidence of firms systematically altering their financing and investment policies meaningfully in the lead-up to the tax system changes. Second, countries may have chosen the specific timing of the changes in anticipation of future economic conditions or as part of a broader policy shift. Either of these possibilities could confound estimation of the causal effects of the tax system changes. While we cannot rule out these possibilities, we do not observe any factors driving the timing of these changes

that would confound causal inference.

Our paper contributes to a substantial literature that explores the effect of both corporate and personal taxes on financial policies. For example, Givoly, Hayn, Ofer, and Sarig (1992) present evidence that firms with more high-tax bracket investors increased leverage more after the 1986 US Tax Reform Act (TRA) reduced the preferential treatment of capital gains. Chetty and Saez (2005) find that firms increased dividend payments in response to the US Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) of 2003, which cut dividend tax rates. Lin and Flannery (2013) find that firms decreased leverage in response to the JGTRRA, consistent with the tax cut reducing the tax advantage of debt over equity.[2] In cross-country studies, Fan, Titman, and Twite (2012) and Faccio and Xu (2015) find that leverage ratios increase with the tax advantage of debt, and in a U.S. study analyzing state-level corporate tax changes, Heider and Ljungqvist (2015) find that firms increase leverage in response to state-level corporate tax increases, but do not reduce leverage in response to tax decreases. Our paper adds to this literature by providing evidence that an increase in the tax advantage of debt leads to an increase in leverage ratios primarily for firms raising external capital.

Two factors make results from existing studies of statutory tax changes challenging to interpret. The first is that the tax changes may represent a response to economic factors that affect financial policy, and the second is that the tax changes are often part of broader policy shifts that may independently affect financial policy. Heider and Ljungqvist (2015) address the first of these identification challenges by comparing financing choices of firms located on either side of the border of a state changing tax rates. The idea is that both firms are subject to the same economic conditions but only the firm in the treated state experiences a change in taxes. However, this identification strategy leaves the second identification

[2]Other papers study the response of financial margins to a dividend tax cut in Sweden (Jacob and Michaely, 2017), the adoption of an imputation tax system in Australia (Pattenden and Twite, 2008), and anticipation of two dividend tax shocks in 2011 and 2013 in the US (Hanlon and Hoopes, 2014).

challenge unaddressed, since state policy varies discontinuously across state borders. Our paper addresses both challenges, because the tax changes we study were compelled by extra-national court rulings that were neither motivated by local economic factors nor part of any broader policy direction.

Finally, our paper also contributes to the literature that studies the impact of shareholder-level taxes on corporate investment. Studying a number of dividend tax changes across multiple countries, Becker, Jacob, and Jacob (2013) find that low cash flow firms decrease (increase) their investment relative to high cash flow firms in response to an increase (decrease) in dividend tax rates. The tax changes they consider include the externally-imposed changes from classical to imputation systems that we study but also other changes that were adopted by choice and hence are more subject to endogeneity concerns. Alstadsæter, Jacob, and Michaely (2017) find a similar difference in the response of low- and high-cash flow firms in Sweden to a 2006 dividend tax in that country. Moon (2019) finds an increase in investment in response to a decrease in the capital gains tax rate in South Korea that affected capital gains taxation differently for firms of different size. However, Yagan (2015) finds that C corporations in the US did not increase their investment relative to S corporations in response to the JGTRRA, which reduced the tax rate on dividends paid to C corporation shareholders.[3] By focusing exclusively on a plausibly exogenous set of tax changes, we are able to provide cleaner evidence of the effects of taxes on investment. Our paper adds to the evidence that dividend taxes affect investment, and that they do so primarily for firms relying on external capital, which face a higher cost of capital after an increase in the effective tax on dividends.

[3]Giroud and Rauh (2019) present evidence that firms' location decisions are sensitive to state-level corporate and personal tax rates.

2 Taxation in the EU and ECJ Rulings

The section discusses the taxation of capital in the European Union and the changes made due to the *Verkooijen* and *Manninen* rulings.

2.1 Imputation and classical tax systems

One important historical feature of taxation in Europe that distinguishes it from the US is its variation in tax systems. While some specific details of the US tax system have varied over time, the US has employed some form of a classical tax system throughout its recent history. In contrast, prior to 2000, seven EU countries had imputation systems - Finland, France, Germany, Ireland, Italy, Spain, and the UK.

In a classical tax system, income paid to shareholders is effectively taxed twice - once, when earned, through the taxation of corporate income, and again, when distributed to shareholders, through taxes on dividends and/or capital gains. An imputation system, in contrast, grants all shareholders of a domestic corporation a tax credit for income tax paid by the corporation. Taxable domestic shareholders can use this "franking" credit to offset dividend taxes that would otherwise be due. An imputation system, then, either eliminates or at least attenuates double taxation for taxable investors.[4] Thus, all else (specifically, tax rates) equal, imputation tax systems result in a lower cost of capital and confer a smaller tax advantage on debt relative to equity financing than classical systems do.

There are three specific variants of classical tax system. Under a *Full Classical Tax System*, dividends are taxed at the full personal income tax rate. Under a *Modified Classical Tax System*, dividends are taxed, but at a lower rate than the personal income tax rate. Under a *Partial Inclusion Tax System*, a specified percentage of dividends is exempt from

[4]In most imputation systems, tax-exempt investors receive a cash rebate for corporate taxes paid when they receive dividends. The only exception we are aware of in the EU is Finland, where tax-exempt investors were not eligible to receive imputation tax credits (Ainsworth, 2016).

taxation. Relative to a full classical system, the modified classical and partial inclusion systems attenuate the second layer of taxation on income received by shareholders. Thus, all else equal, the tax advantage of debt relative to equity and cost of capital are higher under a full classical system than under the other two variants.[5]

There are two specific variants imputation tax system. Under a *Full Imputation* system, shareholders receive a credit equal to 100% of corporate taxes paid. If the corporate tax rate is at least as high as the dividend tax rate, then this credit effectively eliminates the taxation of dividends. Otherwise, it reduces the effective dividend tax to the difference between the dividend and corporate tax rates. Under a *Partial Imputation* system, shareholders receive a credit equal to a percentage (typically 50%) of corporate taxes paid. Thus, all else equal, the effective tax rate on dividends - and hence the tax advantage of debt relative to equity - is smaller under a full imputation system than a partial imputation system. Among the seven EU countries with imputation systems prior to 2000, three had full imputation systems (Finland, Germany, and Italy), while the other four had partial imputation systems (France, Ireland, Spain, and the UK).

2.2 The *Verkooijen* and *Manninen* rulings

In 1999, the ECJ ruled in the landmark *Verkooijen* case that the Dutch tax system, by effectively granting a limited exemption to Dutch taxpayers for dividends paid by Dutch firms but not by firms in other EU countries, violated the EC's ban on obstructions of cross-border economic activity within the EU.[6] The court held that the Dutch system discriminated

[5]The US employed a full classical system until the JGTRRA cut the dividend tax below the personal tax rate in 2003, shifting the US to a modified classical system.

[6]The Dutch tax system required firms to withhold dividend taxes when they paid dividends to shareholders but allowed shareholders to offset any taxes owed by the withheld amount. It granted each Dutch taxpayer an exemption for the first NLG 1,000 of dividends (NLG 2,000 for a couple filing jointly), but this exemption only applied to dividends from shares on which the Dutch dividend tax had been collected. Because non-Dutch firms would not have withheld the Dutch dividend tax, the law had the effect of making the exemption available only for dividends paid by Dutch companies.

against firms in other EU countries by giving Dutch firms an effective cost advantage in raising capital from Dutch investors. In its judgment, the ECJ stated that:

> *Article 1(1) of Council Directive 88/361/EEC of 24 June 1988 for the implementation of Article 67 of the Treaty and Article 52 of the EC Treaty (now, after amendment, Article 43 EC) must be interpreted as precluding legislation of a Member State which grants an exemption from the income tax payable on share dividends subject to the condition that those dividends are paid by a company established in that Member State.*

While the *Verkooijen* ruling addressed the legality of a tax exemption in Holland, which had a classical tax system, the court's conclusion that a provision of a tax system that discriminated against foreign companies violated EC law raised obvious questions about the legality of imputation tax systems in the EU. The UK and Ireland both switched from imputation to classical systems in 2000, followed by Germany in 2002 and Italy in 2004.[7] In 2003, the EC issued a directive discussing the *Verkooijen* case and its implications for EU member countries. This directive mandated equal tax treatment of dividends paid to domestic and foreign shareholders within the EU, stating that:

> *The Commission believes that analysis of this case law leads to fundamental conclusions about the design of dividend taxation systems: Member States cannot levy higher taxes on inbound dividends than on domestic dividends.*

In the meanwhile, a taxpayer in Finland sued the Finnish tax authority in 2000, challenging the legality of the Finnish imputation system on the grounds that it granted franking credits only for dividends paid by Finnish companies. The case eventually reached the ECJ, which ruled in 2004, in the *Manninen* case, that Finland's imputation tax system violated the

[7]While the UK did not technically convert from an imputation system to a classical system until 2000, the UK started granting tax credits to a company's shareholders independently of whether the company paid corporate taxes starting in April 1999 (Ainsworth, 2016). Our analysis is essentially unchanged if we treat the year of the switch for the UK as 1999 instead of 2000 (untabulated).

same EC rule against obstructions to cross-border economic activity within the ECJ cited in the *Verkooijen* case. Indeed, the judgment in the *Manninen* case cites the *Verkooijen* ruling repeatedly. In its judgment, the ECJ stated that:

> *Article 56(1) EC and paragraphs 1(a) and 3 of Article 58 EC preclude provisions of a Member State under which the tax on a dividend received by an individual who is fully taxable in his country of residence from a share company established in the same country is calculated to take account of the corporation tax paid by the company, whereas corporation tax is not offset in the same manner if the dividend is distributed by a company established abroad.*

Finland and France switched from imputation to classical tax systems immediately after the *Manninen* ruling, in 2005. Spain was the last EU country to abandon its imputation system, which it did in 2007. Thus, all seven EU countries with imputation tax systems switched to classical tax systems between 2000 and 2007.

Under a classical system, shareholders receive no credit for taxes paid at the corporate level, regardless of the domicile of the firm. Therefore, switching from imputation to classical systems allowed the governments of the affected countries to comply with the ECJ rulings and EC directive.[8] Three of the seven switching countries transitioned to full classical systems (Ireland, Italy, Spain), one to a modified classical system (UK), and three to partial inclusion systems (Finland, France, Germany). Table 1 summarizes the seven changes in tax systems, which form the basis for our empirical analysis, in detail.

[Table 1 about here]

Econometrically, these changes have three useful features. First, they were effectively involuntary, and the court rulings that ultimately gave rise to them were based on a largely

[8] In principle, a country could have maintained an imputation system if it granted franking credits for dividends paid by foreign companies. However, foreign governments rather than the domestic government would have received the corporate tax giving rise to the credit, making such a system unattractive to the adopter.

technical argument regarding discrimination across countries rather than any consideration of optimal tax policy in any given country. Thus, we can reasonably treat these changes as exogenous shocks to effective dividend taxes for the affected countries, allowing us to sidestep concerns about confounding effects inherent in any voluntary change in a country's tax policy. Second, they were staggered over time in their implementation, mitigating concerns that other events during a narrow time window might make the independent effects of the tax changes difficult to tease out. Third, as we show shortly, these changes had a large impact on effective dividend tax rates.

2.3 Importance of tax system changes due to the ECJ rulings

All else equal, switching from an imputation to classical system increases the effective taxation of corporate dividends. To gauge the importance of these changes, we compute Miller's (1977) measure of the tax advantage of an incremental dollar of debt at the country-year level based on a country's tax system and statutory tax rates at the time. To do so, we use a multitude of sources to obtain and verify tax rates throughout the period 1992-2012. The main sources are the OECD's Tax Database (Combined Corporate Income Tax Rate section) and PWC Worldwide Tax Summaries.[9] In countries with imputation systems, we assume that all taxable earnings are distributed to shareholders. We compute the Miller measure as:

$$Miller = 1 - \frac{[1 - (1 - FC)CTR] \times [1 - DTR \times (1 - Exemption)]}{1 - ITR}, \tag{1}$$

where CTR, DTR, and ITR are the top statutory corporate, dividend, and interest income tax rates, respectively, FC is the fraction of corporate taxes paid granted to shareholders

[9]Other sources are PWC Doing Business, KPMG Tax Facts, KPMG Corporate and Indirect Tax Survey, Ernst & Young Worldwide Personal Tax Guide, Commission of European Communities Dividend Taxation of Individuals, Commission of European Communities Company Taxation, PKF Worldwide Tax Guide, and Harding (2013).

as franking credits, and *Exemption* is the fraction of dividends exempt from taxation. The franking credit fraction FC is 1 in a full imputation system, between 0 and 1 in a partial imputation system, and 0 in any form of classical system. The dividend exemption is 0 in all systems except for a partial inclusion tax system, where it lies between 0 and 1.

Figure 1 plots the time series of the Miller measure around switches from imputation to classical systems, where year S denotes the year of the switch, for the seven EU countries with imputation systems as of the *Verkooijen* ruling. In all seven switching countries, the Miller measure varies little from year to year over the four years before the switch. In six of the seven, the Miller measure increases sharply from the last year before the switch (year $S-1$) to the year in which the switch takes place (year S). The exception is France, which switched from a partial imputation system with a 50% franking credit to a partial inclusion system with a 50% dividend exemption. The dividend tax rate in France at the time (53.5%) was considerably higher than the corporate tax rate (35.4%). As a result, exempting 50% of dividend payouts from taxation had a larger effect on the total tax on each dollar of equity income than crediting shareholders for 50% of corporate taxes paid.

[Figure 1 about here]

In five of the six countries in which the Miller measure increased after the switch, it remains much higher than its pre-switch level four years after the switch. The exception is Ireland, where it rises markedly the first year under a classical system before declining steadily over the next three years to approximately its pre-switch level. This decline occurs because Ireland lowered its corporate tax rate from 24% in 2000 (Ireland's first year under a classical system) to 20% in 2001, 16% in 2002, and 12.5% in 2003. The seven tax system changes collectively are responsible for a considerable portion of the overall variation in taxes in the EU over the period 1992-2012. Table 2 summarizes the total, cross-sectional, and time-series variation in the Miller measure for firms located across EU countries and,

for comparison, firms located across US states. The observational unit is a country-year in the EU and a state-year in the US.

[Table 2 about here]

The first two rows report variances for the EU, while the last two report variances for the US. As the first column shows, the total variance of the Miller measure in the EU is 0.147, almost 50% larger than the total variance of 0.102 in the US. The second column shows that the EU exhibits substantially more cross-sectional variation in tax rates than the US. The cross-sectional variance in the Miller measure across countries in the EU is 0.105 and across states in the US is 0.020. This difference is not surprising since most taxation in the US takes place at the federal level, with comparably small differences across states. By comparison, all taxation in the EU takes place at the country level. There is therefore considerably more scope for cross-sectional variation in tax rates in the EU than in the US.

The third column shows similar time-series variances in the Miller measure in the EU (0.102) and the US (0.100). However, most of the variation in the US is attributable to one event - the 2003 US federal dividend tax cut that was part of the JGTRRA. Excluding this one dividend tax cut, the time-series variance of the measure in the US falls to 0.021. This remaining variation reflects changes in state-level tax rates. The third column also shows that almost 75% of the time-series variance of the Miller measure in the EU is attributable to the seven changes in tax systems stemming from the ECJ rulings. Thus, tests of the response of capital structure to these changes should have statistical power. Moreover, the fact that these changes were staggered over time allows us to filter out the effects of any unobserved aggregate variation that might be correlated with capital structure policies in Europe.

As further evidence of the importance of the changes in the tax systems we study, these changes were followed by a shift in the foreign ownership of firms in the affected countries.

The differential treatment of foreign and domestic shareholders under an imputation system naturally gives rise to a home bias in share ownership. This home bias decreases after a switch to a classical tax system. Consistent with this disadvantage impacting ownership, foreign equity investment (reported by the International Monetary Fund's Coordinated Portfolio Investment Survey) as a fraction of stock market capitalization increases from an average of 35.6% over the four-year period before a switch from imputation to classical system to 51.8% over the four-year period after.[10]

One important difference between the EU and the US that could impact the response of capital structure to taxes is the means by which companies distribute cash to shareholders. In the US, share repurchases have achieved parity with dividends as a means of distributing cash to shareholders. In the EU, by contrast, share repurchases are uncommon (Rau and Vermaelen, 2002; Oswald and Young, 2004; Manconi, Peyer, and Vermaelen, 2014), and dividends remain the dominant means of distributing cash throughout our sample period.

The lack of share repurchases in the EU is somewhat surprising since a share repurchase is generally a more tax-efficient form of distribution than a dividend payment. European tax experts with whom we spoke attribute the lack of share repurchases in Europe to several factors - the requirement in some countries that repurchases via tender offers be treated as dividends for tax purposes, prohibition of open market offers during the first part of our sample period, lack of safe haven protections for repurchases for the first part of the sample period, a stakeholder (employee and banks) governance structure in several countries, the limited use of options and restricted stock in executive compensation, prohibitions on using the proceeds from debt issues to repurchase stock, and the treatment of repurchases as dividends for tax purposes in countries lacking capital gains tax (see Vermaelen et al., 2005;

[10]The increase in the taxation of dividends for domestically-owned shares associated with a shift from an imputation to a classical system potentially impacts capital structure by increasing the cost of equity. Any expansion of the shareholder base because of a leveling of the tax playing field for foreign investors will attenuate the increase in the cost of the equity, especially for larger firms that are more likely to attract foreign investors, though our results should still be qualitatively valid.

Manconi, Peyer, and Vermaelen, 2014).[11]

3 Data and Sample

This section describes how we compute the variables we use in our empirical analysis and the sample construction process.

3.1 Data

At the time of the *Verkooijen* ruling, the EU consisted of 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the UK. We gather annual financial data for all listed firms in these countries from 1992 through 2012 from Compustat Global. We follow the traditional practice in capital structure studies of omitting financial firms and utilities. We further restrict the sample to firms listed on the stock market of the country in which they are domiciled.

From Compustat Global, we compute a number of variables that we use in our analysis. All of these variables are denominated in euros. We define *Book Leverage* as total debt divided by book capital. Total debt is the book value of short-term and long-term interest-bearing debt. Book capital is the book value of common equity plus the book value of preferred stock plus total debt. We define *Market Leverage* as total debt divided by market capital, where market capital is the market value of common equity plus the book value of preferred stock plus total debt. We define *Equity issues* as cash flow from the sale of common stock less cash spent on the repurchase of common stock, divided by total assets, *Debt issues* as net cash flow from the sale and redemption of long- and short-term debt divided by total assets, and *Dividends* as total dividends divided by total assets. In addition

[11] Open market offers were not permitted in EU countries before 1998; safe haven rules were introduced in 2003 in EU countries.

to these financial variables, we also define *Log(Assets)* as the natural logarithm of total assets, *MarketToBook* as market value of the firm (i.e., market capital) divided by total assets, *Tangibility* as fixed assets divided by total assets, *EBIT* as sales minus cost of goods sold, SG&A expense, and depreciation/amortization, divided by total assets, *EBITDA* as EBIT plus depreciation and amortization divided by total assets, and *Capital Expenditure* as capital expenditures divided by total assets.

We exclude firm-year observations for which *Book Leverage* or *Market Leverage* are missing or for which *Total Assets* is less than €15 million. We exclude these tiny firms because their financial data appears to be less reliable. Studies of US firms often follow the same approach. We chose a cutoff of €15 million because it is similar to the $10 million cutoff that studies of US firms often use. The results of our empirical analysis are not sensitive to the cutoff we use. To minimize the potential impact of outliers, we winsorize all variables at the 1st and 99th percentiles.

3.2 Matched sample construction

We examine the responses of firms' financial policies to changes from imputation to classical tax systems due to the ECJ rulings using a generalized difference-in-differences approach, which we describe in Section 4. To implement this approach, we construct a matched sample consisting of firms in countries that made these changes ("treated" firms) and observationally similar firms in countries that already had classical systems at the time of *Verkooijen* ("control" firms). We construct our matched sample using propensity scores to pair each firm in a switching country to a control firm from an EU country that already had a classical system at the time of the *Verkooijen* ruling. Specifically, for each of the seven switching countries, we collect all firm-year observations from the last four years before the switch (years $S-4$ through $s-1$) and the first four years after the switch (years S though $S+3$). We exclude firms for which we do not observe both *Log (Assets)* and *MarketToBook*

in the year prior to the switch. We also exclude firms not present in the data in at least one of the four years after the switch, as we need both pre- and post-switch data to estimate changes in outcome variables around switches. The remaining firms represent the "treated" group for the given switching country.

This process produces seven treated groups, one for each switching country. We then separately match the firms in each of these treated groups to control firms within the same industry over the same time period based on *Log (Assets)* and *MarketToBook* to form seven matched treated-and-control samples. We match on these two variables because they, along with industry, capture the fundamental characteristics of a business in a parsimonious way. We do not match on financial variables such as leverage because financial variables *should* differ pre-switch given the differences in tax incentives under imputation and classical systems.

To implement our matching approach for a given treated group, we first collect all firm-year observations from countries that already had classical systems at the time of *Verkooijen*. We then remove from this sample firms for which we do not observe total assets or market-to-book ratios in the year prior to the switch for the given treated group or that are not present in the data in any of the four years after the switch. The remaining sample represents our set of candidate control firms. We then pool all treated firms for the given switching country and all candidate control firms into a single sample and estimate the following probit regression using this sample:

$$Pr(Switcher = 1|X) = \Phi(\beta_0 + \beta_1 Log(Assets) + \beta_2 MarketToBook), \tag{2}$$

where β_0, β_1, β_2 are parameters to be estimated, and Φ is the Cumulative Distribution Function of the standard normal distribution. We obtain the fitted values of this regression

for each firm, which represents that firm's "propensity" to be treated - i.e., the probability that a firm in the combined sample of treated and potential control firms is in the treated set, conditional on observables. We then choose as a control firm for each firm in a given treated group the candidate control firm in the same 2-digit SIC code (i.e., strict matching) with the closest propensity score, matching with replacement.[12]

Finally, we stack the seven matched treated-and-control samples based on event time to form our final sample. The result is a sample of treated and control firm-year observations spanning the window $S-4$ through $S+3$ relative to the switch year S. By using this procedure, we select control firms that are in the same industry as treated firms in the sample and similar in size and market-to-book ratio.

Table 3 reports the number of firms in the final sample for each of the seven switching countries. There are considerably more firms in our sample from Germany, France, and especially the UK than from the other four countries. Rather than allow countries with more observations to disproportionately affect our regression estimates, we weight each firm-country observation by the inverse of the number of firms in the respective country in all regression analysis.

[Table 3 about here]

Table 4 presents summary statistics for the firms in the treatment sample computed the year prior to the switch as well as comparisons of treatment and control firms the year prior to the *Verkooijen* ruling and the year prior to the switch. For the pre-*Verkooijen* comparison, we construct an alternative matched sample using the same matching approach we describe above for the main sample, except that we match on observables the year prior to *Verkooijen*

[12]Matching within 2-digit SIC ensures reasonable similarity in terms of industry while also ensuring enough candidate matches for each firm that we can obtain good matches on other characteristics. We obtain similar empirical results if we instead match within 3-digit SIC. We report results where we match within 3-digit SIC in the Internet appendix.

(i.e., 1998) instead of the year prior to the switch. In each of the comparisons, we equal weight treatment countries to avoid excessively weighting countries with more firms.

[Table 4 about here]

Our matching process does a good job of homogenizing the treated and control samples on fundamental variables. Treated and control firms in the main sample are similar in terms of size, market-to-book ratio, asset tangibility, and profitability. While we cannot compare firms on *unobserved* dimensions by definition, the similarity of treated and control firms on these observed dimensions provides some comfort that the as-if random assignment assumption for a valid-difference-in-differences estimation is plausibly satisfied. Treated and control firms in the alternative pre-*Verkooijen* matched sample are also similar in terms of fundamentals prior to the *Verkooijen* ruling.

Figure 2 plots the mean value of the Miller measure across the seven countries that switched from imputation to classical systems for each year relative to the transition year. It also plots the mean value of the Miller measure for the eight countries that already had classical tax systems at the time of the *Verkooijen* ruling for the same set of years. The figure shows that the tax advantage of debt relative to equity was much lower for firms in countries with imputation systems pre-transition than for those in countries that already had classical systems. It also shows that the mean increase in the Miller measure after transition completely eliminated the pre-transition difference in the tax advantage of debt.

[Figure 2 about here]

Figure 2 suggests that we should observe that treatment firms have higher leverage ratios, issue more equity, pay more dividends, and invest at a higher level pre-switch than control firms. We generally observe such differences. Treated firms have higher market leverage ratios both before the *Verkooijen* ruling and right before switches, though book leverage

ratios do not differ. Treated firms issue more equity, pay more dividends, and invest more both before the *Verkooijen* ruling and right before switches, though differences in equity issuance pre-*Verkooijen* are not statistically significant. Note that pre-switch differences in financial and investment policies do not present challenges to the as-if random assignment assumption for valid differences-in-differences estimation, as the control firms are already treated (i.e., have classical systems) at the time that the treated firms receive treatment.

As Figure 2 shows, differences in tax incentives for firms in EU countries with imputation and classical systems disappear after the former transition to classical systems. We should therefore observe convergence in financial and investment policies after transitions. We describe how we formally estimate post-switch changes in these policies in the next section.

4 Difference-in-Differences Methodology

This section describes our generalized difference-in-differences methodology. Using the matched sample we described in the previous section, we analyze the effects of changes from imputation to classical tax systems on the financing and investment decisions of firms by estimating the following regression:

$$Y_{it} = \eta PostSwitch_{it} + \lambda Switcher_i * PostSwitch_{it} + \alpha_i + \delta_t + \epsilon_{it}, \tag{3}$$

where Y is an outcome variable, $Switcher$ is an indicator variable equal to one for firms in switching countries and zero for controls, $PostSwitch$ is an indicator variable equal to one for observations in the years after a switch (years S through $S+3$) and zero for observations in the years before (years $S-4$ through $S-1$), and α_i and δ_t represent sets of firm and year fixed effects, respectively. The firm fixed effects absorb any time-invariant heterogeneity across

firms, while year fixed effects control for any aggregate trends in corporate financial policies in the EU during our sample period. The variable *Switcher* does not enter as a separate explanatory variable because it does not vary within firm and hence is fully absorbed by the firm fixed effects. The coefficient λ represents an estimate of the change in the outcome variable Y from the four years before to the four years after a switch, for companies in switching countries relative to controls. This difference-in-differences estimate is the object of interest in the regression. The outcome variables in our analysis are *Book leverage*, *Market leverage*, *Equity issues*, *Debt issues*, and *Dividends*, and *Capex*.

One factor that should affect the response of both financing and investment policy to an increase in the effective tax on dividends is whether a firm relies on internal or external capital to finance investment. A higher tax on dividends raises the cost of external equity. However, it may decrease the opportunity cost of using internal equity because it increases the cost of paying out retained earnings to shareholders as a dividend (Auerbach, 1979). Thus, firms relying on external capital to finance investment are likely to cut investment more in response to an increase in the tax on dividends than those relying on internal capital.

In addition, dividend taxation makes recapitalizing to a higher leverage ratio by issuing debt and paying out equity costly. Firms may therefore refrain from increasing leverage in response to an increase in the tax on dividends, even though the tax advantage of debt, as expressed by Miller (1977), increases. However, firms relying on external capital to finance investment do not need to pay out equity to increase leverage. They can simply tilt their capital raising towards debt. Thus, firms relying on external capital to finance investment are likely to increase leverage more in response to an increase in the tax on dividends than those relying on internal capital.

We test these cross-sectional predictions by splitting our sample based on a firm's capital-raising status. We do not observe a firm's *intended* capital raising after a switch from imputation to classical tax system. Instead, we use whether or not a firm raised a net

positive amount of capital immediately prior to a switch as a proxy for its capital-raising status. Specifically, we consider a firm to be a capital-raiser if it raises a net positive amount of capital (*Equity issues* + *Debt issues* > 0) the year before the switch and a non-capital raiser otherwise. We then estimate (3) separately for capital-raising firms and non-capital raising firms (and their associated controls).

We also estimate (3) separately for firms in countries with full and partial imputation systems at the time that they switched to classical systems (and their associated controls). All else equal, a switch from a full imputation system increases the relative tax advantage of debt more than a switch from a partial imputation system. Thus, any responses in capital structure we observe should be stronger for firms in countries switching from full imputation systems. In addition, we estimate triple-differences regressions to examine the sensitivity of capital structure changes to the change in Miller's (1977) measure of the tax advantage of debt.

While estimates of equation (3) capture the average change in financial and investment decisions from the four years before to four years after the transition from an imputation to classical tax system, they do not indicate the timing of these changes. We provide a more detailed analysis of how financial and investment policies evolve over time by estimating the following regression:

$$Y_{it} = \sum_{\substack{k=-4,-3,\\-2,0,1,2,3}} \beta_k Year(S+k)_{it} + \sum_{\substack{k=-4,-3,\\-2,0,1,2,3}} \gamma_k Switcher_i * Year(S+k)_{it} + \alpha_i + \delta_t + \epsilon_{it}, \quad (4)$$

where, as previously noted, S denotes the year of the switch (i.e., the first year under a classical system). As with equation (3), this regression does not include $Switcher$ as a

separate explanatory variable because it is fully absorbed by the firm fixed effects. Year $S-1$, the final year under an imputation system, is the omitted year in the regression. The γ_k coefficients then capture the difference between outcome variables for firms in switching countries and control firms in a given year relative to the difference in the year $S-1$.

Examining the coefficients γ_{-4}, γ_{-3}, and γ_{-2} allows us to assess differences in pre-trends. It is possible that some of the response will be anticipatory, which will bias our difference-in-differences estimates towards zero. It is also unclear whether one should treat year $S-1$ as a pre-treatment year when analyzing leverage ratios, as a firm that could costlessly adjust its leverage would presumably do so before the end of year $S-1$ in order to begin generating additional tax shields starting in year S.

5 Estimated Changes in Financing and Investment Policies

In this section, we present estimates of changes in firm financial and investment policies around tax system changes arising from the ECJ rulings.

5.1 Graphical analysis

We begin by graphically analyzing the evolution of financial and investment policies around switches from imputation to classical systems, comparing treated firms (those in countries that switched) to control firms. Figure 3 plots mean book leverage, market leverage, equity issuance, dividends, capital expenditures, and change in assets for the treated and control firms separately for each of the four years prior to transition and the four years after transition.

[Figure 3 about here]

Figure 3 generally shows higher equity issuance, dividends, and capital expenditures and lower market leverage for firms in switching countries than for control firms pre-switch, consistent with the evidence in Table 4. While there is some noise in the equity issues time series pre-switch, only the leverage ratio time series show signs of differential pre-trends. However, as we noted in Section 4, firms in switching countries may respond to the pending tax system change by increasing leverage at the end of year $S-1$ in order to begin generating tax shields in year S, the first year under a classical system. If one considers year $S-1$ as part of the post-treatment period for leverage, then differential pre-trends in leverage are less apparent.

Figure 3 also shows a relative decrease in equity issues, dividends, and capital expenditures and an increase in market leverage post-switch for firms in switching countries. All of these changes are consistent with firms responding to the increased tax cost of paying dividends, tax benefits of debt, and cost of capital after the switch from an imputation to classical tax system. However, we do not observe meaningful changes in book leverage. The changes in dividends, capital expenditures, and, to some degree, equity issues result in convergence between firms in switching countries and control firms. As noted previously, such convergence makes sense, as firms in switching countries go from untreated to treated (i.e., from imputation to classical system) while control firms are effectively already treated.

5.2 Difference-in-differences analysis

We next turn to formally estimating changes in financial and investment policies after transitions from imputation to classical tax systems by estimating regression equation (3) for each financing and investment variable we study. Table 5 presents these estimates.

[Table 5 about here]

Panel A reports estimates for all of the firms in our matched sample. Panels B and C

report results for treated firms that we classify as capital-raisers (those for which the treated firm is a net capital raiser in the year prior to the switch) and those that we classify as non-capital raisers (the converse), respectively. We present standard errors clustered by firm below each point estimate in the table.

The estimates in the first two columns of Panel A provide weak evidence of an increase in leverage in the full sample. The coefficients on $Switcher * PostSwitch$ in the book and market leverage regressions are positive but only statistically significant (at the ten percent level) in the market leverage regression. We do observe statistically significant declines in dividends as well as debt and equity issuance. Dividends as a percentage of assets decline by 0.3 percentage points, or 14.6% of the pre-switch mean of 2.3 percentage points (see Table 4, equal-weighted means). The declines in equity and debt issuance are also substantial.

The decrease in dividends is consistent with an increased tax cost of paying dividends under a classical system depressing dividend payments below their previous level. The increase in retained earnings due to this decline in dividends may explain why we observe a decline in capital-raising and only a small increase in leverage. The decline in capital-raising may also be attributable in part to an increase in the cost of external equity. Indeed, capital expenditures decline significantly after changes from imputation to classical systems for the full sample.

While the results in Panel A provide limited support for an increase in leverage after switches from imputation to classical systems for our full sample, the estimates in Panel B indicate that capital-raising firms do increase their leverage ratios substantially post-switch. Book and market leverage ratios for these firms increase by 2.7 and 3.5 percentage points, respectively, after a switch, and both of these increases are statistically significant. In contrast, the estimates in Panel C indicate that non-capital raisers, if anything, decrease their leverage slightly after changes from classical to imputation systems, though the declines are statistically insignificant. These findings are consistent with the tax costs of paying

dividends constraining efforts to increase leverage more for firms with sufficient capital to finance investment than for firms relying on external capital, the latter of which can increase leverage by simply tilting capital raising towards debt.

Dividends also fall by considerably more for capital raisers (a statistically significant 0.5 percentage points) than for non-capital raisers (a statistically insignificant 0.2 percentage points). Firms generating earnings in excess of their investment needs may have limited capacity to cut dividends. Under an imputation system, even a firm raising external capital has an incentive to pay dividends because of the associated franking credit. It is natural that these firms would have the strongest incentive to cut dividends after the transition to a classical system.

Finally, investment declines more for the firms we classify capital-raisers than for non-capital raisers. This finding supports the argument that the overall decline in investment is driven in part by an increased cost of external equity. Non-capital raisers neither increase nor decrease investment. Thus, we do not find support for the trapped equity argument, which suggests that firms reliant on internal capital might increase investment because of the increased opportunity cost of paying dividends. However, it is important to note that our categorization of capital-raisers and non-capital raisers is noisy, and some firms not raising capital pre-switch are likely, by chance, to become dependent on external capital post-switch.

The relative changes we observe in Table 5 appear large enough to offset the pre-treatment differences between treated and control firms reported in Table 4, consistent with the convergence we observe in Figure 3. To verify that our difference-in-difference estimates are not being driven by a single switching country, we reestimate (3) for each outcome variable, excluding one switching country and its associated control observations at a time. Table 6 reports the results. For brevity, we only report the difference-in-differences estimates (i.e., the coefficients on $Switcher * PostSwitch$. The results appear largely insensitive to the exclusion of any individual country.

[Table 6 about here]

5.3 Evolution of policies relative to year of switch

While the results in Table 5 suggest that firms adjust financial policies after a switch from an imputation to classical tax system, they do not speak to the timing of such changes. Next, we estimate regression equation (4), which allows us to examine this timing. Table 7 presents these results.

[Table 7 about here]

Panels A and B present results for the full sample and for capital-raising firms, respectively. We do not show results for non-capital raising firms here, since Panel C of Table 5 reveals few changes after switches for these firms. Recall that year $S-1$ is the final year under an imputation system in a switching country and year S is the first year under a classical system. Also recall that year $S-1$ is the omitted year in the regressions. Thus, the coefficients on $Switcher * Year(S+k)$ capture the difference between switchers and controls relative to the difference in year $S-1$.

Panel A shows that, for the full sample, dividends exhibit a downward jump in the first year under a classical system (year S). They remain between 0.3 and 0.6 percentage points lower than in the last year under imputation for all four years post-switch, and all of these estimates are statistically significant. The timing and persistence of the decline in dividends is consistent with firms clearly responding to the increased tax costs of paying dividends under a classical system.

Equity issuance as a fraction of assets is 2.5 percentage points lower the first year under a classical system (year S) than in the last year under an imputation system (year $S-1$), though the decline is not statistically significant. The decline in equity issues becomes larger in magnitude and statistically significant the second year after a switch (Year $S+1$). Debt

issues decline in the first year under a classical system (year S). There are no clear patterns in the evolution of leverage.

The first two columns of Panel B show that leverage is low relative to controls for years $S-4$ through $S-2$ before increasing in year $S-1$ and remaining at a similar level in years S through $S+4$. Keeping in mind that leverage is a stock variable and that the end of year $S-1$ is also the beginning of year S, the timing suggests that capital-raising firms in switching countries increase leverage sharply in anticipation of the start of the first year under a classical system.

They appear to do so by increasing debt issuance in year $S-1$. The coefficients on $Switcher * Year(S+k)$ are negative and statistically significant for $k=-4$ through $k=-2$ and for $k=0$ through $k=3$. Since $S-1$ is the omitted year in the regressions, these negative coefficients imply that debt issuance is high in year $S-1$ relative to debt issuance levels both before and after year $S-1$. Capital raisers, then, appear to adjust to higher leverage ratios quickly when dividend taxes increase by financing new investment largely with debt. Equity issuance is considerably lower in each of the four years post-switch than in the year prior, and the differences are statistically significant for three of the four years in the post-switch window. Dividends as a percentage of assets are also considerably lower relative to controls (between 0.6 and 0.8 percentage points) in each of the four years post-switch than in the year prior.

5.4 Heterogeneity with change in dividend taxes

Finally, we examine how changes in financing and investment policies arising from a switch vary with the magnitude of the change in the effective tax rate on dividends due to the switch. We do so using two approaches. First, we compare policy changes after switches in countries with full and partial imputation systems pre-switch by estimating regression equation (3) separately for firms (and their controls) in the two groups. All else equal,

switching from a full imputation system to a classical system results in a larger increase in the tax advantage of debt relative to equity than switching from a partial imputation system.

Second, we estimate triple differences regressions of leverage ratios where we interact the difference-in-differences with the change in the Miller measure from year $S-1$ to year S in the switching country. If the increase in leverage after changes from imputation to classical systems reflects a response to an increase in the tax advantage of debt, then we should observe larger increases in leverage for firms in countries where the tax advantage of debt increases more. While this second approach allows us to assess the heterogeneous treatment effect on leverage at a finer level, post-switch tax rates are potentially endogenous. In contrast, the nature of a country's imputation system was fixed at the time of the *Verkooijen* ruling and therefore less subject to concerns about endogeneity. Table 8 presents the results from both sets of analyses.

[Table 8 about here]

Panels A and B present estimates of equation (3) where the treated sample is restricted to firms in countries with full imputation systems pre-switch and those in countries with partial imputation systems pre-switch, respectively. Consistent with a switch from a full imputation system having a larger effect on tax incentives, we observe meaningful and statistically significant increases in both book and market leverage for firms in countries switching from full imputation systems relative to controls but not for firms in countries switching from partial imputation systems. Similarly, we only observe a decline in equity issuance for firms previously operating under full imputation systems, though we do not see meaningful differences in the reduction in dividends. In addition, capital expenditures exhibit an economically meaningful and statistically significant decrease only after changes from full imputation systems.

Panel C presents estimates from the triple differences regressions, where we interact the

change in the Miller measure of the tax advantage of debt with the difference-in-differences. Book leverage increases significantly more after switches when the increase in the Miller measure is larger. Market leverage also increases more when the increase in the Miller measure is larger as well, though the difference is not statistically significant. We also observe larger decreases in equity issuance and capital expenditures when the increase in the Miller measure is larger. Overall, the evidence in Table 8 suggests that financing and investment policies respond more to larger increases in the effective tax on dividends.

6 Conclusion

This paper addresses the role of taxes in the determination of financing policy, one of the central issues in corporate finance. It also addresses the effect of taxes on corporate investment, one of the central issues in public economics. Our analysis focuses on the effects of the tax on dividends, exploiting variation in dividend taxation due to two ECJ rulings that were themselves unconnected to concerns about economic conditions or financial policies. Overall, our empirical results suggest that firms respond to changes in dividend taxes in ways that are consistent with theory.

Our analysis points to the importance of considering variation across firms in incentives to respond to changes in dividend taxes. While we find only weak evidence that firms increase leverage after increases in dividend taxes in the full sample, firms relying on external capital, which can increase leverage by favoring debt over equity issuance without the need to pay out to equity, significantly increase leverage. A natural next step would be to further explore how the ownership of different firms affects the response to the tax changes we study. These changes only affect a firm's domestic shareholders, since foreign shareholders were unable to use franking credits anyway (recall that this was the rationale for the ruling in the *Verkooijen* case). A firm may also be more responsive to changes in dividend taxes if its management

team owns more equity. Detailed ownership data would help to refine our analysis.

The setting we study may also be useful for analyzing the "real" effects of financing on various firm activities. One can think of a change from classical to imputation system as a shock to the cost of external equity. Because the changes we study stem from a court ruling that was itself unconnected to either economic or financial considerations, these changes represent relatively clean shocks to the cost of external equity. They can therefore justifiably be used to identify the real effects of financing on other firm activities beyond those we study here.

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Figure 1: Evolution of Tax Advantage of Debt Around ECJ-Ruling Induced Changes in Tax System

This figure plots the evolution of the Miller's (1977) measure of the tax advantage of debt relative to equity for each imputation country over its last four years as an imputation system and first four years after changing to a classical system.

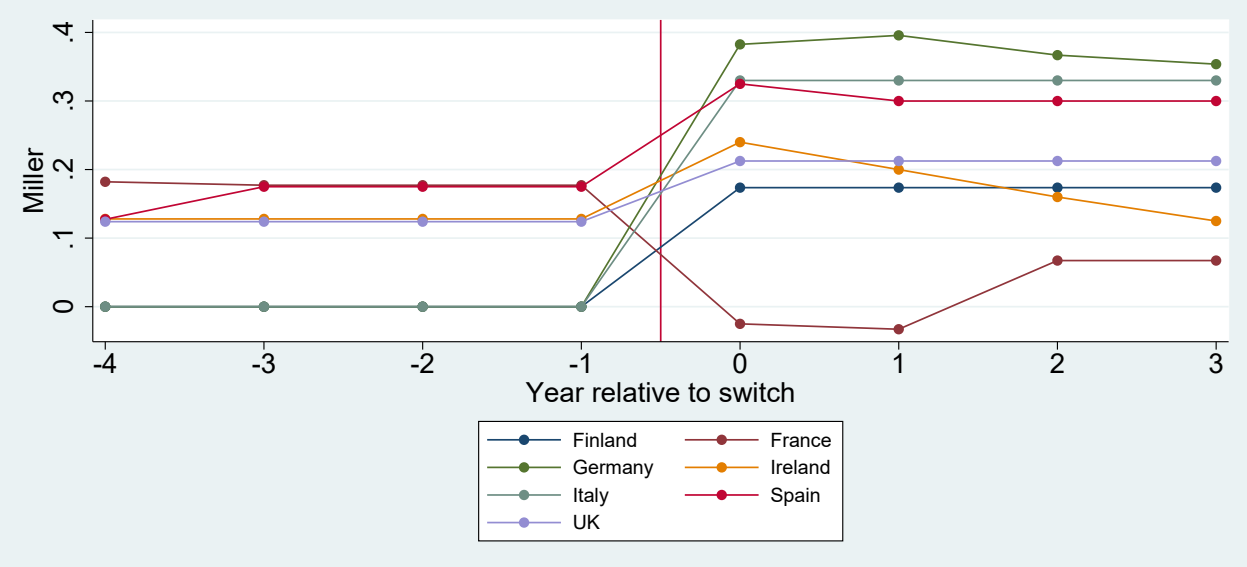


Figure 2: Comparison of Tax Advantage of Debt Around ECJ-Ruling Induced Changes in Tax System for imputation and already-classical countries

This figure plots the mean value of the Miller measure for countries with imputation systems relative to the year the country changed to a classical system as well as the mean value for the same years for all countries that already had classical systems at the time of the Verkooijen ruling).

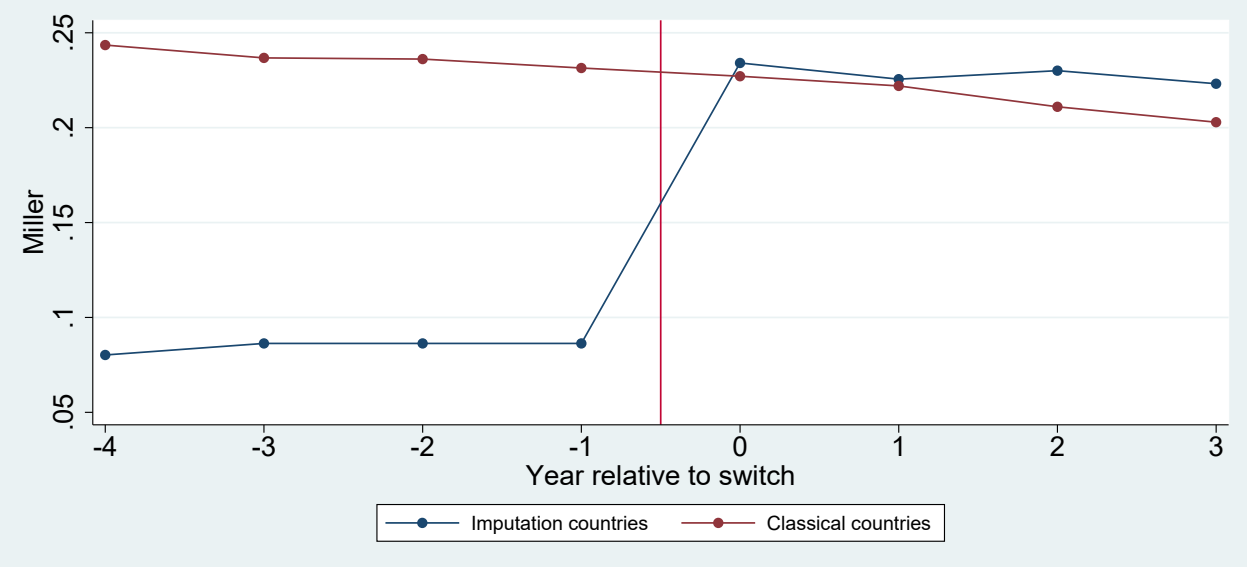
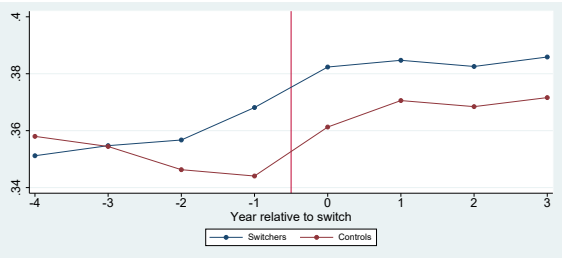


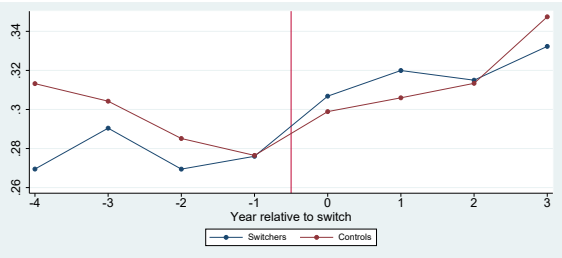
Figure 3: Trends Around ECJ-Ruling Induced Tax System Changes

This figure presents means of various financial and investment variables for firms in switching countries and control firms for the four years before and after a switch. The means are equal-weighted by switching country.

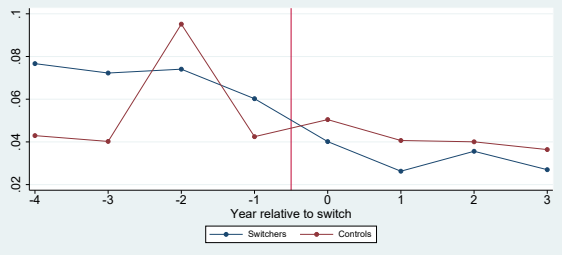
(a) Book leverage



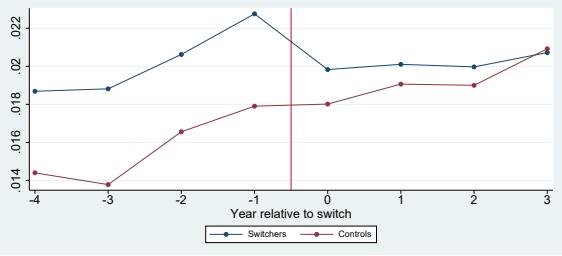
(b) Market leverage



(c) Equity issues



(d) Dividends



(e) Capex

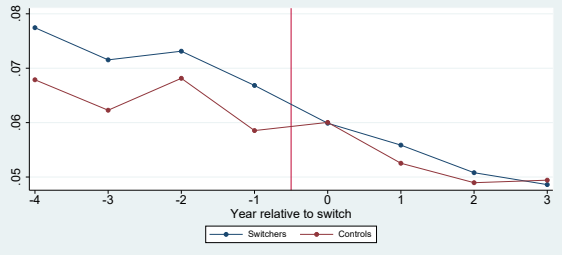


Table 1: Tax System Changes in the EU as a Result of the ECJ Rulings

This table describes the timing and nature of the switches in tax system that we analyze. For each of the seven EU countries with imputation tax systems at the time of the *Verkooijen* ruling in 1999, it reports the year of the switch (i.e., the first year under the new system), the nature of imputation system prior to the switch, and the nature of classical system after the switch.

Country	Switch Year	Pre-switch System	Post-Switch System
Finland	2005	Full Imputation	Partial Inclusion
France	2005	Partial Imputation	Partial Inclusion
Germany	2002	Full Imputation	Partial Inclusion
Ireland	2000	Partial Imputation	Full Classical
Italy	2004	Full Imputation	Full Classical
Spain	2007	Partial Imputation	Full Classical
UK	2000	Partial Imputation	Modified Classical

Table 2: Variation in the Tax Advantage of Debt in the EU and US, 1992 - 2012

This table reports the total, cross-sectional, and time-series annual variance in Miller's (1977) measure of the tax advantage of debt for the 15 countries in the EU as of the time of the *Verkooijen* ruling in 1999 and for the United States. The unit of observation is a country in the EU and a state in the US. The "ECJ rulings changes only" variance in Europe is variance due to the seven EU country tax system changes stemming from the ECJ rulings, ignoring all other tax rate and system variation. The "Excluding 2003 tax cut" variance for the US excludes the one-time drop in the US dividend tax rate starting in 2004 due to the 2003 Jobs and Growth Tax Relief Reconciliation Act.

	Total Variance	Cross-sectional Variance	Time-series Variance
European Union			
All country-years	0.147	0.105	0.102
ECJ rulings changes only			0.074
United States			
All state-years	0.102	0.020	0.100
Excluding 2003 dividend tax cut			0.021

Table 3: Number of Firms by Switching Country

This table reports the number of firms in our matched sample from each country switching from imputation to classical system due to the ECJ rulings.

Country	Number of firms
Finland	94
France	425
Germany	515
Ireland	38
Italy	157
Spain	88
UK	858
Total	2,175

Table 4: ECJ Ruling-Induced Changes in Tax Systems: Summary Statistics and Comparison of Treated and Control Firms

This table presents summary statistics for firms in countries switching from imputation to classical tax systems due to the ECJ rulings ("treated" firms) as well as comparisons of treated with control firms. The first two columns show the mean and standard deviation for each variable measured the year prior to the switch. The third and fourth columns compare the mean value of each variable for treated and control firms the year prior to Verkooijen, where we equal-weight switching countries in computing the means. The fifth and sixth columns compare the means the year prior to the switch, where we again equal-weight switching countries in computing means. *, **, and *** indicate differences in means between treated and control firms based on a two-tailed test with significance at the 10%, 5%, and 1% levels, respectively.

	Treated firms Pre-switch		Means (equal-weighted) Pre-Verkooijen		Pre-switch	
	Mean	S.D.	Treated	Control	Treated	Control
Fundamentals						
Log (Assets)	6.454	2.906	8.011	8.001	8.067	8.043
MarketToBook	1.481	1.847	1.356	1.359	1.353	1.351
Tangibility	0.317	0.219	0.331	0.336	0.331	0.337
EBIT	0.095	0.149	0.096	0.092	0.096	0.092
EBITDA	0.151	0.155	0.152	0.150	0.152	0.150
Financial policies						
Book Leverage	0.335	0.264	0.345	0.364	0.368	0.344
Market Leverage	0.234	0.234	0.259	0.298**	0.256	0.277*
Equity Issues	0.077	0.207	0.058	0.051	0.069	0.051**
Debt Issues	0.019	0.120	0.038	0.033	0.033	0.013***
Dividends	0.021	0.029	0.020	0.015***	0.023	0.018**
Investment						
Capital Expenditures	0.069	0.088	0.095	0.088*	0.068	0.059**

Table 5: Corporate Decisions and ECJ Rulings-Induced Changes in Tax Systems - Difference-in-Differences Estimates

This table presents difference-in-differences estimates of the change in financing variables for countries switching from imputation to classical systems as a result of the ECJ rulings. The sample consists of firm-year observations from the fours years before to four years after a switch for firms in each switching EU country and matched control firms in the same 2-digit SIC industries from unaffected countries. See Appendix B for definitions of the dependent variables. The indicator *Switcher* is one for firms in countries that switched and zero for control firms. The indicator *PostSwitch* is one for the four years after a switch (S though $S+3$) and zero for the four years before ($S-4$ though $S-1$). Panel A reports results for the full sample. Panels B and C report results for capital-raising firms (those raising positive net capital the year before the switch) and non-capital raising firms (the converse), respectively. All regressions include firm and year fixed effects. Observations are weighted by the inverse of the number of observations in the switching country. Standard errors clustered at the firm level appear in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: All Firms

	Book Leverage	Market Leverage	Equity Issues	Debt Issues	Dividends	Capital Expenditures
PostSwitch	0.012*	0.015**	-0.010	0.006	-0.001	0.001
	(0.007)	(0.006)	(0.013)	(0.005)	(0.001)	(0.003)
Switcher * PostSwitch	0.007	0.018*	-0.028**	-0.021***	-0.003***	-0.008***
	(0.010)	(0.009)	(0.013)	(0.005)	(0.001)	(0.003)
Fixed effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Observations	30,425	29,434	22,566	27,597	28,139	27,275
Adjusted R2	0.697	0.705	0.175	0.053	0.593	0.404

Panel B: Capital-Raising Firms

	Book Leverage	Market Leverage	Equity Issues	Debt Issues	Dividends	Capital Expenditures
PostSwitch	0.004	0.014	-0.027	-0.003	-0.002*	-0.004
	(0.009)	(0.009)	(0.020)	(0.008)	(0.001)	(0.004)
Switcher * PostSwitch	0.027**	0.035***	-0.033	-0.044***	-0.005***	-0.014***
	(0.013)	(0.012)	(0.020)	(0.008)	(0.002)	(0.004)
Fixed effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Observations	14,966	14,432	11,286	13,645	13,847	13,470
Adjusted R2	0.683	0.693	0.208	0.068	0.620	0.425

Panel C: Non-Capital-Raising Firms

	Book Leverage	Market Leverage	Equity Issues	Debt Issues	Dividends	Capital Expenditures
PostSwitch	0.022**	0.015*	0.001	0.018***	0.000	0.007**
	(0.009)	(0.008)	(0.011)	(0.007)	(0.001)	(0.003)
Switcher * PostSwitch	-0.020	-0.004	-0.016	0.005	-0.002	-0.002
	(0.013)	(0.013)	(0.011)	(0.006)	(0.002)	(0.004)
Fixed effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Observations	14,609	14,179	10,853	13,377	13,570	13,233
Adjusted R2	0.720	0.727	0.116	0.050	0.569	0.379

Table 6: Corporate Decisions and ECJ Ruling-Induced Changes in Tax Systems - Excluding One Switching Country at a Time

This table presents difference-in-differences estimates of the change in financing variables for countries switching from imputation to classical systems as a result of the ECJ rulings, where we exclude one switching country at a time. The sample consists of firm-year observations from the four years before to four years after a switch for firms in each switching EU country and matched control firms in the same 2-digit SIC industries from unaffected countries. See Appendix B for definitions of the dependent variables. Each pair of rows reports estimates where we exclude the listed switching country and its associated controls from the sample. The table reports only the coefficients and standard errors for $Switcher * PostSwitch$ from each regression for brevity. Observations are weighted by the inverse of the number of observations in the switching country. Standard errors clustered at the firm level appear in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Book Leverage	Market Leverage	Equity Issues	Debt Issues	Dividends	Capital Expenditures
Excluded country						
Finland	0.009	0.019**	-0.027*	-0.022***	-0.004***	-0.007**
	(0.010)	(0.010)	(0.014)	(0.005)	(0.001)	(0.003)
France	0.011	0.019*	-0.028**	-0.022***	-0.003**	-0.011***
	(0.011)	(0.011)	(0.014)	(0.006)	(0.001)	(0.003)
Germany	0.006	0.018*	-0.007	-0.023***	-0.003**	-0.004
	(0.011)	(0.010)	(0.015)	(0.006)	(0.001)	(0.003)
Ireland	0.004	0.011	-0.027**	-0.012***	-0.002	-0.008***
	(0.009)	(0.009)	(0.012)	(0.004)	(0.001)	(0.003)
Italy	-0.002	0.012	-0.031**	-0.024***	-0.004***	-0.010***
	(0.011)	(0.010)	(0.015)	(0.006)	(0.001)	(0.003)
Spain	0.003	0.020**	-0.036***	-0.021***	-0.004***	-0.009***
	(0.011)	(0.010)	(0.013)	(0.006)	(0.001)	(0.003)
UK	0.016	0.027**	-0.038***	-0.021***	-0.004***	-0.008***
	(0.011)	(0.010)	(0.014)	(0.006)	(0.001)	(0.003)

Table 7: Evolution of Corporate Decisions Around ECJ Rulings-Induced Changes in Tax Systems

This table presents year-by-year estimates of the difference in financing variables for countries switching from imputation to classical systems as a result of the ECJ rulings and control firms. The sample consists of firm-year observations from the fours years before to four years after a switch for firms in each switching EU country and matched control firms in the same 2-digit SIC industries from unaffected countries. See Appendix B for definitions of the dependent variables. The indicator *Switcher* is one for firms in countries that switched and zero for control firms. The indicator $YearS + k$, $k = -4, -3, ..., 2, 3$, is one for observations in year k relative to the switch year and zero otherwise. Year $S - 1$ is the omitted year in the regressions. Panel A reports results for the full sample. Panel B reports results for capital-raising firms (those raising positive net capital the year before the switch). Observations are weighted by the inverse of the number of observations in the switching country. Standard errors clustered at the firm level appear in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: All Firms						
	Book Leverage	Market Leverage	Equity Issues	Debt Issues	Dividends	Capital Expenditures
Year(S-4)	-0.009	0.009	0.072***	0.003	-0.003	0.005
	(0.014)	(0.015)	(0.024)	(0.011)	(0.002)	(0.006)
Year(S-3)	-0.001	0.013	0.063***	0.006	-0.004**	0.000
	(0.011)	(0.012)	(0.024)	(0.009)	(0.002)	(0.004)
Year(S-2)	-0.008	-0.004	0.094***	-0.006	-0.003**	0.005
	(0.007)	(0.008)	(0.032)	(0.008)	(0.001)	(0.004)
Year(S)	0.014***	0.018***	-0.035*	0.011	-0.002*	-0.001
	(0.005)	(0.006)	(0.018)	(0.007)	(0.001)	(0.003)
Year(S+1)	0.013**	-0.004	0.023*	0.005	-0.000	0.003
	(0.006)	(0.006)	(0.013)	(0.006)	(0.001)	(0.002)
Year(S+2)	0.007	0.005	-0.006	0.005	-0.001	-0.001
	(0.006)	(0.006)	(0.011)	(0.005)	(0.001)	(0.002)
Switcher * Year(S-4)	-0.024*	-0.036***	0.062**	-0.022**	-0.003*	0.001
	(0.014)	(0.013)	(0.028)	(0.010)	(0.002)	(0.006)
Switcher * Year(S-3)	-0.020*	-0.004	0.053**	-0.017*	-0.000	0.001
	(0.012)	(0.012)	(0.021)	(0.010)	(0.002)	(0.005)
Switcher * Year(S-2)	-0.012	-0.012	-0.021	-0.006	-0.000	-0.004
	(0.008)	(0.008)	(0.038)	(0.010)	(0.001)	(0.005)
Switcher * Year(S)	-0.004	0.007	-0.025	-0.039***	-0.003**	-0.009**
	(0.007)	(0.007)	(0.020)	(0.011)	(0.001)	(0.004)
Switcher * Year(S+1)	-0.010	0.014	-0.036*	-0.030***	-0.004***	-0.007
	(0.011)	(0.009)	(0.018)	(0.010)	(0.002)	(0.005)
Switcher * Year(S+2)	-0.007	0.007	-0.013	-0.030***	-0.005**	-0.008*
	(0.012)	(0.012)	(0.022)	(0.009)	(0.002)	(0.004)
Switcher * Year(S+3)	-0.005	-0.005	-0.018	-0.030***	-0.006***	-0.010**
	(0.012)	(0.014)	(0.023)	(0.010)	(0.002)	(0.005)
Fixed effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Observations	30,425	29,434	22,566	27,597	28,139	27,275
Adjusted R2	0.698	0.706	0.182	0.054	0.594	0.404

Table 7: Evolution of Corporate Decisions Around ECJ Rulings-Induced Changes in Tax Systems (continued from previous page)

Panel B: Capital-Raising Firms						
	Book Leverage	Market Leverage	Equity Issues	Debt Issues	Dividends	Capital Expenditures
Year(S-4)	-0.002	0.023	0.109***	0.006	-0.003	0.007
	(0.020)	(0.021)	(0.041)	(0.017)	(0.003)	(0.007)
Year(S-3)	0.006	0.024	0.077*	0.014	-0.005**	0.001
	(0.016)	(0.018)	(0.042)	(0.013)	(0.002)	(0.005)
Year(S-2)	-0.004	0.001	0.139***	-0.001	-0.002	0.010*
	(0.010)	(0.012)	(0.052)	(0.012)	(0.002)	(0.006)
Year(S)	0.017**	0.025***	-0.053*	0.013	-0.002*	-0.002
	(0.007)	(0.008)	(0.030)	(0.011)	(0.001)	(0.003)
Year(S+1)	0.013*	-0.004	0.024	0.012	-0.000	0.006**
	(0.007)	(0.008)	(0.021)	(0.008)	(0.001)	(0.003)
Year(S+2)	0.008	0.012	-0.023	-0.000	0.000	-0.004
	(0.007)	(0.009)	(0.017)	(0.007)	(0.001)	(0.003)
Switcher * Year(S-4)	-0.069***	-0.079***	0.008	-0.076***	-0.006**	-0.015*
	(0.021)	(0.019)	(0.045)	(0.016)	(0.002)	(0.008)
Switcher * Year(S-3)	-0.066***	-0.040**	0.001	-0.076***	-0.002	-0.008
	(0.018)	(0.018)	(0.036)	(0.017)	(0.002)	(0.006)
Switcher * Year(S-2)	-0.046***	-0.044***	-0.104	-0.056***	-0.002	-0.015**
	(0.012)	(0.013)	(0.063)	(0.015)	(0.002)	(0.007)
Switcher * Year(S)	-0.011	0.001	-0.062*	-0.100***	-0.006***	-0.021***
	(0.009)	(0.009)	(0.034)	(0.016)	(0.002)	(0.005)
Switcher * Year(S+1)	-0.016	0.011	-0.084***	-0.092***	-0.007***	-0.023***
	(0.013)	(0.012)	(0.028)	(0.015)	(0.002)	(0.006)
Switcher * Year(S+2)	-0.017	-0.004	-0.051	-0.089***	-0.008***	-0.022***
	(0.014)	(0.016)	(0.037)	(0.013)	(0.003)	(0.006)
Switcher * Year(S+3)	-0.018	-0.016	-0.063*	-0.087***	-0.008***	-0.022***
	(0.015)	(0.019)	(0.038)	(0.014)	(0.003)	(0.007)
Fixed effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Observations	14,966	14,432	11,286	13,645	13,847	13,470
Adjusted R2	0.686	0.696	0.215	0.082	0.621	0.427

Table 8: Corporate Decisions and ECJ Rulings-Induced Changes in Tax Systems - Variation with Scale of Changes

This table presents difference-in-differences estimates of the change in financing variables for countries switching from imputation to classical systems as a result of the *Verkooijen* ruling. The sample consists of firm-year observations from the fours years before to four years after a switch for firms in each switching EU country and matched control firms in the same 2-digit SIC industries from unaffected countries. See Appendix B for definitions of the dependent variables. The indicator *Switcher* is one for firms in countries that switched and zero for control firms. The indicator *PostSwitch* is one for the four years after a switch (S though $S+3$) and zero for the four years before ($S-4$ though $S-1$). Panel A reports results for the full sample. Panels B and C report results for capital-raising firms (those raising positive net capital the year before the switch) and non-capital raising firms (the converse), respectively. Panel A reports results for firms in countries switching from full imputation countries and Panel B for firms in countries switching from partial imputation systems. All regressions include firm and year fixed effects. Observations are weighted by the inverse of the number of observations in the switching country. Standard errors clustered at the firm level appear in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Full Imputation Countries

	Book Leverage	Market Leverage	Equity Issues	Debt Issues	Dividends	Capital Expenditures
PostSwitch	0.005	0.012	0.015	0.003	-0.005***	0.002
	(0.010)	(0.010)	(0.013)	(0.007)	(0.001)	(0.004)
Switcher * PostSwitch	0.020*	0.025**	-0.062***	-0.007	-0.004*	-0.015***
	(0.012)	(0.013)	(0.015)	(0.006)	(0.002)	(0.004)
Fixed effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Observations	10,852	10,439	8,163	9,887	10,241	9,763
Adjusted R2	0.706	0.698	0.163	0.045	0.591	0.321

Panel B: Partial Imputation Countries

	Book Leverage	Market Leverage	Equity Issues	Debt Issues	Dividends	Capital Expenditures
PostSwitch	-0.001	0.008	0.001	-0.003	0.001	-0.001
	(0.013)	(0.011)	(0.030)	(0.010)	(0.002)	(0.004)
Switcher * PostSwitch	-0.004	0.012	0.001	-0.031***	-0.004**	-0.003
	(0.014)	(0.012)	(0.020)	(0.008)	(0.002)	(0.004)
Fixed effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Observations	19,573	18,995	14,403	17,710	17,898	17,512
Adjusted R2	0.693	0.712	0.219	0.062	0.598	0.471

Panel C: Variation in Δ Miller

	Book Leverage	Market Leverage
PostSwitch	0.012	0.013*
	(0.008)	(0.007)
Switcher * PostSwitch	-0.008	0.012
	(0.011)	(0.010)
PostSwitch * Δ Miller	-0.007	0.003
	(0.024)	(0.024)
Switcher * PostSwitch	0.099***	0.040
* Δ Miller	(0.033)	(0.030)
Fixed effects	Firm & Year	Firm & Year
Observations	30,425	29,434
Adjusted R2	0.698	0.705

A Taxes and Capital Structure: A Theoretical Framework

Consider a firm with perpetual risk-free debt of D as of $t = 0$. The firm produces deterministic operating profits of X per period in perpetuity, starting in period $t = 1$. The risk-free rate is $r > 0$. Interest is tax deductible, so the firm's after-tax profit in each period is $(X - rD)(1 - \tau_C)$. The firm pays all of its after-tax profits in each period to shareholders in the form of a dividend. Shareholders' after-tax cash flow in each period then equals $(X - rD)(1 - \tau_C)(1 - \tau_E)$. The present value of this risk-free cash flow stream is:

$$V = \frac{(X - rD)(1 - \tau_C)(1 - \tau_E)}{r(1 - \tau_D)}. \tag{5}$$

Now suppose that, at $t = 0$, the firm recapitalizes by borrowing an additional amount ΔD at the risk-free rate and immediately paying out the proceeds to shareholders as a dividend, and then maintains its new debt level, $D + \Delta D$, in perpetuity. Shareholders receive an after-tax cash flow of $\Delta D(1 - \tau_E)$ at $t = 0$ and an after-tax perpetuity beginning in period $t = 1$ of $[X - r(D + \Delta D)](1 - \tau_C)(1 - \tau_E)$. The present value of these cash flows is now:

$$V' = \Delta D(1 - \tau_E) + \frac{[X - r(D + \Delta D)](1 - \tau_C)(1 - \tau_E)}{r(1 - \tau_D)}. \tag{6}$$

The present value of the tax savings due to this recapitalization is:

$$\Delta V = V' - V = \Delta D \left[(1 - \tau_E) - \frac{(1 - \tau_C)(1 - \tau_E)}{1 - \tau_D}\right]. \tag{7}$$

Absent tax-driven adjustment costs, the first term in the brackets in (7) is 1 instead of $1 - \tau_E$, and the entire term in the brackets becomes Miller's (1977) familiar measure of the tax advantage of debt relative to equity per dollar of corporate income, $1 - \frac{(1-\tau_C)(1-\tau_E)}{1-\tau_D}$. The taxation of dividends in a recapitalization then reduces the benefit of increasing leverage. The expression in (7) simplifies slightly to:

$$\Delta V = \Delta D \times \frac{(1 - \tau_E)(\tau_C - \tau_D)}{1 - \tau_D}. \tag{8}$$

Now consider the effect of an increase in the dividend tax rate on the tax benefit of additional debt:

$$\frac{\partial \Delta V}{\partial \tau_E} = \Delta D \times \frac{\tau_D - \tau_C}{1 - \tau_D}. \tag{9}$$

This effect is smaller than the effect ignoring the taxation of dividends in a recapitalization, $\Delta D \times \frac{1-\tau_C}{1-\tau_D}$. Indeed, the sign of $\frac{\partial \Delta V}{\partial \tau_E}$ is ambiguous.

This analysis implies that the need to pay taxes on dividends to increase leverage may cause firms to adjust capital structure slowly or not at all in response to an increase in the

tax on dividends. Whether a firm needs to pay dividends to increase leverage depends on whether it relies on internal or external capital to finance investment. If a firm relies on internal capital, then increasing leverage requires replacing equity with debt, which requires a payout to shareholders. On the other hand, a firm that relies on external financing can increase leverage by simply tilting its issuance towards debt, with no need to pay out to shareholders.

It should be noted that the above analysis assumes that all shareholders face the same marginal tax rates, which ignores the fact that some investors, such as pension funds, are exempt from taxation. The taxation of distributions in a leveraged recapitalization only affects taxable shareholders, so there will be a conflict between the interests of the taxable and tax-exempt investors, who would prefer an immediate increase in leverage if the dividend tax rate increases. The analysis also focuses on dividends rather than repurchases as a means of paying out capital to shareholders. While τ_E could, in principle, represent the tax rate on repurchases as well, firms in Europe during our sample period pay out capital almost exclusively through dividends.

B Variable Definitions

Variable	Definition
Financing variables:	
Book Leverage	Total debt divided by book capital.
Market Leverage	Total debt divided by market capital.
Total debt	Book value of short-term and long-term interest-bearing debt.
Book capital	Book value of common equity plus the book value of preferred stock plus total debt.
Market capital	Market value of common equity plus the book value of preferred stock plus total debt.
Equity issues	Cash flow from the sale of common stock less cash spent on the repurchase of common stock, divided by total assets.
Debt issues	Net cash flow from the sale and redemption of long- and short-term debt divided by total assets.
Equity Issues/Total Issues	Equity issues divided by the sum of equity and debt issues if the sum is positive.
Dividends	Total dividends divided by total assets.
Other firm variables:	
Log(Assets)	Natural logarithm of total assets.
MarketToBook	Market value of the firm divided by total assets.
Tangibility	Fixed assets divided by total assets.
EBIT	Sales minus cost of goods sold, SG&A expense, and depreciation/amortization, divided by total assets.
EBITDA	Sales minus cost of goods sold and SG&A expense divided by total assets.
Capital Expenditure	Capital expenditure divided by total assets.
Tax and tax system variables:	
Miller	$\left[1 - \frac{(1-CorporateTaxRate)\times(1-DividendTaxRate)}{(1-InterestTaxRate)}\right]$
Corporate Tax Rate (CTR)	Top statutory tax rate on corporate profits.
Interest Tax Rate (ITR)	Top statutory personal tax rates on interest income.
Dividend Tax Rate (DTR)	Top statutory tax rate on dividend income to resident shareholders, adjusted for allowance
Exemption	Fraction of dividends exempt from taxation
FC	Fraction of corporate profits for which shareholders can receive a franking credit under an imputation system (equal to zero in a classical system).
Switcher	Indicator variable equal to one for countries that switch from imputation to classical systems during the sample period and zero otherwise.
PostSwitch	Indicator variable equal to one in the post-switch period and zero in the pre-switch period.